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Participants'Sourcebook

Africa Regional Environmental Assessment Training Course
USAID/Tanzania Partners

AFRICAN WILDLIFE FOUNDATION

USAID

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EPIQ

We would like to acknowledge the many individuals and institutions that assisted in the design of this course. Eric Loken and Rich Tobin helped to conceive this training concept and supported it through their respective offices at REDSO/ESA and the Environmental and Natural Resources Policy and Training Project (EPAT). Walter Knausenberger, of USAID Africa Bureau's Division of Productive Sector Growth and the Environment (AFR/SD/PSGE), played essential coordination and cross-fertilization roles, providing many of the materials that shaped the course. John Gaudet, also of AFR/SD/PSGE, provided many comments and insights. Idrissa Samba's considerable experience and wisdom could not have been brought to the course without the support of the REDSO/WCA office and Wayne Macdonald. As REDSO/ESA's Environmental Advisor, Charlotte Bingham provided expert editing and technical contributions to the modules, significantly improving the quality of the sourcebooks with each re-drafting. She also proved to be our most dynamic presenter, particularly for the sessions on environmental assessment and environmental monitoring, evaluation and mitigation.

Significant organizational effort is required to set up and deliver this course in any setting: resource persons must be identified, field sites assessed, the course venue prepared, participants and presenters invited, transportation arranged, materials reviewed and reproduced, and many actors coordinated. Immeasurable thanks go to Oliver Chapeyama of the USAID Mission in Zimbabwe who undertook most of this effort to enable the pilot course in Kadoma, Zimbabwe to take place in July-August 1995, and to Robin Mason, who undertook similar efforts for the second course in Maputo, Mozambique. Thanks also go to the Zimbabwe and Mozambique USAID Missions for their support of the pilot activities.

In addition to Zimbabwe and Mozambique, to date the course has been given in Uganda, Tanzania, Madagascar, Senegal and Mali. Thus since its inception many other individuals and institutions have contributed ideas, documents, and other assistance. Key portions of the course are also being adapted for use in providing Environmental Assessment Training to U.S. P.L.480 Cooperating Sponsors engaged in Food for Development Activities. The first such course was presented in Ethiopia, and additional courses are now scheduled for Ghana in December 1997 and Cape Verde in the Spring of 1998.

Peter Croal of the Canadian International Development Agency and Patrice LeBlanc of the Canadian Federal Environmental Assessment Review Office followed the development of this course and supplied a number of very useful supporting documents. The US Environmental Protection Agency provided copies of its Environmental Assessment course materials, which proved very useful. The Centre for Our Common Future is gratefully acknowledged for allowing reproduction of sections of its layperson's version of Agenda 21.

Wes Fisher and Michael Lazarus
October, 1999

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List of Acronyms

ADB	African Development Bank
DFA	Development Fund for Africa
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMEMP	Environmental Monitoring, Evaluation, and Mitigation plan (or program)
ESA	Eastern and Southern Africa
FAA	Foreign Assistance Act
GIS	Geographic Information System
ICDP	Integrated Conservation and Development Project
IEE	Initial Environmental Examination
LOP	Life of Project
M&E	Monitoring and Evaluation
MEO	Mission Environmental Officer (USAID)
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
NPA	Nonproject Assistance
NRM	Natural Resources Management
PAAD	Program Assistance Approval Document
PEA	Programmatic Environmental Assessment
PSA	Pesticide Sector Assessment
PVO	Private Voluntary Organization
REDSO	Regional Economic Development Support Office (USAID)
REO	Regional Environmental Officer (USAID)
RFP	Request for Proposals
SD/PSGE	Office of Sustainable Development/Division of Productive Sector Growth and the Environment (USAID)
SO	Strategic Objective
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WCA	West and Central Africa
WRI	World Resources Institute
WWF	World Wildlife Fund

Course Program

COURSE PROGRAM AND OBJECTIVES

Course Objectives

The Africa Regional Environmental Assessment Training has four primary objectives, assisting PVOs, NGOs, USAID Missions, contractors, host governments and other entities to:

1) Design and implement environmentally-sound activities. This is the overriding goal of the course, as well as of the environmental methods and procedures that will be taught. The course will help participants develop deeper understanding and awareness of how environmental concerns can affect the sustainability of development programs and activities, and thus to appreciate the role for environmental assessment, monitoring and evaluation.

2) Identify and assess reasonably foreseeable environmental impacts. The course will familiarize participants with the basic principles and practice of environmental assessment, and provide them with practical experience in the application of simple assessment tools and approaches.

3) Mitigate, monitor, and thereby avoid unnecessary adverse environmental impacts. USAID's *Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Humanitarian and Development Activities* and other reference materials will be introduced to participants for use in identifying options to minimize negative environmental impacts.

4) Follow USAID procedures in the context of evolving local policies and needs, using local expertise where possible to do so, and thereby avoiding unnecessary delays in project approval and implementation.

The bulk of USAID projects in Africa require only an Initial Environmental Examination, with follow-up reviews and monitoring arrangements, rather than more sophisticated Environmental Impact Assessments and detailed Environmental Mitigation, Evaluation, and Monitoring Plans. For some larger USAID "umbrella projects", it is likely that an "umbrella-type IEE" will have already been prepared. In such cases, specific grants or sub-grants will not require a full IEE, but rather a more brief environmental review or screening of the specific, proposed activities.

Therefore, the course will focus on developing participants' capability to: a) prepare an environmental review and relevant supporting material; and b) designing a mitigation, monitoring and evaluation process for activity components with potential negative impacts. While participants will gain knowledge of the other procedural requirements of Reg.16 and the logical progression of required documentation and analysis, less emphasis will be placed on more complex environmental procedures and documents.

The course relies heavily on case studies and participant working group exercises to achieve these objectives.

USAID Tanzania
Environmental Assessment Training Course – October 4-8, 1999
Sopa Lodge, Tarangire National Park, Tanzania
Agenda

Sun Oct 3	***Arrival and Registration***
4:00-6:00	Registration and Distribution of Course Materials
Mon Oct 4	***Introduction, Why EIA?, Environmentally-Sound Design, Basic Concepts, Environmental/Natural Resource Issues, Host Country EIA & USAID Procedures***
8:00	Opening Statement
8:15-9:15	Participant Introductions, Presentation of Course Agenda, Solicitation of Group Goals and Expectations, Housekeeping *(Module 1)*
9:15-10:15	Why Assess Environmental Impacts? The Big Picture *(Module 3)*
10:15-10:45	***Break***
10:45-11:30	Environmentally-Sound Design and Implementation *(Module 4)*
11:30-12:30	Assessing Environmental Impacts: Basic Concepts *(Module 7)*
12:30-1:30	***Lunch***
1:30-2:30	Environmental/Natural Resource Issues, Policies and Information Sources – Dr. Raphael Mwalyosi, Institute of Resource Assessment, University of Dar es Salaam *(Module 8)*
2:30-3:00	Awareness of Host Country Environmental Issues – Paul Mtoni, National Environmental Management Council of Tanzania *(Module 8)*
3:00-3:30	Assessing Environmental Impacts (continued)
3:30-3:45	***Break***
3:45-4:30	Overview of USAID Environmental Procedures – A Tiered Environmental Process (*Module 9)*
4:30-5:00	Environmental Screening and Review for Small-Scale Activities *(Module 11)*
6:00	Facilitators' Meeting
7:00	Social Hour around the Pool ***Participants: Please Read Case Site Study Descriptions in Module 14, as you will need to sign up for case site trips on Tuesday***
Tues Oct 5	***Environmental Screening & Review, EA Tools & Methods, Role Play, Field Trip Preparation***
8:00-8:45	Environmental Screening and Review for Small-Scale Activities *(Module 11)*
8:45-10:15	Work Group Exercise: Using the Environmental Screening Process
10:15-10:30	***Break***
10:30-11:00	Plenary: Work Groups Panel Report on Initial Screening Exercise
11:00-12:00	Simple Tools and Methods for Environmental Assessment *(Module 10)*
12:00-12:30	Public Participation and Consultation: Explanation and Assignments for Role Playing Exercise *(Module 12)*
12:30-1:30	***Lunch: Start Role Play Preparation – Meet and Eat as a Stakeholder Group***
1:30-2:15	Stakeholder Groups: Preparation for Role Play
2:15-3:15	The Great Debate
3:15-3:30	The Outcome (An Environmental Review and a Decision)
3:30-3:45	***Break (sign up for case studies)***
3:45-4:15	Introduction to Mitigation and Monitoring *(Module 13)*
4:15-4:45	General Instructions/Preparations for Field Trip Activities *(Module 14)*
4:45-5:45	The Agro-Ecological and Socio-Cultural Setting
6:00-7:00	Facilitators' Meeting
Evening	Case Study Working Groups Meet to Form Interdisciplinary Teams and Assign Responsibilities for October 6 Field Trip

Wed Oct 6	*Case Study Field Trip*
8:00	Assemble and depart for Ngoley Primary School Improvement and Water Development *(Module 14)*
8:15	Assemble and depart for Kuro Ranger Post Relocation and/or Rehabilitation *(Module 14)*
8:30	Assemble and depart for: Tarangire National Park Visitor Center *(Module 14)* Tarangire Hill Road Improvement and Special Camp Site *(Module 14)* ***Box Lunch***
5:00	Return to Sopa Lodge (Case Study Teams must depart so as to arrive Sopa Lodge no later than 5:00 pm)
6:30	Facilitators' Meeting

Thurs Oct 7	*Drafting Environmental Reviews, Presentations, Mitigation and Monitoring*
8:00-8:30	Plenary: Field Trip Anecdotes (No more than 5 minutes per group)
8:30-9:15	Writing the Environmental Review: Instructions to Teams *(Module 14)*
9:15-12:30	Case Study Teams: Draft Environmental Reviews, Sections 1 through 4 (including ***Break 10:15-10:30)***
12:30-1:30	***Lunch***
1:30-3:30	Plenary: Case Study Teams Present Environmental Reviews
3:30-3:45	***Break***
3:45-4:00	Discussion of Environmental Reviews
4:00-5:00	Mitigation & Monitoring (More on Issues and Methods) *(Module 13)*
Evening	Case Study Teams: Begin Drafting Mitigation & Monitoring Plans, Section 5 of Environmental Review
6:30	Facilitators' Meeting

Fri Oct 8	*Drafting Mitigation & Monitoring Plans, Presentations, Full EA, EIA Capacity Building, Course Evaluation and Award of Certificates*
8:00-8:15	Announcements
8:15-10:15	Case Study Teams: Continue Drafting Mitigation & Monitoring Plans, Section 5 of Environmental Review
10:15-10:30	***Break***
10:30-12:30	Plenary: Case Study Teams Present Mitigation & Monitoring Plans
12:30-1:30	***Lunch***
1:30-2:00	Special Issues – Pesticides, Water Quality Monitoring & Biosafety *(Module 16)*
2:00-2:30	Going Beyond an Environmental Review: When to Do and What is a Full EA? *(Module 15)*
2:30-3:15	Plenary: Capacity Building for EIA *(Module 17)*
3:15-3:30	Course Evaluation Forms *(Module 18)*
3:30-3:45	***Break (finish course evaluation forms)***
3:45-4:00	Discussion of Course and Recommendations for Follow-up Activities
4:00-4:45	Closing and Award of Certificates

COURSE MODULES

Module 1

1. Introductory Session

The introductory session will cover the following topics:

- Opening Statements (see Course Program)
- Overview of Course Program and Objectives (Facilitators)
- Participant Introductions: Be prepared to describe yourself briefly in one minute or less, noting your professional background, institutional affiliation, and experience with environmental assessment.
- Facilitator and Resource Person Introductions
- Discussion of Group Goals for the Week (Group)
- Logistical Details (Course Organizers) Finally, the course organizers will briefly explain important logistical considerations related to the course venue and the week's activities.

Notes for Participants (adapted from Jawara Lumumba and John Petit, REDSO/WCA, 1995)

The following tips for participants are useful in maximizing the success of the course:

1. Participate actively.
2. Ask questions.
3. Respect different points of view.
4. Share many thoughts & ideas.
5. Build upon the ideas presented by others.
6. Join in problem-solving.
7. Make "I" statements.
8. Abide by confidentiality.
9. Have fun!

Notes on Working Groups

The working groups comprise the core of the course. The purposes of the working group sessions include:

1. To conduct group/team work exercise;
2. To provide the opportunity for detailed discussions among participants in small groups;
3. To gather up lessons learned, innovative experience, country experiences and other information cost-effectively; and,
4. To conclude with a series of specific findings and suggestions to improve the design, implementation and monitoring of projects, programs and other development activities.

Working Group Chairs

For working group sessions, the chair is a neutral servant of the group. The chair can be a course facilitator or participant. The chair should not evaluate the ideas or contributions of others, but try to focus the energy of the group on the common task. The chair should protect individuals and their ideas from attack and encourage participation. It is the chair's role to orchestrate and assist the group to function creatively, energetically, democratically and productively in the time allotted.

The chair must manage time to assure that the tasks the group is assigned are accomplished. When appropriate, the chair tries to achieve agreement or consensus on recommendations. (Consensus is not required for these sessions.) If agreement is lacking, areas of convergence and divergence may be reported.

During the working group

- Assemble the group in the assigned location and set a climate for open discussion,

e.g., welcome the group; say something to help them be comfortable.

- Open the session. Introduce yourself. Identify the topic to be discussed and link it to previous or upcoming sessions. Set the ground rules. Keep these remarks brief-not more than two or three minutes.
- Clarify your role to the group. Tell them you may make periodic interventions to help move things along, keep the group focused on the assigned objective, assure that everyone gets to participate and that no one dominates. Tell them you may raise questions of clarity and encourage full use of the resources in the room.
- Introduce the rapporteur and clarify her/his role: to capture key points on the flip chart to assist them in their discussion and also to assist with the reporting out.
- Assure the group task and the expected results are clear. State how much time is available and how you plan to allocate it. Then invite discussion.
- Manage the time. Allocate time for various parts of the task (e.g. brainstorming, discussion, synthesis). Ask the rapporteur or a participant to help keep the group on time.
- Manage the task. Keep discussion focused on the objective of the session. Encourage broad participation (limit overactive participation) and keep discussion moving. Point out areas of consensus. Note unresolved questions, information needed or assumptions made. If useful, break into sub-groups and assign sub-groups or individual participants the responsibility for writing or synthesizing. Press for decisions. Ensure that decisions are recorded for sharing in large group sessions and that minority views are recognized.
- In general, the chairs are responsible for maintaining pace, diversity and relevance. Every effort should be made to encourage participation by all members of the group. On the other hand, the chair should ensure that the discussion does not diverge from the overall objectives of the conference and the theme under discussion.
- Make sure recommendations or initial work plans are clear. For example, recommendations should say <u>who</u> is to do <u>what</u> and <u>when</u>.
- Toward the end of the discussion time be sure to allow a wrap-up summary period.
- Have the group designate the person reporting to the general session, which can but does not need to be the rapporteur. Give the rapporteur (and presenter, if separate) time to summarize and clarify important points, assist in preparations for reporting out the group's deliberations. The presentations should generally be 5-15 minutes in length; this should be clarified with the course facilitators in relation to each working group session.
- Thank everyone for their participation when the time is up. Make sure they know where they are to go next, i.e., to the main room, lunch, or whatever.
- Close the session by making a brief summary statement. Thank the participants. Reconfirm who will present the group's work. If further meetings is planned, clarify where and when. Making announcements regarding the next session and the time it begins.

<u>After the working group</u>

- Assist the rapporteur/presenter in the synthesis of key points to be reported.

- Follow up to be sure participants carry through on assigned tasks. Assist them, if necessary.

Notes for Rapporteurs

The rapporteur is responsible for accurately and succinctly reporting the results of group discussion. Specific responsibilities include:

- Assure flip chart paper, markers and tape are available in the small group meeting room and that chairs are arranged. Organizers can make an effort to have this done, but please check to assure it is done with enough advance time to find an administrative staff person to assist you in getting it set up if it is not.
- Position yourself near the flip chart and capture important points.
- Use your judgment about how best to assist the group by recording during the session. Publicly recording important points made during the discussion helps the group know visually what it has covered and provides a visual memory of the proceedings. It can assist in clarifying points; it allows participants to correct statements that inaccurately reflect their views. If people are having a hard time getting into conversation, you may record a few key phrases and then ask questions about them to promote discussion. Or, if someone seems intent on making a point more than once (even if it seems unimportant to you), you can write it down and then refer back to it as having been said and ask someone else for additional points.
- The rapporteur will be responsible for capturing all key points related to the specific theme, and noting comments on cross-cutting themes as appropriate. Recording notes on a flip chart will help participants respond to points made and remind them of what has been said.
- Record highlights of what is said on a flip chart. However, in order not to slow people down by recording points they are making: use phrases (using their words) rather than complete sentences.
- Make sure notes and charts are legible, understandable, and turned in to a facilitator (after reporting out).

TWELVE ESSENTIALS OF TEAMWORK

(Adapted from Rees, "How to lead work teams in facilitation skills")

VALUING DIVERSITY	COMFORTABLE ATMOSPHERE	ACTIVE PARTICIPATION OF ALL MEMBERS	SHARED GOALS AND OBJECTIVES
BALANCED APPROACH TO PROCESS AND CONTENT	**WHAT EFFECTIVE TEAMS NEED**		EFFECTIVE COMMUNICATION
SHARED LEADERSHIP			CONSTRUCTIVE CONFLICT MANAGEMENT
ACTION ACCOUNTABILITY RESPONSIBILITY	MUTUAL TRUST	CRITICAL ANALYSIS AND PROBLEM-SOLVING	CONSENSUS DECISION-MAKING PREFERENCE

Module 2

2. Environment, Development and Sustainability: Global and Regional Issues

Description/Objectives

Should you be concerned about global warming? Who benefits from biodiversity? How can international rivers and water bodies be managed to ensure adequate supply and quality for all?

This module introduces the broad trends and issues affecting the environment globally, regionally, and locally. These issues help to shape donor policy, national strategies, and the overall setting in which projects and programs are developed and implemented. You are encouraged to reflect upon on your perspective on these issues, and how they might affect the projects you work on.

Readings

Module Backgrounder

In Appendix C: Keating, M. 1993. *Agenda for Change*: *A plain language version of Agenda 21 and the other Rio Agreements*, Centre for Our Common Future, Geneva. pp. vi-34.

In Appendix C: "Global and Cross-Sectoral Issues in Environmental Review", excerpts from World Bank, 1991, *in Appendix C*.

Module 3

3. Why Assess Environmental Impacts? The Big Picture

Description/Objectives

Why is environmental impact assessment important? Why do it? This module traces the history of interest and concern for environmental protection, both in the U.S., globally and in Africa and explores the rationale for carrying out environmental assessment as a tool for sustainable management of the environment and the natural resource base.

Note from the editors: Because this report was too long to include in one issue, we are printing it in two parts. Part 1, *The Concept of Sustainability*, appears below. Part 2, dealing with the power sector, will appear in the Winter 1994 issue of ***Impact Assessment***.

ENVIRONMENTAL SUSTAINABILITY AND THE POWER SECTOR

Robert Goodland[1]

PART 1: THE CONCEPT OF SUSTAINABILITY

Ever since Prime Minister Brundtland achieved the brilliant feat of garnering almost worldwide political consensus on the urgent need for sustainability,[2] countries and agencies have been grappling with the problem of defining sustainability. Precisely what is sustainability, and specifically what does it mean for this sector or that region? First, let us start with what sustainability is not. Sustainability (ES) is not pornography! Detractors claim sustainability is like pornography: "You'll know it when you see it." Sustainability must not become a landfill dump for everyone's environmental and

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[1] Robert Goodland is with the World Bank in Washington DC (fax: 202-477-0565; internet: rgoodland@worldbank.org). This paper is adapted from a longer one originally presented at the Hydro-Quebec conference on sustainable development in September 1994. A chapter, co-authored with Herman Daly, on the concepts covered in Part 1 will be included in *Environmental and Social Impact Assessment*, to be published by John Wiley (UK) in 1995. The opinions in this paper should in no way be construed as the official position of the World Bank Group.

The author wishes to acknowledge the massive help throughout this paper of Herman Daly, the world's leading theoretician on the concept of sustainability.

[2] The Honorable Mrs. Gro Harlem Brundtland, prime minister of Norway, chaired the UN's World Commission on Environment and Development. She is listed as primary author of the 1987 report, *Our Common Future*, generally referred to as "the Bruntdland report."

social wish-lists. Detractors are terrified of defining ES precisely because they know it would change their behavior, so they pursue two evasive actions. They load all desiderata—such as freedom, democracy, gender balance, equality, equity—onto the sustainability bandwagon. And then they refuse to define ES; keep it fuzzy and interpretive, they say, or keep it pornographic.

Some detractors even claim sustainability cannot be defined or made operational. They keep the concept trite and insipid precisely so that it will not cause specific action. This paper does the opposite. Environmental sustainability is tightly defined (below) and the rigorous scientific principles on which it is based are listed.

This paper focuses on the definition of environmental sustainability (ES), partly by distinguishing ES from social sustainability and from economic sustainability. The challenge to social scientists is to produce their own definition of social sustainability, rather than load a social wish-list on to the definition of ES. Similarly with economic sustainability; let economists define it or use previous definitions of economic sustainability. The three types of sustainability—social, environmental, and economic—are clearest when kept separate. They are contrasted in Figures 1 and 2.

While there is overlap between the three, and certainly linkages, the three are best disaggregated and addressed separately by different disciplines. The disciplines best able to analyze each type of sustainability are different; each follows different laws and methods. It is not clarifying to heap all priorities on to a single type of sustainability.

Social Sustainability

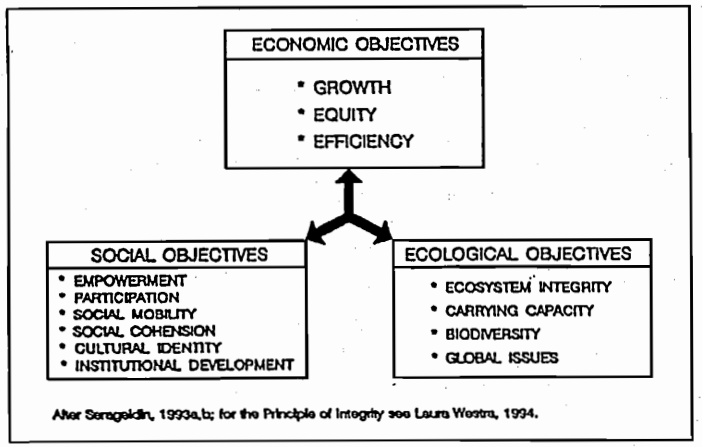
Elimination of poverty is arguably the paramount goal of humanity. Poverty reduction is the main goal of social sustainability. Poverty is increasing in the world despite economic growth (see below). Growth has so far failed to alleviate poverty. Poverty reduction has to come more from qualitative development, rather than from trickle-down quantitative growth, from redistribution and sharing, and from population stability. Politicians doubtless want the impossible goal of growth—increasing consumption by all. Countries truly sustaining themselves, rather than liquidating their resources, will be more peaceful than unsustainable countries.

Figure 1. **Comparison of social, economic, and environmental sustainability**

Social Sustainability ("SS")	Economic Sustainability ("EcS")	Environmental Sustainability ("ES")
ES needs SS—the social scaffolding of people's organizations that empower self-control and self-policing in peoples' management of natural resources (see Cernea, 1993). Resources should be used in ways which increase equity and social justice, while reducing social disruptions. SS will emphasize qualitative improvement over quantitative growth; and cradle-to-grave pricing to cover full costs, especially social. SS will be achieved only by strong and systematic community participation or civil society. Social cohesion, cultural identity, sodality, sense of community, fellowship, fraternity, institutions, love, conviviality, commonly accepted standards of honesty, laws, discipline, etc., constitute the part of social capital that is least subject to measurement, but probably most important for SS. This "moral capital," as some have called it, requires maintenance and replenishment by the religious and cultural life of the community. Without this care it will depreciate just as surely as will physical capital.	The widely accepted definition of economic sustainability is *maintenance of capital*, or keeping capital intact, and has been used by accountants since the Middle Ages to enable merchant traders to know how much of their sales receipts they and their families could consume. Thus the modern definition of income (Hicks, 1946) is already sustainable. But of the four forms of capital (human-made, natural, social, and human) economists have scarcely at all been concerned with natural capital (e.g., intact forests, healthy air) because until relatively recently it had not been scarce. Also economics prefers to value things in money terms, so it is having major problems valuing natural capital, intangible, intergenerational, and especially common access resources, such as air, etc. In addition, environmental costs used to be "externalized," but are now starting to be internalized through sound environmental policies and valuation techniques. Because people and irreversibles are at stake, economics has to use anticipation and the precautionary principle routinely, and should err on the side of caution in the face of uncertainty and risk. Human capital (investments in education, health, and nutrition of individuals is now accepted in the economic lifestyle, but social capital, as used in SS, is not adequately addressed.	Although environmental sustainability is needed by humans and originated because of social concerns, ES itself seeks to improve human welfare by protecting the sources of raw materials used for human needs and ensuring that the sinks for human wastes are not exceeded, in order to prevent harm to humans. Humanity must learn to live within the limitations of the physical environment, both as a provider of inputs (*sources*) and as a *sink* for wastes (Serageldin, 1993). This translates into holding waste emissions within the assimilative capacity of the environment without impairing it, also by keeping harvest rates of renewables to within regeneration rates. Quasi-ES can be approached for nonrenewables by holding depletion rates equal to the rate at which renewable substitutes can be created (El Serafy, 1991).

Unsustainable economies, those expanding their consumption and dependence on resources in other countries (e.g., Middle East oil) or belonging to humankind in general (e.g., atmospheric capacity to absorb carbon dioxide) are more likely to wage war than are sustainable economies (Goodland, 1994). Peace needs work; it is not automatic. The poor, vulnerable minorities (e.g., Canada's First Nation) and all project-affected people need the best efforts to alleviate their poverty, and empower them to democratically enact rules for the common good and ensure that the project benefits them. Fundamental though social sustainability is, that part of sustainability is not here amplified further. The rest of this paper refers instead to environmental sustainability.

Figure 2. The three goals of economic development



SUSTAINABILITY AND DEVELOPMENT

When environmental sustainability is the goal, sustainable development can be part of the means to approach that goal. We define sustainable development as "development without growth beyond environmental carrying

capacity."[3] Our definition of ES thus hinges on distinguishing between growth and development as we do in Figure 3. According to Boutros-Ghali (1994), development is a "fundamental human right" which requires, among other things, democracy and good governance. "Economic growth is the engine of development. . . sustained economic growth."[4]

Recent emphases on social development, economic development, development with equity, and development and basic needs suggests that the word "development" could become so vague as to require a sanctifying adjective. These terms should be carefully distinguished and defined by those who use t, but that is a challenge for development specialists, not for environmentalists. The priorities of development are the reduction of poverty, illiteracy, hunger, and disease. While these goals are fundamentally important, they are quite different from the goals of environmental sustainability, namely maintaining human life support system—environmental sink and source capacities—unimpaired. But "environmental sustainability" is legitimized by the latest pronouncement on economic development (Boutros-Ghali, 1994).

The tacit goal of economic development is to narrow the equity gap between the rich and the poor. Almost always this is taken to mean raising the bottom (i.e., enriching the poor), rather than lowering the top or redistribution (Haavelmo and Hansen, 1992). Only very recently has it acknowledged that bringing the low-income countries up to the affluence levels in OECD countries, in 40 or even 100 years, is a totally unrealistic goal, although politicians and most citizens have not yet accepted the unrealistic nature of this goal.

[3] Or development without growth in throughput of matter and energy beyond regenerative and absorptive capacities. Daily and Ehrlich (1992) explicate "carrying capacity" (CC) in the most effective way. Ecologist's definition of CC is: "the maximal population size of a given species that an area can support without reducing its ability to support the same species in the future." But for humans, CC must be disaggregated into Biophysical CC and Social CC, very parallel to the distinction of SS and ES.

[4] This definition does not distinguish between the different concepts of growth and development (Figure 3). While development can and should go on indefinitely for all nations, throughput growth cannot. Sustainability will be achieved only when development supplants growth. Acknowledging the finite nature of our planet, "sustainable growth" is an bad oxymoron (Daly, 1991).

Yet the importance of sustainability has become paramount partly because the world is starting to recognize that current patterns of economic development are not generalizable. Present patterns of OECD *per capita* resource consumption and pollution cannot possibly be generalized to all currently living people, much less to future generations, without liquidating the natural capital on which future economic activity depends. Sustainability thus arose from the recognition that the profligate and inequitable nature of current patterns of development, when projected into the not-too-distant future, lead to biophysical impossibilities.

The transition to sustainability is urgent because the deterioration of global life-support systems—the environment—imposes a time limit. We do not have time to dream of creating more living space or more environment, such as colonizing the moon or building cities beneath the sea; we must save the remnants of the only environment we have, allowing time for and investing in the regeneration of what we have already damaged.

Figure 3. Growth compared with development

To grow *means to increase in size by the assimilation or accretion of materials.*

To develop *means to expand or realize the potentialities of; to bring to a fuller, greater or better state.*

Note: The distinction between these definitions is useful in conceptualizing sustainability, in that development is sustainable and throughput growth is not. In fact, "sustainable growth" is an oxymoron. This is unrelated to the unhelpful "development vs environment" perception of a policy tradeoff. True, growth refers to added value, but sustainability demands that we disaggregate the part of value-added increase that is due to quantity change (throughput) and the part that is due to qualitative improvement.

GROWTH COMPARED WITH DEVELOPMENT

When something grows it gets quantitatively bigger; when it develops it get qualitatively better or at least different. Growth is a physical or material and quantitative expansion; development is qualitative improvement. Quantitative growth and qualitative improvement follow different laws. Our planet develops over time without growing. Our economy, a subsystem of the finite and nongrowing earth, must eventually adapt to a similar pattern of development without throughput growth. The time for such adaption is now.

It is neither ethical nor helpful to the environment to expect the poor to cut or arrest their development, which tends to be highly associated with throughput growth. Poor, small, developing communities need both growth and development. Therefore, the rich communities, which are responsible for most of today's environmental damage and whose material well-being can sustain halting or even reversing throughput growth, must take the lead in this respect. Poverty reduction will require considerable growth, as well as development. But global environmental constraints (atmospheric CO_2 accumulation, ozone shield damage, acid rain, etc.) are real, and if environmental sustainability is to be achieverd, more growth for the poor must be balanced by negative throughput growth for the rich.

NATURAL CAPITAL AND SUSTAINABILITY

Intergenerational and Intragenerational Sustainability

Sustainability in economic terms can be described as the "maintenance of capital," sometimes phrased as "nondeclining capital." Historically, at least as early as the Middle Ages, merchant traders used the word "capital" to refer to human-made capital. The merchants wanted to know how much of their receipts from trading ship cargo sales could be consumed by their families without depleting their capital. Economics Nobelist Sir John Hicks encapsulated the sustainability concept in 1946 when he defined income as "the amount (whether natural or financial capital) one could consume during a period and still be as well off at the end of the period."

Today's OECD societies have already impoverished much of the world. Most people in the world today are living in poverty or barely above subsistence and can, by no stretch of the imagination, ever be as well off as the

OECD average. And it seems likely that future generations will be more numerous and poorer than today's generation. Sustainability indeed has an element of not harming the future (intergenerational equity). But addressing only the future diverts attention from today's lack of sustainability (intragenerational equity). If the world cannot move toward intragenerational sustainability for this generation, it will be much more difficult to achieve intergenerational sustainability in the future.

This is partly because the world is hurtling away from ES today; environmental source and sink capacities are being impaired. This means the capacity of these environmental services will be lower in the future than they are today. The second reason for tackling intragenerational sustainability first is that world population soars by 100 million new souls each year, some of them born to be OECD over-consumers, but most of them born into poverty. And achieving intergenerational equity is more difficult for each year that has a bigger human generation.

Of the various forms of capital, *environmental sustainability* refers to natural capital. So defining environmental sustainability includes at least two further terms, namely *natural capital* and *maintenance* (or at least nondeclining). Natural capital is basically our natural environment, and is defined as the stock of environmentally provided assets (such as soil, atmosphere, forests, fauna, water, wetlands) that provide a flow of useful goods or services. The flow of useful goods and services from natural capital can be renewable or nonrenewable, and marketed or nonmarketed. Sustainability means maintaining, or at least not depleting, environmental assets.

"Income" is sustainable by the generally accepted Hicksian definition of economics (Hicks, 1946), mentioned above. Any consumption that is based on the depletion of natural capital should not be counted as income. Prevailing models of economic analysis tend to treat consumption of natural capital as income, and therefore tend to promote patterns of economic activity that are unsustainable. Consumption of natural capital is liquidation, the opposite of capital accumulation.

Natural capital is distinguished from other forms of capital, namely human capital or social capital (people, their capacity levels, institutions, cultural

cohesion, education, information, knowledge)[5] and human-made capital (houses, roads, factories, ships). From the mercantilists until very recently capital referred to the form of capital in the shortest supply, namely human-made capital. Investments were made in the limiting factor, such as sawmills and fishing boats, because their natural capital complements -- forests and fish -- were abundant. That idyllic era has ended.

Now that the environment is so heavily used, the limiting factor for much economic development has become natural capital as much as human-made capital. In some cases, like marine fishing, natural capital has become the limiting factor. Fish have become limited, rather than fishing boats. Timber is limited by remaining forests, not by saw mills; petroleum is limited by geological deposits and atmospheric capacity to absorb CO_2, not by refining capacity.

As natural forests and fish populations become limiting factors, we begin to invest in plantation forests and fish ponds. This introduces an important hybrid category that combines natural and human-made capital—a category we may call "cultivated natural capital."[6] This category is vital to human well-being, accounting for most of the food we eat and a good deal of the wood and fibers we use. The fact that humanity has the capacity to "cultivate" natural capital dramatically expands the capacity of natural capital to deliver services. But utilities-cultivated natural capital (agriculture) is decomposable into human-made capital (e.g., tractors, diesel irrigation pumps, chemical fertilizers) and natural capital (e.g., topsoil, sunlight, water). Eventually the natural capital proves limiting.

[5] Human capital formation is, by convention, left out of the national accounts for various reasons—one of which is that, if it is truly productive, it will eventually be reflected, through enhanced productivity, in a higher GDP. Realization of the values of education and administration, for example, are lagged, and are conventionally assumed to be equal to their costs. If the loss of natural capital is not recorded, as is largely the case today, some time will elapse before before the loss is reflected in income and productivity measurements.

[6] The subcategory of marketed natural capital, intermediate between human capital and natural capital, is "cultivated natural capital" such as agriculture products, pond-bred fish, cattle herds, and plantation forests. These generally need more inputs (throughput of matter or energy) than the truly natural caapital that they imitate. For example, pond-bred fish need diesel, feed, tractors etc., the functions of which are provided free in the ocean.

Natural Capital Is Now Scarce

In an era in which natural capital was considered infinite relative to the scale of human use, it was reasonable not to deduct natural capital consumption from gross receipts in calculating income. That time is now past. The goal of environmental sustainability is thus the conservative effort to maintain the traditional meaning and measure of income in an era in which natural capital is no longer a free good, but is more and more the limiting factor in development. The difficulties in applying the concept arise mainly from operational problems of measurement and valuation of natural capital, as emphasized by Ahmad *et al.* (1989), Lutz (1993), El Serafy (1991, 1993), and Cobb and Cobb (1994).

Three Degrees of Environmental Sustainability

Sustainability can be divided into three degrees—weak, strong, and absurdly strong—depending on how much substitution one thinks there is among types of capital (Daly and Cobb, 1994). We recognize that there are at least four kinds of capital: human-made capital (the one usually considered in financial and economic accounts), natural capital (as defined previously, and ignoring for the moment the case of cultivated natural capital), human capital (investments in education, health, and nutrition of individuals), and social capital (the institutional and cultural basis for a society to function).

Weak sustainability is maintaining total capital intact without regard to the composition of that capital between the different kinds of capital (natural, human-made, social, or human). This implies that the different kinds of capital are perfect substitutes, at least within the boundaries of current levels of economic activity and resource endowment. Given current gross inefficiencies in resource use, weak sustainability would be a vast improvement as a welcome first step, but would by no means constitute ES. According to this tenet, if we adopted a policy of weak sustainability, we could convert all or most of the world's natural capital into human-made capital or artifacts and still be as well off. (Human and social capital are largely lost at death so must be renewed each generation.) The author, however, disagrees; society would be worse off (fewer choices) because natural and human-made capital are not perfect substitutes. On the contrary, they are complements to a great extent.

Strong sustainability requires maintaining different kinds of capital intact separately. Thus for natural capital, receipts from depleting oil should be invested in ensuring that energy will be available to future generations at least as plentifully as enjoyed by the beneficiaries of today's oil consumption. This assumes that natural and human-made capital are not really substitutes but complements in most production functions. A saw-mill (human-made capital) is worthless without the complementary natural capital of a forest. The same logic would argue that if there are to be reductions in one kind of educational investments they should be offset by other kinds of education, not by investments in roads. Of the three degrees of sustainability, the author prefers strong sustainability.

Absurdly strong sustainability would never deplete anything. Nonrenewable resources—absurdly—could not be used at all. And with respect to renewables, only net annual growth rates could be harvested in the form of the overmature portion of the stock.

The decision between intermediate (weak) and strong sustainability highlights the tradeoffs between human-made capital and natural capital. Economic logic requires us to invest in the limiting factor which now is often natural capital rather than human-made capital (the limiting factor of yesteryear). Investing in natural capital (non-marketed) is essentially an infrastructure investment on a grand scale, that is, the biophysical infrastructure of the entire human niche. Investment in such "infra-infrastructure" maintains the productivity of all previous economic investments in human-made capital, public or private, by rebuilding the natural capital stocks that have come to be limitative. Operationally, this translates into three concrete actions as noted in Figure 4.

Criteria for Environmental Sustainability

From the above "maintenance of natural capital" approach to environmental sustainability (ES), we can draw practical rules-of-thumb to guide the design of economic development. As a first approximation, the design of investment strategies should be compared with the input/output rules of ES (Figure 5) in order to assess the extent to which a project is sustainable. At the next level of detail, specific indicators of environmental sustainability can be used, such as those the World Bank is preparing.

Figure 4. **Rebuilding natural capital stocks**

1. REGENERATION: Encouraging the growth of natural capital by reducing our level of current exploitation of it
2. RELIEVE PRESSURE: Investing in projects to relieve pressure on natural capital stocks by expanding cultivated natural capital, such as tree plantations to relieve pressure on natural forests
3. EFFICIENCY: Increasing the end-use efficiency of products (such as improved cookstoves, solar cookers, hay-box cookers, wind pumps, solar pumps, manure rather than chemical fertilizer)

The implications of implementing environmental sustainability are immense. We must learn how to manage the renewable resources for the long term; we have to reduce waste and pollution. In fact, because the capacity of natural systems to absorb our wastes is limited and cannot be expanded, sustainable societies will eliminate the concept of waste by optimizing the full life-cycle of products and processes. No "throwaways" will be permissible; recyclability and reparability will be integrated during manufacture; ephemeral fads and fashions will become errors of the past. We must learn how to use energy and materials with scrupulous efficiency; we must learn how to use solar energy in all its forms. And we must invest in repairing the damage, as much as possible, done to the earth in the past few decades by unthinking industrialization in many parts of the globe.

Environmental sustainability needs enabling conditions that are not integral parts of environmental sustainability—not only economic and social sustainability (Figures 1 and 2) but democracy, empowerment of women, human resource development, and much more investment in human capital than is common today (i.e., increased literacy, especially ecoliteracy (Orr, 1992)).

The sooner we start to approach environmental sustainability, the easier it will become. For example, the demographic transition took a century in Europe, but only a decade in Taiwan; technology and education make big differences. But the longer we delay, the worse the eventual quality of life

(e.g., fewer choices, fewer species, more damage, more risk) will be, especially for the poor who do not have the means to insulate themselves from the negative effects of environmental degradation.

Many writers have expressed concern that the world is hurtling away from environmental sustainability at present (Goodland, 1992; Simonis, 1990; Meadows *et al.*, 1992; Brown *et al.*, 1994; Brown and Kane, 1994; Hardin, 1993), although consensus has not yet been reached. But what is not contestable is that the current modes of production prevailing in most parts of the global economy are causing the exhaustion and dispersion of a one-time inheritance of natural capital, such as topsoil, groundwater, tropical forests, fisheries, and biodiversity. The rapid depletion of these essential resources, coupled with the degradation of land and atmospheric quality, show that the human economy, as currently configured, is already inflicting serious damage on global supporting ecosystems and is probably reducing future potential biophysical carrying capacities by depleting essential natural capital stocks (Daily and Ehrlich, 1992).

Yet, in spite of spending capital inheritance rather than just income, most of the world consumes at barely subsistence levels. Can humanity attain a more equitable standard of living that does not exceed the carrying capacity of the planet? The transition to environmental sustainability is inevitable. The question is whether nations will have the wisdom and foresight to plan for an orderly and equitable transition to environmental sustainability, or allow biophysical limits to dictate the timing and course of this transition.

It is obvious that if pollution and environmental degradation were to grow at the same rate as economic activity, or even population growth, the damage to ecological and human health would be appalling, and the growth itself would be undermined and even self-defeating. Fortunately, this is not necessary. A transition to sustainability is possible, although it will require changes in policies and the way we humans value things. The key to the improvement of the well-being of millions of people lies in the increase of the added value of output after properly netting out all the environmental costs and benefits and after differentiating between the stock and flow aspects of the use of natural resources. In our view, this is the key to sustainable development. Without this needed adjustment in thinking and measurement, the pursuit of economic growth that does not account for natural capital and counts depletion of natural capital as an income stream will not lead to a sustainable development path.

The global ecosystem, which is the source of all the resources needed for the economic subsystem, is finite and has now reached a stage where its regenerative and assimilative capacities have become very strained. It looks inevitable that the next century will witness double the number of people in the human economy, depleting sources and filling sinks with their increasing wastes. If we emphasize the latter, it is because human experience seems to indicate that we have tended to overestimate the environment's capacity to cope with our wastes, even more than we overestimated the "limitless" bounty of such resources as the fish in the sea.

BASIC CONDITIONS FOR ENVIRONMENTAL SUSTAINABILITY

The fundamental definition of environmental sustainability is the input/output rule shown in Figure 5.

Figure 5. **The Definition of Environmental Sustainability**

1. **OUTPUT RULE**
   Waste emissions from a project should be within the assimilative capacity of the local environment to absorb without unacceptable degradation of its future waste absorptive capacity or other important services.

2. **INPUT RULE**
   (a) **Renewables.** Harvest rates of renewable resource inputs would be within regenerative capacity of the natural system that generates them.

   (b) **Nonrenewables.** Depletion rates of nonrenewable resource inputs should be equal to the rate at which renewable substitutes are developed by human invention and investment. An easily calculable portion of the proceeds from liquidating nonrenewables should be allocated to research in pursuit of sustainable substitutes. *(For a theoretical development of this idea, see El Serafy, 1991, 1993.)*

Building on the economic definition of sustainability as "nondeclining wealth *per capita*," and as wealth is so difficult to measure, environmental sustainability is now defined by the two fundamental environmental services—the source and sink functions—that must be maintained unimpaired during the period over which sustainability is required. This general definition is robust and irrespective of country, sector, or epoch; that is why we call it universal and non-negotiable. Even so, it can, in turn, be disaggregated (Figures 6 through 9).

The emphasis on maintenance is to be expected, first for intergenerational equity. Our descendants should have as much choice as we have. Second, as scale increases or matures, production is no longer for growth but for maintenance. Production is the maintenance cost of the stock and should be minimized (Daly, 1994). Sustainability demands that production and consumption be equal so that we maintain capital stocks. Efficiency demands that the maintenance cost (production equal to consumption) be minimized, given the capital stock.

To stop throughput of matter and energy from growing or to hold throughput constant (we leave until later the need actually to reduce throughput[7]) means stabilizing population on the demand side, and improving resource productivity or "dematerializing" the economy on the supply side. Resource productivity has increased already, although more progress is possible and needed. The increases include improvements in energy efficiency; more production with less energy and fewer materials; tight recycling; repair, reuse, and decarbonization; another name of the transition to renewables such as wind, photovoltaics, and the hydrogen economy.

[7] Sustainability does not imply optimality. Sustainability is a necessary but not sufficient condition of optimality (Daly, 1994).

Figure 6. The basic conditions for environmental sustainability

1. Maintenance of human-made capital (e.g., artifacts, infrastructure) per capita.

2. Maintenance of renewable natural capital (e.g., healthy air, natural forests, oceanic fish stocks) per capita.

3. Maintenance of nonrenewable substitutable natural capital per capita, with capital values based on the value of the services of the present stock of natural capital. This means that if the cost of supplying energy substitutes rises, sufficient capital must be accumulated to maintain these services.

4. Maintenance of nonsubstitutable, nonrenewable natural resources (e.g., waste absorption by environmental sink services). No depletion or deterioration of nonsubstitutable nonrenewable natural capital. This derives from *Figure 5* output rule: no net increases in waste emissions beyond absorptive capacity.

5. All economic consumption should be priced to reflect full cost of all capital depletion, including waste creation, the cost of which is equal to the cost of reducing an equivalent amount of that particular waste.

6. Stating the conditions in per capita terms calls attention to the importance of stopping population growth. Theoretically, the per capita stock of all kinds of capital could remain constant as long as the stocks grew at the same rate as population. But in actuality the rate of growth of population and stocks of physical wealth must move toward zero.

Figure 7. Laws relating to sustainability
(believed to hold rigorously)
(From: Bartlett 1994)

1. Population growth and growth in the rates of consumption of resources cannot be sustained.

2. The larger the population of a society and the larger its rates of consumption of resources, the more difficult it will be to transform the society to the condition of sustainability.

3. The response time of populations to changes in the total fertility rate is the length of time people live from their child-bearing years to the end of life, or approximately 50 years.

4. The size of population that can be sustained (the carrying capacity) and the sustainable average standard of living are inversely related to one another.

5. Sustainability requires that the size of the population be less than or equal to the carrying capacity of the ecosystem for the desired standard of living.

6. The benefits of population growth and of growth in the rate of consumption of resources accrue to a few individuals; the costs are borne by all of society. (The tragedy of the commons.)

7. Growth in the rate of consumption of a nonrenewable resource such as a fossil fuel, causes a dramatic decrease in the life expectancy of the resource.

8. The time of expiration of nonrenewable resources such as a fossil fuel, causes a dramatic decrease in the life expectancy of the resource.

9. When large efforts are made to improve the efficiency with which resources are used, the resulting savings are easily wiped out by the added resource needs that arise as a consequence of modest increases in population.

10. When rates of pollution exceed the natural cleansing capacity of the environment, it is easier to pollute than it is to clean up the environment.

11. Humans will always be dependent on agriculture. Supermarkets alone are not sufficient. Therefore land and other renewable resources will always be essential.

12. If humans fail to stop population growth and growth in the rates of consumption of resources, nature will stop these growths. Nature's method of stopping growth is cruel and inhumane.

13. Starving people don't care about sustainability.
14. The addition of the world "sustainable" to our vocabulary, to our reports, programs, and papers, and to the names of our academic institutes is not sufficient to ensure that our society becomes sustainable.
15. Extinction is forever.

Figure 8. **Hypotheses about sustainability**
(less rigorous than laws; there may be exceptions to some, and some may be proven to be wrong)
(From: Bartlett 1994)

1. For the 1994 average global standard of living, the 1994 population of the earth exceeds the carrying capacity.
2. Increasing sizes of populations are the single greatest and most insidious threat to representative democracy.
3. The costs of programs to stop population growth are small compared to the costs of population growth.
4. The time required for a society to make a planned transition to sustainability increases with increases in the size of its population and the average per capita consumption of resources.
5. Social stability is a necessary, but not a sufficient, condition for sustainability. Social stability tends to be inversely related to population density.
6. The burden of the lowered standard of living that results from population growth and from the decline of resources falls most heavily upon the poor.
7. Environmental problems cannot be solved or ameliorated by increases in the rates of consumption of resources.
8. The environment cannot be enhanced or preserved through compromises.
9. By the time overpopulation and shortage of resources are obvious to most people, the carrying capacity has been exceeded. It is then too late to think about sustainability.

Figure 9. **Priorities to approach global environmental sustainability**

The main means to accelerate the two crucial transitions—population stability and renewable energy—are:

1. **Human capital formation**
   Education and training, employment creation, particularly for girls equivalent to that for boys; the poor and vulnerable minorities; meeting unmet family planning demand, delaying marriage slightly, postponing first birth marginally, spacing births optimally.
2. **Technological transfer**
   For the South and East to leapfrog the North's environmentally damaging stage of economic evolution. For the developing countries, this requires creating an incentive framework conducive to efficient investment. For industrial countries, this requires adequate investment in new and cleaner technologies.
3. **Direct poverty alleviation**
   Including social safety nets and targeted aid (Goodland and Daly 1993a, b).

SOME COMMON MISCONCEPTIONS ABOUT ENVIRONMENTAL SUSTAINABILITY (ES)

Is ES the Same as Sustained Yield?

No, clearly not. There is a lively debate, especially in forestry and fishery circles, whether ES is "sustained yield" (S-Y), in the form of timber removals from forest, for example. Clearly ES includes, but certainly is far from limited to, sustained yield. ES is more akin to the simultaneous S-Y of many interrelated populations in an ecosystem. S-Y is often used in forestry and fisheries to determine the optimal—most profitable—extraction rate of trees or fish. S-Y counts only the service of the product extracted, and ignores all other natural services; ES counts all the natural services of the sustained resource.

Specifically with respect to forests, S-Y forestry counts only the timber value extracted; ES forestry counts all services. These include protecting vulnerable ethnic minority forest dwellers, biodiversity, genetic values, intrinsic as well as instrumental values, climatic, wildlife, carbon balance, water source and water moderation values, ecosystem integrity in general (Westra, 1994), and, of course, timber extracted. The relation between the two is that if S-Y is actually achieved, the stock resource (e.g., the forest) will be nearer sustainability than if S-Y is not achieved.

S-Y in tropical forestry is doubtful now (Ludwig, 1993), and will be more doubtful in the future, as human population pressures intensify. But even were S-Y to be achieved, that resource is unlikely to have also attained environmental sustainability. The optimal solution for a single variable, such as S-Y, usually (possibly inevitably) results in declining utility or declining natural capital sometime in the future, therefore is not sustainable.

Is ES a Variable or a Constant?

ES is a variable, but it changes so slowly that it is probably best to assume it is constant as a first approximation. If humans evolve lungs that can use hitherto unbreathable polluted air, or if we carry cylinders of oxygen on our backs, then that part of ES could be construed as a variable. On the output side, in general, assimilative capacity cannot be substantially increased. As "waste is our fastest growing resource" this is significant. On the nonrenewable input side, nonrenewables can be used more slowly or more efficiently, or more ores and substitutes can be found, but the stock of nonrenewables is fixed and cannot be increased. Technology and efficiency squeeze more utility out of inputs, but do not increase the stock.

It is difficult to get renewables to regenerate faster! Even well-fertilized and irrigated trees in the US, for example, grow slower than *laisser faire* trees in Costa Rica, which has a short winter. Light is often more limiting than water and nutrients. Human-made capital such as pond fish and intensive agriculture such as sugarcane or hydroponic laboratory greenhouse crops have reached high levels of productivity, but the ability to get the whole of humanity to produce effectively and in an environmentally sensitive fashion and match performances achievable on experimental farms is another question. So ES appears to be more constant than variable—i.e., a very slowly changing variable. This is why we suggest ES is universal.

Is ES More of a Concern for Developing Regions?

No. ES is even more relevant to industrial regions than to developing countries. The big difference is in burden sharing. The North is responsible for the overwhelming share of global environmental damage today, and it is unlikely that poor countries will want to move toward sustainability if the North doesn't do so first. The North can contribute significantly to decreasing the global warming risks by reducing greenhouse gas emissions and the release of substances such as CFCs that damage the ozone shield. So the North has to adapt to ES more than, and arguably before, the South.

The North can afford to exert leadership on itself. But because developing economies depend to a much greater extent than OECD economies on natural resources, especially renewables, the South has much to gain from reaching ES. In addition, because much tropical environmental damage is irreversible, it is either impossible or much more expensive to rehabilitate than temperate environments, so the South will gain from a preventive approach, rather than emulating the short-sighted and expensive curative approach and similar mistakes of the North.

Does ES Imply Reversion to Autarky or the Stone Age?

Certainly not; ES is not sacrifice. On the contrary, ES increases welfare, although the message that affluence and overconsumption do not increase welfare is being acted on by few people. Much more education is needed for overconsumers to realize that limousine rides are often slower and more polluting than the subway, and eating three steaks a day reduces health. As the diseases of overconsumption increase (heart attack, stroke), this message will spread. The concept of sufficiency (doing more with less) needs to be disseminated. People need to be educated to the fact that love, pleasure, fulfillment, enjoyment, and other rewards do not depend on overconsumption, but in fact are decreased by it

A single measure— population times *per capita* consumption of natural capital—encapsulates an essential dimension of the relationship between economic activity and environmental sustainability. This scale of the growing human economic subsystem is judged, whether large or small, relative to the finite global ecosystem on which it so totally depends, and of which it is a part. The global ecosystem is the source of all material inputs feeding the economic subsystem, and is the sink for all its wastes. Population times *per capita* consumption of natural capital is the total flow—throughput—of

resources from the global ecosystem to the economic subsystem, then back to the global ecosystem as waste.

In the long-gone "empty world" case, the scale of the human economic subsystem is small relative to the large, but nongrowing, global ecosystem. In the "full world" case, the scale of the human economic subsystem is large and still growing, relative to the finite global ecosystem. In the full world case, the economic subsystem has already started to interfere with global ecosystemic processes, such as altering the composition of the atmosphere (greenhouse warming), or the now nearly global damage to the ozone shield.

CONCLUSION

This paper suggests that ES is a clear concept, that it is universal and non-negotiable, and that it is based on rigorous scientific principles. While the many paths leading to ES in each country, region, or sector will differ, the goal remains constant. The concept will doubtless be refined. This conceptualization is far from an academic exercise. The monumental global challenge of ensuring that possibly ten billion people are decently fed and housed within less than two human generations—without damaging the environment on which we all depend—means that the goal of environmental sustainability must be reached as soon as humanly possible.

SOURCES OF INFORMATION

Ahmad, Y., S. El Serafy, and E. Lutz (eds). 1989. Environmental accounting. Washington DC: World Bank, 100p.

Ahmed, K. 1994. Renewable energy technologies: a review of the status and costs of selected technologies. Washington DC: World Bank, Energy Tech Paper 240.

Anderson, D. 1993. The decoupling of environmental concerns from energy production and use. *Pacific and Asian Journal of Energy* 3: 63-73. EH2 3ES

Anderson, D. 1991. Energy and the Environment: an economic perspective on recent technical developments and policies. Special Briefing Paper No. 1. Edinburgh: The Wealth of Nations Foundation.

Anderson, D. and K. Ahmed. 1993. Where we stand with renewable energy. *Finance and Development* 30:40-43.

Barrie, D. 1992. Environmental protection in federal states: interjurisdictional cooperation in Canada and Australia. Federalism Research Center, 31p.

Bartlett, A. 1994. [Laws of sustainability]. Population & Environment (in press).

Beausejour, L., G. Lenjosek, and M. Smart. 1992. An environmental CGE model of Canada and the United States. Ottawa, Dept. of Finance, 92p.

Bennett, D. 1993. The Canadian Labor Congress' pollution prevention strategy. *New Solutions* 3(3):44-53.

Besant-Jones, J. 1989. The future role of hydropower in developing countries. Washington DC: World Bank, Industry and Energy department, 25p.

Boardman, R. 1992. Canadian environmental policy: ecosystems, politics and process. Oxford University Press, 321p.

Bourque, D. 1993. Nouvelle loi Canadienne sur l'évaluation environnementale. *Ecodecision* 74-76.

Boutros-Ghali, B. 1994. An agenda for development. New York: United Nations. *NGO Liaison Service* 46, 20p.

Brandon, C. and R. Ramankutty. 1993. Toward an environmental strategy for Asia. Washington DC: World Bank, Discussion paper 224, 210p.

Brown, L.B. *et al.* 1994. State of the world: 1994. Washington DC: Worldwatch Institute 265p.

Brown, L.B. and H. Kane. 1994. Fullhouse: Reassessing the earth's population carrying capacity. Washington DC: Norton, 261p.

Caldwell, L.K. 1993. Emerging boundary environmental challenges and institutional issues: Canada and the United States. *The Natural Resources Journal* 33(1):9-32.

Canada's Green Plan: May 1991. Blueprint for a healthy environment. *Environment* 33:14-20, 38-45.

Cernea, M. 1993. The Sociologist's approach to sustainable development. *Finance and Development* 30(4):11-13.

Churchill, A. 1994. Hydropower: Down the drain? *HRM Magazine* (in press).

Churchill, A. 1993. Energy demand and supply in the developing world 1990-2020: three decades of explosive growth. [Conference on Development Economics] Washington DC: World Bank, 32p.

Cobb, C. and J. Cobb. 1994. The green national product: a proposed index of sustainable economic welfare. Lanham MD: University Press of America, 343pp.

Consumer Energy Council of America Research Foundation. 1993. Incorporating environmental externalities into utility planning: Seeking a cost-effective means of assuring environmental quality. Washington DC: Consumer Energy Council of America Research Foundation, 271p.

D'Amore, L.J. 1992. Promoting sustainable tourism: the Canadian approach. *Tourism Management* 13:258-62.

Daily, G.C. and P.R. Ehrlich. 1992. Population, sustainability and the earth's carrying capacity. *BioScience* 42(10):761-771.

Daly, H.E. and J. Cobb. 1994. For the common good. Boston: Beacon Press, 492p.

Daly, H.E. 1994. Consumption: value added, physical transformation, and welfare (draft). College Park MD: University of Maryland, Public Affairs.

Daly, H.E. 1991. Sustainable growth: a bad oxymoron. *Grassroots Development* 15(3):39.

Darmstadter, J. and R. Fri. 1992. Interconnections between energy and the environment: global challenges. *Ann. Rev. Energy and Environment* 17:45-76.

Dickson, I.W., R. Goodland, P.H. LeBlond, F.L. Leistritz, C. Limoges (Chair), and T. Scudder. 1994. Hydro-Quebec's Great Whole Environmental Impact Study. Montreal: Quebec Hydro, 53+p.

Doering, R. 1993. Canadian Round Tables on the environment and the economy. *International Environmental Affairs* 5(4):355-371.

Dosman, E.J. and J. Haar. 1992. Canada's environmental priority. *North South: the Magazine of the Americas* 2:23-225.

Ehrlich, P.R. and J.P. Holdren. 1974. Impact of population growth. *Science* 171: 1212-1217.

Ehrlich, P. and A. Ehrlich. 1989b. How the rich can save the poor and themselves. *Pacific and Asian Journal of Energy* 3:53-63.

El Serafy, S. 1991. The environment as capital (168-175). *In* R. Costanza (ed.) *Ecological Economics*. New York: Columbia University Press, 525p.

El Serafy, S. 1993. Country macroeconomic work and natural resources. Washington DC: World Bank. Environment working paper 58, 50p.

Environment Canada. 1991. The State of Canada's Environment. Government of Canada, 29p.

Environmental Defense Fund & NRDC, 1994. Power failure: a review of the World Bank's implementation of its new energy policy. Washington DC: EDF & NRDC.

Francis, G. 1993. [Canadian] Ecosystem management. *The Natural Resources Journal* 33:315-45.

Gagnon, L. 1993. Emissions from hydroelectric reservoirs and comparisons of hydroelectricity, natural gas and oil. *Ambio* 22:568-569.

Gendron, C. 1994. Vers une règlementation environnementale Canadienne plus efficace. *Ecodecision* 12:24-25.0

Gibson, R.B. 1993. Environmental assessment design: lessons from the Canadian experience. *Environmental Professional* 15(1):12-25.

Goldemberg, J., T.B. Johansson, A.K.N. Reddy, and R.H. Williams. 1987. Energy for a sustainable world. Washington DC: World Resources Institute.

Goldsmith, K. 1991. The case for small scale hydropower. *Water Power and Dam Construction* 43(5):12-17.

Goldsmith, E. 1979. The future of an affluent society: the case of Canada. *The Ecologist* 7(5):161-192.

Goodland, R. 1986. Hydro and the environment: evaluating the tradeoffs. *Water Power and Dam Construction* (Nov.):25-34.

Goodland, R. and M. Webb. 1987. The management of cultural property in World Bank-assisted projects: archaeological, historical, religious and natural unique sites. Washington DC: World bank technical paper 62, 102p.

Goodland, R., A.A. Juras, and R. Pachauri. 1992. Can hydro reservoirs in tropical moist forest be made environmentally sustainable? *Energy Policy* (June):507-516.

Goodland, R. and H.E. Daly. 1993a. Why Northern income growth is not the solution to Southern poverty. *Ecological Economics* 8:85-101.

Goodland, R. and H.E. Daly. 1993b. Poverty alleviation is essential for environmental sustainability. Washington DC: World Bank. Environment wkg paper 42.

Goodland, R. 1994. Environmental sustainability: imperative for peace (2:19-46). *In* N.Graeger and D. Smith (eds) *Environment, Poverty, Conflict.* Oslo Prio: International Peace Research Institute, 125p.

Goodland, R. 1993. Ethical priorities in environmentally sustainable energy systems: the case of tropical hydropower. *Intl J. Sustainable Development* 1(4):3-14.

Goodland, R. 1989. The environmental implications of major projects. *In* Third World Development (9-32) *in* P.W.G. Morris (ed), *Major Projects and the Environment.* Oxford: Major Projects Assn, Oxford Ctr for Mgt Studies, 109p.

Goodland, R. 1979. Environmental optimization in hydrodevelopment of tropical forest regions (10-20.) *In* R. Panday (ed), *Man-made lakes and human health.* Paramaribo: University of Suriname, Faculty of Medicine, 73p.

Goodland, R. 1982. Tribal people and economic development. Washington DC: World Bank, 102p.

Goodland, R. 1992. The case that the world has reached limits. *Population & Environment* 13(2):167-182.

Griss, P. 1993. Implementing sustainable forests: a Canadian commitment. *Forestry Chronicle* 69(5):535-539.

Guimont, F. 1993. New directions being taken to achieve environmental protection and sustainable development. Quebec: Canadian Institute of Mining, Metallurgy, and Petroleum, Material Process & Environmental Protection in Mining & and Metallurgy, International Symposium, 207-218.

Gutman, P. 1993. Involuntary resettlement in hydroprojects. Washington DC: World Bank, Industry and Energy staff report, 71p.

Hamilton, D. and G. Cameron. 1994. Canadian carbon tax. Canadian Public Policy (in press).

Hardin, G. 1993. Living within limits. New York: Oxford University Press, 202p.

Health and Welfare Canada. c1992. A vital link: health and the environment in Canada. Health and Welfare Canada.

Hicks, Sir J.R. 1946. Value and capital. Oxford: Clarendon Press, 446p.

HMSO. 1994. An assessment of renewable energy for the UK. London: HMSO.

Hofgard, K.C. 1993. This land (Canada) really our land? Impacts of free trade agreement on US environmental protection. *Environmental Law* 23(2):635-682.

Hohmeyer, O., and R.L. Ottinger (eds). 1990. External environmental costs of electric power: analysis and internalization. Heidelberg: Springer, 497p.

Horbulyk, T.M. and W.A. Ross. 1992. Potential to sequester carbon in Canadian forests: a comment. *Canadian Public Policy* 19:463-73.

House, J.D. 1993. Knowledge-based development in the North: new approaches to sustainable development. Inari, Finland: Pampere Peace Resources "Institutional Politics & Sustainable Growth *(sic)* in the Arctic" (Workshop): 81-99.

Johansson, T.B, H. Kelly, A.K.N. Reddy, R.H. Williams. 1993. Renewable energy: sources for fuels and electricity. Washington DC: Island Press, 1160p.

Kellenberg, J. and H. Daly. 1994. Counting user cost in evaluating projects involving depletion of natural capital. Washington DC: World Bank, Environment working paper 66, 39p.

Krause, F., and J. Eto. 1988. Least cost utility planning: a handbook for public utility commissioners. Washington DC: National Association of Regulatory Utility Commissioners, 3 vols.

Kumar, R. E.W. Manning, and B.Murch, B. 1993. The challenge of sustainability. Don Mills, Ontario: Centre for a Sustainable Future, 276p.

Lanoie, P. and B. Laplante. 1992. Market response to environmental regulation in Canada: A theoretical and empirical analysis. Université de Montréal. Centre de recherche et développement en économique, no.0192:1-24.

Ledbetter, M. *et al.* 1992. Exporting integrated resource planning to less-developed and post-communist countries (111-119). *In* ACEEE Summer School in Energy Efficient Buildings. Washington DC: American Council for an Energy Efficient Economy.

Lemco, J. 1992. Tensions at the border: energy and environmental concerns in Canada and the United States. New York: Praeger 176p.

Lerner, S. 1994. Local stewardship: training ground for an environmental vanguard. Canada, Altern: *Perspective Social Technological Environment* 20(2):14-20.

Ludwig, D. 1993. Uncertainty, resource exploitation and conservation: Lessons from history. *Science* 260(2 April):17, 36.

Lutz, E. (ed.) 1993. Toward improved accounting for the environment. An UNSTAT-World Bank symposium. Washington DC: World Bank, 329p.

McNeill, J. and D. Runnalls. 1993. A strategy for sustainable energy development and use for Ontario Hydro. Toronto: Ontario Hydro, 136p.

Meadows, D., D. Meadows, and J. Randers. 1992. Beyond the limits. Post Mills, VT: Chelsea Green Publishing, 300p.

Mies, M. 1991. Consumption patterns of the North: the cause of environmental destruction and poverty in the South: women and children first. Geneva: UNCED, UNICEF, and UNFPA, 26p.

Miller, A. 1993. The role of citizen scientists in nature resource decision-making: lessons from the spruce budworm problem in Canada. *Environmentalist* 13(1):47-60.

Mueller, R. and A. McChesney. 1993. Environment and legal development. *Eco-decision* 10:24-25

Murphy, P.J. 1993. Sustainable forests: a Canadian commitment national forest strategy and Canada forest accord process and results. *Forestry Chronicle* 69(3):278-285.

Organisation for Economic Co-operation and Development. OECD in Figures: Statistics on the member countries. Paris: OECD.

Orr, D.W. 1992. Environmental literacy: education and the transition to a postmodern world. Albany: State University of New York, 211p.

Oud, E. 1993. Global warming: a changing climate for hydro. *Water Power and Dam Construction* (UK) 45:20-23, May 1993.

Parikh, J. and K. Parikh. 1991. Consumption patterns: the driving force of environmental stress. Geneva: UNCED, 38p.

Parikh, J. and R. Bannerjee. 1993. Demand side management in power planning. Delhi: Indira Gandhi Institute for Development Planning.

Pearce, F. 1992. The dammed: rivers, dams, and the coming world water crisis. London: Bodley Head, 376p.

Pearce, D. 1994. Joint implementation: a general overview. London: CSERGE, University College.

Philips, M. 1991. The least cost energy path for developing countries. Washington DC: IIEC, 194p.

Pimentel, D. 1994. Natural resources and an optimum human population. *Population and Environment* 15(5):347-370.

Reid, E.S. 1993. Global perspectives and impacts on Canada's environment. *Forestry Chronicle* 69(2):146-151.

Sadler, B. 1993. Shared resources, common future: sustainable management of Canada-United States border waters. *The Natural Resources Journal* 33:375-96.

Sadler, B. 1993. Mediation provisions and options in Canadian environmental assessment. *Environmental Impact Assessment Review.* 13:375-90.

Saunders, R. 1993. Energy efficiency and conservation in the developing world. Washington DC: World Bank, 102p.

Saunders, R. 1993. The World Bank's role in the electric power sector. Washington DC: World Bank, 84p.

Schipper, L. 1994. Energy efficiency: lessons from the past and strategies for the future (397-472). Washington DC: The World Bank Annual Conference on Development Economics, 489p.

Serageldin, I. 1993a. Making development sustainable. *Finance and Development* 30(4):6-10.

Serageldin, I. 1993b. Development partners: Aid and cooperation in the 1990s. Stockholm: SIDA, 153p.

Simonis, U.E. 1990. Beyond growth: elements of sustainable development. Berlin: Edition Sigma, 151p.

Spaling, H. and B. Smit. 1993. [Canada's] Cumulative environmental change: conceptual frameworks, evaluation approaches and institutional perspectives. *Environmental Management* 17(5):587-601.

Svensson, B.S. and S-O. Ericson. 1993. Does hydroelectric power increase global warming? *Ambio* 22:569-570.

Szekely, A. 1992. Establishing a region for ecological cooperation in North America. International Transboundary Resources Center:563-622.

UNCED. 1991. Canada's national report: United Nations Conference on Environment and Development. Ottawa: Minister of Supply and Services, Enquiries Centre, Environment Canada, 149p.

Valiante, M. and P. Muldoon. 1992. Annual review of Canada, United States environmental relations. *International Environmental Affairs* 4:254-72.

Van Bers, C. and J.B. Robinson. 1993. Farming in 2031: a scenario of sustainable agriculture in Canada. *Journal of Sustainable Agriculture* 4(1):41-66.

Vitousek, P.M., P. Ehrlich, A. Ehrlich, and P. Matson. 1986. Human appropriation of the products of photosynthesis. *BioScience* 36:368-373.

Westra, L. 1994. An environmental proposal for ethics: The principle of integrity. Lanham MD: Rowan and Littlefield, 237p.

World Energy Council. 1993a. Energy for tomorrow's world. New York: St. Martin's Press.

World Energy Council. 1993b. Renewable energy resources: opportunities and constraints 1990-2020. London.

World Bank. 1992a. Energy efficiency and conservation in the developing world. Washington DC: World Bank.

World Bank. 1994. Resettlement and development: a Bankwide review of projects involving involuntary resettlement. Washington DC: World Bank, Environment Department.

World Bank. 1992b. The World Bank's role in the energy sector. Washington DC: World Bank.

Economic and Fiscal Impact Assessment

F. Larry Leistritz[1]

When major resource or industrial development projects are proposed or when policy changes that will substantially affect patterns of economic activity and resource use are considered, decision makers are increasingly requesting analyses of the socibeconomic impacts that may result. The socioeconomic impacts of development projects and programs have been categorized in a number of ways. One classification of such impacts identifies (1) *economic* impacts (including changes in local employment, business activity, earnings, and income), (2) *demographic* impacts (changes in the size, distribution, and composition of the population), (3) *public service* impacts (changes in the demand for, and availability of, public services and facilities), (4) *fiscal* impacts (changes in revenues and costs among local government jurisdictions), and (5) *social* impacts (changes in the patterns of interaction, the formal and informal relationships resulting from such interactions, and the perceptions of such relationships among various groups in a social setting) (Leistritz, Murdock, 1981; Leistritz, Ekstrom, 1986; Murdock *et al.*, 1986).

This paper provides a brief overview of the conceptual bases, methodological alternatives, and assessment techniques that are commonly utilized in assessing two of these categories of impacts (i.e., economic and fiscal impacts). In addition, the importance of economic and fiscal impact assessment to policy making and impact management is discussed, and the likely future of the field is described.

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4. Environmentally-Sound Design and Implementation

Description/Objectives

This module will introduce resources you can use to ensure projects are designed, from the start, to avoid negative environmental consequences. It also covers how these principles can be incorporated into USAID activity, project, or program design process, and reviews briefly the principal issues by sector, such as:

- domestic water supply and sanitation;
- water supply development;
- resettlement;
- development of new agricultural lands and agricultural mechanization;
- road building and improvement;
- natural resource management;
- ecotourism;
- health care facilities;
- solid and hazardous waste management and projects involving the procurement or use of pesticides.

This module is designed to stimulate your open discussion of successes and failures and to identify key problems that need to be tackled in the activity, project or program development and implementation process. You were asked in your invitation to bring with you to the workshop examples from your own experience. These will be used in this module to discuss actual design and implementation issues.
Participants present experiences (formal or informal) with specific activities in the country that were notably successful or unsuccessful in managing potential environmental problems.

You will also be asked to prepare a summary list (and seek consensus) on principal obstacles to environmentally sound design and implementation. Please post your list (e.g. on a large piece of butcher block paper) in the classroom for the duration of the course to refer back to when delving into the details of the course and feel free to add items to it.

Questions to Think About

- Environmentally-sound design principles are not new. Have they been followed? If not, why not?
- What more can be done nationally and locally to improve environmentally sound program, project and activity design?
- Do you have specific examples of sound or unsound designs that the other participants would benefit from knowing about or should be alerted to? Are there particularly sensitive situations to watch out for? What low-cost techniques have you seen applied to identify potential problems? Are there certain kinds of regionally-based technical resources/expertise (e.g. GIS, remote sensing, water resource planning, etc.) that could improve environmentally sound design?

Readings

Module Backgrounder

Sectoral Sections from *Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Humanitarian and Development Activities*, USAID, AFR/SD/PSGE, 1996.

Annex 1 - "Excerpts from the electronic copy of *The World Bank Environmental Assessment Sourcebook: Volume I* on Environmental Sustainability (1996)", based on Annexes 1-5, pp. 51-53.

Useful Reference Materials

The Coordination in Development (CODEL)/Volunteers in Technical Assistance (VITA) Series

Altieri, Miguel. 1988. *Environmentally Sound Small Scale Agricultural Projects*. Revised edition. Guidelines for planning, project design, and implementation of agriculture projects with a community development emphasis. Includes technical and ecological information. Aimed toward the general user.

Bassan, Elizabeth and Wood, Timothy. 1985. *Environmentally Sound Small Scale Energy Projects*. Guidelines for planning. project design and implementation of energy projects. Addresses how to use natural resources for energy in a way that maintains ecological well-being. Aimed toward the general user.

Frolliott, Peter and Thames, John. 1983. *Environmentally Sound Small Scale Forestry Projects*. Guidelines for planning, project design, and implementation of forestry and agroforestry projects. Meant for the general practitioner, with an emphasis on community development.

Jacobs, Linda. 1986. *Environmentally Sound Small-Scale Livestock Projects*. Guidelines for planning, project design, and implementation of livestock and range management projects. Included is material on waste management, health, and husbandry.

Tillman, Gus. 1981. *Environmentally Sound Small Scale Water Projects*. Guidelines for planning, project design, and implementation of water resource development projects. Suggests low-cost techniques to avoid adverse impacts of water development.

> **To order CODEL/VITA documents**: VITA Publications, PO Box 12028, Arlington, VA, 22209. (703) 435-3245. No fax orders. $12.95 including shipping (USA), 15.95 (overseas surface), and 19.75 (airmail).

World Bank Environmental Assessment Sourcebook (with Updates). 1993. Washington, D.C.
Available as a software package from the Bank, this document is filled with a wealth of information on environmental screening, assessment, monitoring and mitigation.

Relevant chapters for this session include:

> *Chapter 1: Update: Public Involvement in Environmental Assessment*
> *Chapter 3: Social and Cultural Issues in Environmental Review*
> *Chapter 5: Strengthening Local Capabilities and Institutions*

MODULE BACKGROUNDER
Environmentally-Sound Design

1. Introduction

USAID's Bureau for Africa has developed a set of *Environmental Guidelines for Small-Scale Activities in Africa* which are used as the primary reference in this session to discuss the process of environmentally sound design, before we deal with the specifics of meeting USAID environmental procedures and requirements.

1.2. Background

Through its activities, USAID aims both to protect the environment and foster sustainable development. Host governments, contractors, PVOs/NGOs and USAID staff can play an important role in pursuit of this goal as they implement USAID-funded projects and programs. They can do so by:

- integrating environmental considerations in a practical way early in program and activity designs;
- ensuring that host country environmental programs and policies are taken into account, and their environmental regulations are followed;
- fully incorporating in design and implementation , people's knowledge and concerns related to environmental problems with emphasis on community participation, equity and gender, environmental justice and potential effects on vulnerable groups;
- taking into account financial and economic criteria;
- making sure appropriate technical and engineering practices are followed;
- providing for training in environmental and natural resource management, where appropriate;
- implementing in an adaptive fashion based on an (i) understanding of the effects on the environment associated with varying scale and intensity of activities;(ii) environment/resource constraints on long-term environmental and economic sustainability; (iii) anticipation of potential impacts from drought, famine or civil strife and related emergency assistance, including food aid; and (iv) safeguarding the long-term viability of implemented activities with sound natural resource management and mitigation of identified environmental problems; and
- learning from each other through both formal evaluations of lessons learned and strong communication links for informal communication of successes and failures.

1.3. Learning from Experience - Two Examples

Box 1. From "River basin Projects in Africa" Environment 31 (2): 4-9; 27-32 March 1989) by Thayer Scudder

The narrow focus of most planning studies (and of most development) on river basins as hydrological systems has tended to restrict development, on the one hand, to water resource management, and , on the other hand, to national (rather than local) accounting of electricity generation and crop production on large dam projects. National accounting of project benefits allows the costs to riverine populations to be discounted and ignored. (page 9)

Recently, irrigation has been receiving more and more emphasis as a secondary objective. However, the priority given to medium- and large-scale irrigation projects is difficult to justify on grounds either of funding costs or of postconstruction economic repercussions...Even by double cropping high value crops, it is not possible to pay off such costs; frequently projects do not even cover operating costs. Although some families living on irrigated settlements may be better off than they were before the project, many do not move beyond subsistence. (Page 27)

On balance, the impacts of dam construction on downstream riverine habitats have been negative. The elimination of downstream flooding has devastated many local production systems. Riverine habitats for flood water farming and livestock management are adversely affected, and fisheries' productivity and hence fish landings for consumption and commercial purposes are greatly reduced.

The most detailed analysis of the adverse effects of dam construction on downriver users deals with the Kaniji, Bakolor and Tiga dams in northern Nigeria. In a study area extending 200 kilometers downstream from Kainji, catches of fish and dry season harvests from flood plains declined over 50 percent after construction of the dam. Similar decreases in fish landings were reported further downriver, and loses in yam production of approximately one hundred thousand tons were reported in the lower Anambra basis of eastern Nigeria. Following the completion of the Bakolori Dam, fish catches and dry season harvests also decreased. Farmers had to leave home to find work in the cities or on other farms as migrant laborers to support their families... Following completion of the Tiga Dam, decreases in fish landing and in flood plain harvests were reported to exceed those recorded during the drought from 1972 to 1974. (Page 27-28)

The impacts on the people living in the basins of future reservoirs are no less devastating than those on populations downstream. Throughout Africa, the resettlement of riverine communities to lands outside of future reservoirs has been the least satisfactory component associated with dam construction...Over the long term, resettlement is apt to lead to lower living standards and environmental degradation because of the difficulty of planning and implementing viable production systems in new, frequently problem-prone habitats. (Page 28)

Box 2. IUCN Review of Southern Okavango Integrated Water Development Project, IUCN Wetlands Programme (1992)

The Southern Okavango Integrated Water Development Project (SOIWDP) was developed for the Government of Botswana's Department of Water Affairs by the Snowy Mountains Engineering Corporation (SMEC)....Focusing on the lower portion of the Okavango Delta and the Boteti River, the SOIWDP was intended to achieve a set of broad goals. These included improved utilization of land and water resources, increased food production, and creation of employment opportunities and a raised living standard for the people of Ngamiland District and Boteti Sub District. (Exec. Sum. p.1)

The goals for the SOIWDP were to be achieved by an integrated scheme of surface water development requiring an enhancement of Boro distributary outflows in the lower portion of the Okavango Delta by channelization and construction of three reservoirs...The effect of channel excavation and bunding would have been to reduce the area flooded on a seasonal basis, thereby reducing evapotranspiration from those areas and increasing outflow. A programme of reseeding and transplanting of indigenous species was proposed with the intention of ensuring the revegetation of impacted areas and reducing the environmental impacts...increased flow from the Boro was to be stored in three reservoirs..these reservoirs were designed to provide storage for..water supply, commercial irrigation and flood plain agriculture. Other intended benefits included a more reliable flow to Lake Ngami and - in the form of the Sukwane Reservoir - a partial barrier between wildlife in the Makgadikgadi Pans Game Reserve and villages on the west bank.
When the contractor began mobilisation in November 1990, strong opposition to the Project arose. Following a major meeting to solicit the views of the local community in Maun in January 1991, the Government - showing its responsiveness to local concerns- suspended the project and agreed to seek further review. To the best of IUCN's knowledge this was a precedent setting decision, being the first time that a national government has asked for an independent review of a major water development project by an international conservation organization. (Executive Summary - page 2)

When released publicly on May 21st 1992, the IUCN Review Team's Draft Final Report recommended that the Southern Okavango Integrated Water Development Project be terminated. Emphasizing local opposition, the Government of Botswana announced later that day that the SOIWDP was being canceled. IUCN's recommendation for termination was based on a number of deficiencies and the availability of a more effective and less expensive alternative.

Implementation would have been at the expense of the village population. With a low rate of return, the SOIWDP was justified on humanitarian rather than economic grounds because of the benefits it was supposed to bring to the village population within the impact region. Analysis by the IUCN Review Team, however, leads to the conclusion that the low income rural major (including resident communities along the Boteti) would, on balance, have been worse off if the proposed scheme had gone ahead.... (page 4)

One of our major criticisms of the SOIWDP is that parts of the design were based limited data of questionable accuracy. (page 6)

One of the claimed benefits for the Sukwane Reservoir was the fact that it would act as a barrier between the Makgadikgadi Pans Game Reserve and the cattle on the other side of the Boteti. We calculated the open length on a month-by month basis which showed that in three years out of four the open length is around 20 km in June and July and in half of the years the open length is over 30 km in those two months and still 20 km in August. In one year in four the open length is over 30 km the whole year and reaches up to 60 km. The length of the river along the game reserve is around 70 km. As the reservoir tends to be drawn down at times of the year when animals are likely to be attracted to the river for grazing, the benefit of the reservoir barrier between cattle and game seems unlikely to be a major one. (page 10)

Box 2. IUCN Review of Southern Okavango Integrated Water Development (continued)

Another claimed benefit was that releases from the Maun Reservoir would lead to some regeneration of Lake Ngami with potential benefits for bird populations. It was estimated that in years when there was no natural inflow the release would create a lake of 16 km^2 whose life would be extended by rainfall. Initial analysis showed that this was unlikely; evaporation loss during the month when the release was made would not allow a lake of 16 km to form, even ignoring losses from seepage, and that there were very few months where rainfall was larger than evaporation (p.10). While there can be no question that villagers have over-emphasized the impact of historic interventions on their lives (and in the process have downplayed the importance of drought and an increasing human and livestock population), their analysis can be shown to have validity in some cases, examples being dredging and bunding the lower Boro in the 1970s and creation of the Mopipi Reservoir and diversion of Boteti waters into that reservoir.

The conclusions drawn from a review and assessment of the SOIWDP benefits are that, while project benefits have been examined, they are excessively optimistic and flawed by conceptual errors. The review of disbenefits finds a striking asymmetry in accounting for project costs and benefits. All of the benefits which could conceivably be quantified were quantified; many of the costs which could have been quantified were left unquantified (p.12). Historically, compensation and resettlement have been one of the least satisfactory aspects of water resource development projects, with a majority of those compensated and relocated apt to be made worse off as a result of the project. The IUCN SOIWDP Review has concluded that implementation of the SOIWDP will have similar results (p.12).

Realistically, artificial revegetation of the dredged length of the Boro River could be achieved only by rhizome planting in the river bed and banks, and by complete control over water level and flow for over a year. At 5,000 rhizomes/ha the total aquatic bed vegetation required for revegetation of 600 ha would be 3 million plants. Clearly, the logistics of acquiring, transporting and transplanting millions of plants would be substantial. Presumably the impact of obtaining such planting material from natural populations outside the Boro River area would also be substantial. Even if rhizomes were planted, transplanting-induced desiccation and shock require that the plants are supplied with water to the correct depth until the shoot and root systems are fully developed...IUCN believes that the SOIWDP has not shown that the proposed revegetation strategies would work. SMEC considered that most of the typical riparian woodland plants would survive adjacent to the full supply level in the reservoir, but that the more typically dryland species might be adversely affected. However, the impact of changes in soil chemistry has been entirely overlooked in the study. Based upon analysis of the structure of riparian soils along the proposed reservoirs and of the woodland community structure, IUCN concludes that the probable impact of raising the water table will be to largely destroy the riparian woodland.

In addition to analyzing the project deficiencies in detail, [IUCN analyzed] why a project which has been so carefully planned over a ten year period has been found to be so deficient... Implicit with the Terms of Reference for the SOIWDP is an untenable assumption; namely that the provision of more potable water in a semi-arid habitat is by definition a good thing. While the SOIWDP would have provided more surface water for the village sector in the SOIWDP impact region...analysis has shown that associated reductions in the availability of floodplain fields and in grazing would have lowered the living standards of a majority of the rural population contrary to projection intentions....The Terms of the Reference for the SOIWDP were too restrictive and therefore incompatible with the broad goals that the SOIWDP was expected to meet. For example, **insufficient attention was paid to alternatives** [emphasis supplied] in project design.... The SOIWDP was planned as an integrated rural and urban development project. Such a project requires the continuity of an interdisciplinary team. While IUCN found the engineering components...to be of a high professional standard...during a ten year period less social science expertise was utilized than fielded by IUCN during its one year assessment...Institutional weaknesses (including inadequate continuity of consultation) restricted cooperation with other government institutions and ...district residents.

2. Understanding the Policy Context and Enabling Conditions

The following enabling conditions facilitate sustainable environmental management:

(1) a legal and policy framework enabling sustainable private-sector and public initiatives;
(2) clearly defined national objectives related to environmental design and management;
(3) information regarding national environmental resources (e.g., assessments or management plans); and
(4) sufficient host country capacity (including financial resources, trained professionals, effective institutions) to apply laws and policy as well as communicate information.

In developing countries and those in transition, agricultural growth is important for overall economic growth and the alleviation of poverty and food insecurity. Macroeconomic, trade and sector policies are important for agricultural growth and sustainability.

Resource tenure and property rights often influence patterns of natural resource management or mismanagement. Such rights vary among cultures and are frequently gender-specific. Understanding the distribution of these rights among states, communities, families, and individuals is essential to making informed decisions that promote and encourage sustainable use of the resources base.

To address medium- and longer-term impacts of development activities, experience has shown that the most effective and least management-intensive approach is to build in capacity through policy reform, institutional support and strengthening of the NGO/PVO community, along with the participation and empowerment of the public through the political process. The object is to have communities take charge of the environmental movement, directly at the grass roots level. This will help evoke political support for environmental and natural resources management as governmental priorities.

3. Ensure Community Participation

Promoting genuine and effective participation of the populations involved or influenced by development activities is the shared responsibility of all parties.

Successful activities, especially agricultural & natural resource programs and activities, should involve local stakeholders from the beginning of the design process because:

- they must live with the environmental impacts of activities;
- by participating in design, implementation, and monitoring, local stakeholders have a sense of ownership and responsibility, and a clear understanding of objectives and anticipated outcomes;
- their full participation serves as an incentive to identify and mitigate any adverse environmental impacts;
- they need the understanding and capacity to adapt activities to future change after donor support ceases;

- their detailed knowledge of local natural resources and environmental conditions is often critical in anticipating and identifying potential impacts;

- they may have prior experience with particular types of activities (either traditionally or through past development projects), and can therefore foresee possible negative impacts with which they have had previous experience; and

- they are in the **best position to monitor long-term environmental effects** of project activities. Local communities are the long-term residents of the area, and will be best able to identify and address adverse impacts after donor assistance ends.

Unfortunately, ensuring local participation remains a poorly understood process. How to go about gathering information and promoting local, community or village involvement is rarely clear or easy. With each program or project, experienced individuals need to work with various techniques until the right ingredients are found which allow fruitful participation to happen. The recipe inevitably varies from activity to activity depending on local interests and conditions. For rural stakeholders, Participatory Rural Appraisal and Rapid Rural Appraisal are two techniques often employed in design. However, methods for continuous monitoring, evaluation and adjustment based on feedback, also become very important to effective implementation of long-term development activities.

Box 3. Namibia: Gender Factors in Natural Resource Management

Gender factors play a central role in natural resource management. The responsibility for monitoring and managing a given resource may fall along gender lines. For example, in Namibia some pastoralist women have begun to sell woven palm frond baskets, traditionally used to store milk, to tourists to generate income. In order to prevent harmful increases in consumption of palm leaves, tree counting and monitoring was transferred by conservationists to the male lineage heads of the community. Women traditionally controlled the rights over milk and its distribution, symbolized by the keeping of the milk in the palm frond baskets. With men now monitoring the trees from which the baskets were made, women began to feel their rights over milk distribution were under threat. They began to overharvest fronds from certain trees, killing some of them, to intentionally ignore the old way of managing palm trees. The lineage heads blamed the women as lazy, but the women explained their rationale for doing so. Once responsibility for the trees was returned to women, they continued to harvest fronds for baskets in the old way of cutting only a few from each tree, and the palms thrived. The women observed that it was in their interest to protect the resource from which they earned income.

Source: Adapted from Brown and Wyckoff-Baird, 1992.

Participatory techniques and methods need to be more widely available to NGOs through training, and the use of these tools should be further developed and consistently applied. An example is the application of Participatory Rural Appraisal techniques to the development of the priority issues to be addressed in the Andasibe-Mantadia integrated conservation and development project in Madagascar.

4. Consider Gender and Equity Perspectives

Women, as important players in food production, natural resource management, and economic systems, constitute a major stakeholder group. In many rural communities women and children constitute over 3/4ths of the total population. Often farmers and smallholders are synonymous terms for women in a community. They must be integrated into development projects as both participants and beneficiaries to meet the dual objectives of better resource management and improved community welfare.

As users and managers of the natural resource base, women have extensive knowledge of the environment and play a critical role in their communities, though their contribution may not always be obvious to outsiders. They often have indigenous knowledge unknown to men in the community, especially regarding such subjects as subsistence agriculture, woodfuel utilization, water availability and quality, gathered foods and certain medicines. This knowledge should be tapped during program and project planning sessions, as well as for input into design and implementation of activities, such as developing the scope for environmental assessment work. Socio-cultural expertise should be used to obtain women's input, since in many cultures respect for traditional male authority prevents women from making their opinions directly known to men. It is often best to interview and work with families as well as individuals.

5. Take Financial and Economic Criteria into Account

The following questions should be addressed:

- Does the activity budget incorporate those mitigative measures to reduce environmental impacts?
- Is the activity financially sustainable without continuous external support?
- Do the benefits of the activity outweigh the costs (for example, how are labor costs calculated in Food For Work?).

A hardest economic question to ask, although not directly transferable to social or public programs is: 'Would a commercial bank loan money to do this activity?'

6. Examine Technical and Engineering Criteria

Ask these questions:

- What is the land suitable for? Is the use the most economically productive and sustainable?
  - Have appropriate choices of crops or trees been made?
  - Is their appropriate understanding of the activity's relationship to climate and soils?
  - Are the building materials appropriate?
  - Is appropriate technology being utilized?

- Are sound engineering practices being followed? What is the project life?

7. Consider a Training Element for All Sector Activities

Environmental education and training can increase sustainability in all sectors. Planners, community participants and stakeholders need to be adequately trained to recognize how activities can affect the environment in order to foresee their adverse impacts. Environmental management and sustainable development can occur simultaneously and are reinforcing.

Education and training activities might include environmental education in schools, teacher awareness training, extension worker training, or workshops for stakeholders and journalists (to promote public dialogue of environmental issues). Awareness building is equally important for government agencies. Even if the organizations are not directly involved with an activity, they need to be informed in order to deal with any indirect environmental effects. The development of capacity (both human and financial) in environmental management and protection is vitally important, and there are the most locally appropriate methods of doing so should be explored.

8. Monitor and Evaluate: Towards Adaptive Program Implementation and Mitigation

Program and activity budgets should identify funding sources and responsibility for monitoring and evaluation from the onset of design. It is important to anticipate the **costs**, including providing a strategy and **budget** for an environmental **mitigation and monitoring** component, if needed.
Program or a activity monitoring should be seen as an opportunity to test assumptions, identify linkages, modify implementation activities, and share lessons learned locally and regionally. Monitoring must support basic management functions of the NGO. And special efforts are needed to reduce the typically passive role of the resource user community in this context. For example, monitoring and evaluation can be used as collaborative tools in a training and learning context.

An on-going monitoring process should be established as part of a project. This includes the gathering of environmental impact information during the project design, the initial environmental examination (see Section 4), environmental assessment activities, and project implementation.

Some flexibility and a learning curve need to be built into environmental programs, to accommodate the tremendous flux often experienced in the development process. A directed activity focused only on the initial goal may encounter operational problems (of showing impact, managing activities, etc.) in future years. While it may make sense initially to focus attention on implementing the existing program concept, managers and implementers need to be flexible and open to change, in order to make adjustments and be prepared take mitigative steps to deal with adverse impacts (environmental or otherwise).

9. Sound Design of Integrated Conservation and Development Projects ICDPs)[1]

For agriculture/natural resource management projects sound design can be fostered by applying biological and socio-economic criteria in site selection. Priority should be given to areas where:

1. A large proportion of target natural resources remains and the host government has an effective conservation policy;

2. High species richness and endemism[2] exists;

3. Conserving habitat in a project area assures conservation of a large number of species;

4. Government has been genuinely supporting efforts to preserve biodiversity in protected areas that are facing high population pressures; and

5. Use and threat to resources is weighed with the opportunity and costs of affecting change.

Application of these criteria helps in identifying interventions where the chances of success are favorable. By setting a good example, one can establish the credibility of ICDPs and encourage their use elsewhere.

10. Food Aid and Natural Resource Management[3]

Food aid appears in many forms, from emergency relief to program food aid, including food for work (FFW). These forms of food aid are targeted at various beneficiary groups, and each form may have a different impact on the environment. Direct impacts may achieve the goals of assistance---to relieve starvation in a disaster setting or encourage soil restoration through FFW payments, for example. As relief and development are not mutually exclusive, food aid activities can involve components of both. Indirect impacts allow or cause people to change the way they use their environment, as a result of changes in household attitudes, motivations, and economies.

All links between food aid and sustainable natural resource management should be examined prior to and during implementation. The flow of food resources into a region and the mechanisms put in place to support that flow are also intended to improve the food security and economic strength of the beneficiaries. The arrival of food aid into a community can potentially alter the relationship between people and how they use the natural resource base.

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4. Adapted from Brown and Wycoff-Baird, 1992.

5. Endemic: found only in a certain region.

6. Adapted from Catterson, et al., 1993.

Potential effects include:

- shifts in crop and livestock production strategies;
- changes in local institutions that govern how the community interacts with its physical environment: land tenure arrangements, grazing regulations, etc.
- changes in seasonal and long-term migration patterns;
- altered wood gathering patterns and localized stress on wood resources;
- localized stress on surface vegetation in and around food distribution points and wells;
- potential alterations in sanitation, water quality and availability; and
- reduced local seed production and utilization, resulting in a loss of genetic resources and biodiversity.

With program food aid and other forms of food assistance supporting development objectives, the following questions should be considered:

- Is program food aid necessary for the development of natural resource management in the host country, or indeed, for the development of the country?
- What are the costs and benefits of this food aid?
- Are there more cost-effective ways to achieve development?
- To what extent does food aid create local dependency on external resources and a loss of self-reliance?

Food aid should be used to mitigate famine and protect the environment, but assistance should not be at the expense of undermining food security, self-reliance and resource management capacity of the beneficiaries. While sometimes a useful tool for relief and development, food aid is not an ideal mode of project activity. Planners need to carefully consider if long-term sustainability of local communities is best served by food aid or by other development activities.

11. Identify Regional Lessons: Learning from Each Other

Similar biological and socio-economic conditions often characterize each of Africa's geographical regions. For this reason, there may be opportunities to apply lessons learned in one country to others within a particular region. However, one organization may sometimes be unaware that another is conducting a similar implementation activity within a particular area or region. Regional coordination and the use of consistent field methodologies can facilitate the sharing of lessons learned regarding potential positive and negative environmental impacts associated with rural development implementation activities.

NGOs and PVOs with their collaborators need to create more mechanisms for inter-country exchanges. Building on existing models, ways can be found to cost-effectively access the work of colleagues tackling similar problems, and share experiences at the ground-level. Prime examples exist among community-based natural resources management projects and integrated conservation and development projects.

Seek to Standardize Methods Among NGOs and Other Organizations

Anecdotal sharing of lessons can be useful in implementation and the design of future activities, but applying standardized field methodologies (e.g., environmental and socio-economic indicators) where feasible, can provide objective data that is very valuable to organizations interested in learning from and comparing the results of each others activities.

12. Summary

Sound natural resource management includes both environmental conservation and sustainable development; they are inseparable. USAID recognizes that sustained and broad-based economic growth is linked to responsible stewardship of the resource base. Effective development programs focus on this linkage, using locally-based, specific approaches. Coordination among donors, host governments, PVOs/NGOs, and other institutions is important to ensure policies are consistent regarding the environment, health, economics, and other issues.

Project and program success is enhanced by considering biological, social, and political criteria together early in design and throughout the implementation process. Activities are most likely to succeed in situations where:

- there is significant local participation and collaboration among stakeholders, especially at the grassroots level [Experience has demonstrated that effective development projects require negotiating a set of commonly shared perceptions and understanding between all key stakeholders. Establishing working relationships and processes for communication and decision-making with the involvement of all parties is critical. During the design phase, if it appears that conflict cannot be brokered or negotiated to the satisfaction of the different groups, the feasibility of the whole project should be questioned];

- the potential economic return to stakeholders is high;

- indigenous knowledge has been incorporated in the design and implementation of the activities [Experience has shown that incorporation of traditional or indigenous knowledge into project design leads to projects that are socially more sound. To do so, one must understand the rationale of indigenous resource management systems and indigenous peoples' perceptions of the mechanics of ecosystems and the role of intervening factors];

- local control exists over access to resources and there are effective institutions to set and enforce rules over use. The ability of local people to limit access by outsiders in the short and long-term is critical to effective resource management. If resource users do not have control over access, the most rational management strategy is to use the resource to the benefit of insiders before "outsiders" expropriate the resource. Maximizing local control must be encouraged and implemented within the context of all stakeholders' interests. This can be done through some form of co-management where project planners balance long-term collective interests. Institutional strengthening should be another component, applying techniques in areas such as participatory rural appraisal and ecological monitoring;

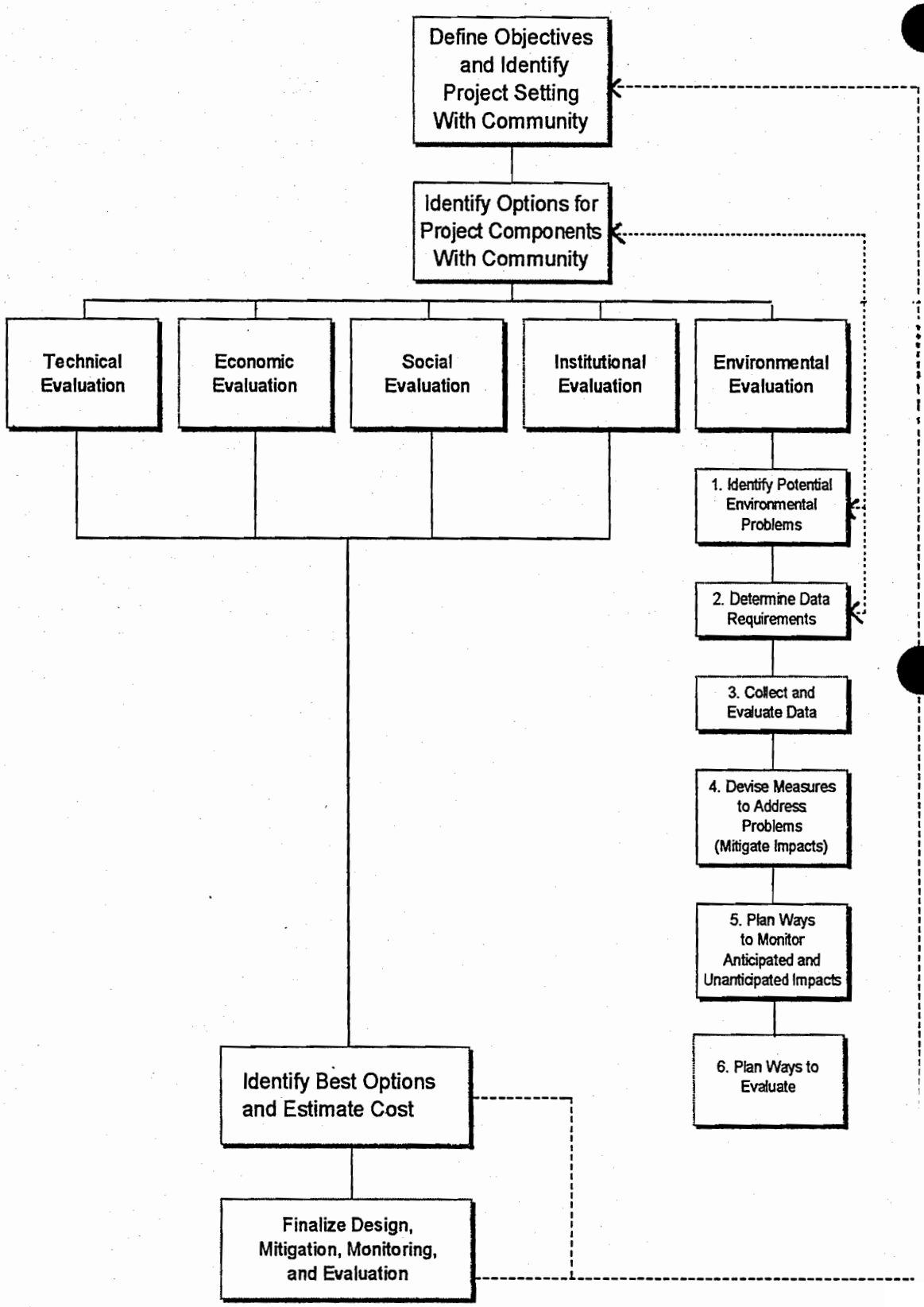
- the relationship between action and benefit to local populations is as direct as possible. All material benefits should be clearly tied to the conservation action, as perceived by the people themselves. Sometimes, linkages between development and conservation activities can be strengthened by directing the activities toward groups or individuals whose current actions threaten the protected area. Viable alternative economic opportunities must exist for individuals to adopt conservation behavior, particularly when the conservation activity requires the alteration of existing exploitative activities.

- the activity includes a conservation education component. Development and conservation activities frequently must be complemented with a conservation extension or education program that informs all parties of their responsibilities under the project, and the interrelationships of conservation and development;

- national policies and their potential impact on program and project implementation have been taken into account. Any design must consider the manner in which international, national, and local laws and policies affect both local resource-use patterns and management options available to resource users. From the outset, program and project planners need to consider the full range of issues both geographically and thematically that will affect implementation, particularly those policies related to land development; and

- long-term financial and economic viability have been assured. It is imperative that financial and economic analysis be done as part of any activity which requires any change in land use management. To become sustainable, resource users must be aware of the opportunity costs and potential benefits accruing to shifts in resource management strategies.

Process of Environmental Sound Design



Annex 1

Excerpts From
The Electronic Copy of
The World Bank Environmental Assessment SourceBook:
Volume I
On
Environmental Sustainability[1]

In what follows the use of the terms "assimilative or regenerative capacity" should not be taken necessarily to imply that there is a discontinuous threshold of use intensity below which there is no effect on the ecosystem being used. Capacity may be thought of as a current level of a particular ecosystem service beyond which further use will cause unacceptable (e.g., cumulative, irreversible, excessive) degradation of the ecosystem and loss of its future services. Also capacity refers to the capacity of the relevant ecosystem, not to individual species in isolation. There are many difficulties in defining sustainable yield and sustainable use, just as there are many analogous difficulties in defining income.

But to answer the unavoidable question -- How much can we consume this year without reducing our capacity to produce next year? -- requires that we at least give a prudent rule of thumb.

Output Guide

Rule: Waste emissions from a project should be within the assimilative capacity of the local environment to absorb without unacceptable degradation of its future waste absorptive capacity or other important services.

Discussion: If each project obeyed this rule, then the sum of all projects, or the average project, would also conform to the rule. But the average or sum may obey the rule even though each project fails to, as long as there is compensation among project pairs or other combinations. Of course it is easier for earlier projects to meet this condition than for later ones added after assimilative capacities have been largely used up or even decreased. Once capacity has been reached a new project might be paired with an old one that is removed to make room for it, if the new one is more valuable than the old one. Alternatively the new project may be paired with another new project that makes room by absorbing the waste outputs of other projects up to the amount emitted by the new one. The pairing idea has been discussed by David Pearce, and is a variant of the "bubble concept". Under the "bubble concept" the total emissions for an area must be set collectively, but the market can allocate that total among competing uses by exchange of emission permits.

Input Guide

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1. These excerpts are based on Annexes 1-5 of the *World Bank Environmental Assessment Sourcebook, Volume I: Policies, Procedures and Cross-Sectoral Issues*, Annexes 1-5 "On Project-Level Guides for Environmental Sustainability", 1991. pp. 51-53, but were extracted from the electronic version by using the keyword: 'sustainability'.

Rule: Harvest rates of renewable resource inputs should be within regenerative capacity of the natural system that generates them; depletion rates of nonrenewable resource inputs should be equal to the rate at which renewable substitutes are developed by human invention and investment.

Discussion: The inputs of interest are the primary inputs from nature, not the interindustry or intermediate inputs from other firms. This rule then only applies to the extractive sector, whereas the previous rule applies to all sectors. Inputs from nature are of two kinds, renewable and nonrenewable.

(a) Renewable inputs: The rule is that harvest rates should not exceed regeneration rates. In other words sustainable yield exploitation should be the rule. The sustainable yield concept presents two problems: measurement difficulties, and the existence of many different sustainable yields, one for each possible population of the exploited resource. The measurement problem is similar to that faced by the income accountant -- measuring income in a way that keeps capital (productive capacity) intact and prevents inadvertent impoverishment by over-consumption. The point in both cases is to find a prudent rule of thumb to avoid over-consumption, not to find the "theoretically unique scientifically precise number." But the rule to exploit at sustainable yield does not tell us what size population of the exploited resource should be maintained in this way. Choosing the population size that gives maximum sustainable yield does not give a sufficient answer, although it is relevant consideration. The economically optimum yield generally does not coincide with the biological maximum yield (they coincide only when harvest costs are constant with respect to the amount harvested). There is no warrant for assuming that the existing population size of an exploited species is optimal. It can be quite reasonable up to a point to cut down forest for farmland. But when we do this we must be clear that the trees from the virgin forest cut in excess of replacement represent capital consumption, not income. If total capita is to be maintained intact the net receipts from the cut virgin timber should be treated as a depreciation fund to be reinvested in some alternative renewable resource that is more valuable at the margin.

(b) Nonrenewable inputs. The rule is to deplete at a rate equal to the rate of development of renewable substitutes. Thus extractive projects based on nonrenewable resources must be paired with a project that develops the renewable substitute. Net receipts of nonrenewable exploitation are divided into two components (income and a capital set-aside) such that the capital set-aside, when invested in a renewable substitute each year will, by the time the nonrenewable is depleted, have grown to a stock size whose sustainable yield is equal to the income component that was being consumed all along. The capital set-side will be greater the lower the growth rate of the renewable substitute (real or biological discount rate) and the shorter the lifetime of the non-renewable reserves (i.e., the reserve stock divided by annual depletion). The logic and calculations have been worked out by El Serafy in the context of national income accounting, but apply with equal relevancy to accounting at the project level.

Module 5

5. Environmentally Sound or Unsound? Participant Experiences in Design and Implementation

Description/Objectives

This module is designed to stimulate your open discussion of successes and failures and to identify key problems that need to be tackled in the activity, project or program development and implementation process. You were asked in your invitation to bring with you to the workshop examples from your own experience. These will be used in this module to discuss actual design and implementation issues.
Participants present experiences (formal or informal) with specific activities in the country that were notably successful or unsuccessful in managing potential environmental problems.

You will also be asked to prepare a summary list (and seek consensus) on principal obstacles to environmentally sound design and implementation. Please post your list (e.g. on a large piece of butcher block paper) in the classroom for the duration of the course to refer back to when delving into the details of the course and feel free to add items to it.

Questions to Think About

- Environmentally-sound design principles are not new. Have they been followed? If not, why not?

- What more can be done nationally and locally to improve environmentally sound program, project and activity design?

- Do you have specific examples of sound or unsound designs that the other participants would benefit from knowing about or should be alerted to? Are there particularly sensitive situations to watch out for? What low-cost techniques have you seen applied to identify potential problems? Are there certain kinds of regionally-based technical resources/expertise (e.g. GIS, remote sensing, water resource planning, etc.) that could improve environmentally sound design?

Module 6

6. Individual Experiences with Environmental Design and Assessment

Description/Objectives

This session is designed to allow you to share your experiences and thoughts and get to know the other participants a little better. You will be asked to describe the activities or projects you work on, your thoughts on the first day, and your goals for the week.

In addition, you may have taken part in the design of development activities or projects. These activities may have had an impact on the environment, positive or negative, reversible or irreversible, direct or indirect. This session provides an opportunity to share your thoughts and observations on activity or project design, successes and failures.

Questions to Think About

1. How are environmental considerations incorporated into the design of activities that you work on? Is there a major difference between what is supposed to happen and what does in practice?

2. Have you witnessed any major successes or failures in terms of environmentally-sound design? If so, please describe them.

3. What do you perceive as the most important changes that need to occur to improve activity or project design and reduce negative environmental impacts? Are they legal, social, cultural, or other?

Module 7

7. Assessing Environmental Impacts: Basic Concepts

Description/Objectives

In most cases, the assessment of environmental impacts is a straight-forward process. It requires good information, reasoning, judgment, and communication. It is not just a job for scientists and other experts with complex techniques; anyone with the basic concepts and skills can contribute to the process.

This module is designed to introduce you to that process and its basic elements. What is the environment? What is an impact? When is it significant? How does one go about determining the magnitude and importance of a potential environmental impact? Why bother? Subsequent sessions will elaborate on the environmental assessment process in its many forms, while this session addresses the following questions:

- What will happen to the environment as the result of an activity, project or project?
- What will be the extent and magnitude of these changes?
- Do these changes matter?
- What can be done about them?
- How can decision-makers be informed of what needs to be done?

Readings

Module Backgrounder: "Assessing Environmental Impacts: Basic Concepts"

MODULE BACKGROUNDER
Assessing Environmental Impacts: Basic Concepts

In this module, we will introduce you to the general terminology and concepts of how to assess projects from an environmental perspective.

1. What is Environmental Impact Assessment?

The first formal efforts to assess environmental impacts were conducted in the US in the early 1970s, in response to rising public concern over environmental deterioration. They were prepared in order to "provide full and fair discussion of significant environmental impacts" of a planned action and to "inform decision-makers and the public of the reasonable alternatives, which would avoid or minimize adverse impacts, or enhance the quality of the human environment." Since then, thousands of environmental impact assessments have been conducted around the world. Today, they are a legal requirement for major development projects with significant environmental impacts in most industrialized countries and in many developing countries.

In addition to legal requirements that may exist within the countries themselves, projects funded by most bilateral and multilateral funding agencies, such as USAID and the World Bank, must adhere to their own legal requirements, which generally specify the need for initial environmental examinations or more thorough environmental impact assessments.

To date, these and other donor requirements motivated the application of environmental impact assessment methods in many developing countries. While the process of assessing environmental impacts in developing countries has often been conducted by foreign consultants, with limited local participation, this situation is changing. More governments are developing their own environmental assessment programs with growing participation of local experts, officials, and the public.

The environmental assessment process should provoke question-asking. Both the questions and the answers can lead to a different focus for an activity, clarify its purpose and need, help refine alternatives, or suggest ways of improving an activity or project design. The impact assessor serves an important role by asking questions and,in doing so, soliciting the advice and information of both experts and the population affected by a proposed action.

The material presented in this module, and a subsequent one on tools and techniques, is designed to *familiarize* course participants with the key terminology and concepts involved in the process of assessing environmental impacts. Much of the material is general, and can be enriched by the experiences of local experts and project developers with environmental impact assessments in their own country.[1]

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1. It is principally drawn from four sources: UNEP, 1988; EPA, 1993; World Bank, 1991; and, Samba, 1994. Numerous textbooks are available for participants who are interested in learning more about EIA methods and practices. (See list of supplementary background readings, e.g., Wathern, 1988.)

Some Key Definitions and Principles

Assessing environmental impacts focuses on:

- ***The environment***, including three major and interconnected components: *physical components*, including the geology, topography, soils, water resources, and air quality; *biological components*, including fauna, flora, biodiversity, and ecosystems; and *social components*, including culture, religion, and local values.

- ***Impacts***, which are ~~deviations~~ alterations from a baseline situation, or the likely future conditions in the absence of the project. It is important to recognize that the baseline situation is not static, and that conditions may be improving or deteriorating regardless of whether a proposed action is undertaken. Defining this baseline situation, and more specifically the availability of sufficient and accurate data to do so, is one of the most important constraints in assessing impacts, particularly in developing countries.

- ***Assessment***, an activity that is part art and part science. Environmental information should be gathered and analyzed using rigorous scientific methods. However, environmental data are often lacking, analysis can never be complete, predictions are always uncertain, and outcomes are not guaranteed. The interpretation and evaluation of the results requires judgment. And choices inevitably involve the subjective weighing of costs and benefits and of the varied interests of different stakeholders. Assessing impacts involves far more than science alone.

The purpose is to:

- ***identify*** and ***concentrate*** on problems, conflicts, or natural resource constraints that could affect the viability of a project (UNEP, 1988);
- ***predict*** the likely environmental impacts of projects (or programs);
- ***identify*** measures to minimize the problems and ***outline*** ways to improve the project's suitability for its proposed environment (UNEP, 1988); and,
- ***present*** predictions and options to decision-makers and the public before irrevocable decisions are made.

The process should be:

- ***systematic*** to assure that all feasible alternatives are considered and compared and that all measures that could protect important environmental resources are given full consideration in the planning process;
- ***reproducible*** to permit independent verification of the findings and conclusions; and,
- ***interdisciplinary*** to ensure that experts in the relevant physical, biological, cultural and socioeconomic disciplines contribute their expertise to the overall assessment so that important perspectives and analyses are not missing.

2. Why Assess Environmental Impacts?

Apart from fulfilling legal requirements, **tangible benefits** can result from soundly assessing environmental impacts. The process should lead to more environmentally-sound and sustainable activities; and as a consequence, preserved or enhanced quality of life.

The process of assessing environmental impacts aims to ensure, to the greatest degree possible, that the undesirable environmental effects of an action are kept to a **practicable minimum**. Although virtually any new development, redevelopment, or remedial action will alter some attributes of the existing environment, the process of assessing environmental impacts can influence decision-making on key aspects of project design. Some of the potential benefits of assessing environmental impacts at the initial stages of a project include (Sadar et al., 1994):

- ***lower project costs*** in the long term (fewer costly changes later in the project; lower probability of environmental disasters, court cases, or costly clean-ups);
- ***alternative designs***, which provide options for decision-makers and the public to choose from, and thus show that environmental impact assessment can be an important *development planning tool;*
- ***mitigation activities*** that can be incorporated into project activities in time to address and minimize adverse impacts.

Timely environmental assessments have led to more balanced decisions that have made development projects more sustainable, both environmentally and economically. The following examples from Chew (1988) are just two of many that could be offered:

- "The environmental assessment of the Cairo Wastewater Project indicated that it would be necessary to phase construction activities and recommended several alternatives for the USAID mission and the Government of Egypt to consider before the engineering design and construction schedule were finalized.";
- "The environmental assessment of the ecological conditions in the Palcazu Valley in Peru was instrumental in convincing the USAID Mission and host country government to change the project's development strategy. The original plan centered on road building and encouraging settlers to clear the tropical forest in the area for large-scale, agro-industrial activities. The environmental assessment recommended against the proposed activities and, instead, proposed activities that emphasize natural forest management with very limited small-scale agriculture in the project area."

An important component of assessing environmental impacts is **public participation**. Local involvement gives communities and individuals a voice in issues that may bear directly on their health, welfare, and quality of life. Public participation should begin in the earliest phases of project planning and continue through the decision-making process.[2] An open flow of environmental information helps bring out the range of issues and offers the opportunity for people to make reasoned choices about the

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2. Public involvement can be formalized by scheduling public meetings and public information sessions, creating public advisory and/or liaison groups, and periodically distributing information concerning the status of project planning.

benefits and risks of proposed actions. Some benefits to the public of timely environmental assessments include (Sadar et al., 1994):

- an opportunity for the public to learn about the potential environmental effects of the proposed project and to express concerns;
- an opportunity for the public to influence the decision-making process, possibly leading to alternative designs or mitigation activities; and,
- enhanced public confidence in public and private institutions.

3. How to Assess Environmental Impacts? Some Basic Concepts

Assessing environmental impacts begins with posing a few simple questions about the nature of the proposed project (after UNEP, 1988):

- Is the purpose and need well-defined?
- What are the components of the proposed action?
- What will happen as a result of the project?
- What will be the extent of the changes?
- Do the changes matter?
- What can be done about them?
- How can decision-makers be informed of what needs to be done?

To answer these questions, you will need information and a framework for organizing that information.

Understand the Purpose and Need. The purpose and need for a project or activity should be thoroughly examined. It is misleading to define the purpose or need for a project in terms of the characteristics of the activity proposed, e.g., a road, a well, or introduction of fertilizer; instead, purpose and need should be defined and described in terms of why one is doing the project , e.g. improved access (in the case of a road); improved water supply or quality (in the case of a well); or improved agricultural production or increased income (in the case of fertilizer introduction). Important characteristics of describing the purpose and need for a project are the intended beneficiaries, the results to be expected, and the rationale for how the activity is expected to achieve the results. Often, thinking in this broad way will lead one to realize that other alternatives may be possible to serve the purpose and need. For example, water transport or sometimes air access can sometimes be viable alternatives to a road.

Determine the Project Components: Without knowing what the proposed action is, you cannot know how the action could alter the environment, much less what the impacts of those alterations would be. To understand the impacts of the action, communicate with program developers, project designers, engineers, and whoever else is involved in formulating the action and, if possible, visit a similar activity or project. By knowing what the activity or project components are specifically, you can determine what is or is not likely to be a problem. For example, air or noise may not likely be a problem, but loss of habitat could be.

Also, you should consider all the ancillary parts of a project. For example, reservoirs may require haul roads, borrow areas at some distance from the site, or intake structures on a river and

pipelines to carry water to feed the reservoir. Road construction, including rehabilitation, may require borrow areas, quarry sites or temporary detour roads. You should define not just the action, but all subsidiary components.

Evaluate the Baseline Situation: The baseline situation refers to the important characteristics of the area in which the proposed action would occur. The baseline study is necessary to enable prediction of environmental impacts of the proposed action and to provide a basis for comparing these impacts with what would likely happen in the absence of the proposed activity. Some points to remember are:

- Concentrate on relevant and important factors. There is often a tendency for scientists to waste considerable effort on research not directly relevant to assessing the nature and degree of environmental impacts. Early baseline studies compiled lists of "things" in the affected environment, and told little about ecosystem function and response. Today, baseline studies are more focused on the ecosystem properties most sensitive to disturbance.

- Establish the potential zones of impact, i.e., the appropriate geographic study areas. Consider the phases of the activity from planning through decommissioning and determine what aspect of the environment the action might alter at the site itself, in the immediate site vicinity or neighborhood, within the watershed, in the general area or region (transport routes or off-site construction related or disposal areas), within specific administrative jurisdictions or areas with economic and trade linkages (particularly with regard to socioeconomic or fiscal impacts), within the nation, across borders, globally, etc. Different alternatives can affect different geographic areas; and different types of alterations in the environment vary in geographic extent. Visual impacts, for example, are limited to what can be seen (with ordinary eyesight, with binoculars, from the air?) Avoid the common mistake of concentrating too much on the site of the activity itself and not on the surroundings.

- Provide a level of descriptive detail that is sufficient to indicate the nature of the natural and human resources that are potentially affected by the proposed action. The level of detail will vary with the nature of the proposed action and affected resources, as well as with the availability of data and the priority concerns identified in the scoping process. Table 7A-1 describes the major categories that should be addressed in a baseline study.

Table 7A-1

Major Categories in a Baseline Study

- **Geology** - geological provinces, bedrock formations, history of geological stability or instability.
- **Topography** - general topography of region, specific topography of project area.
- **Soils** - soils mapping, soil series properties, constraints to development.

- **Groundwater Resources** - nature of water-bearing formations, recharge rates, sustainable safe yields, locations and depths of existing wells, quality.
- **Surface Water Resources** - drainage basins and sub-basins, named and unnamed water bodies and watercourses, regulatory classification of water bodies, flow regimes, water quality data and evaluation, identification of existing permitted discharges to surface waters.
- **Terrestrial Communities** - spatial arrangement of vegetative community types, vegetative species-abundance listings, wildlife species-abundance listings, records of threatened and endangered plant and animal species.
- **Aquatic Communities** - nature of aquatic habitats, species-abundance listings for aquatic macro-invertebrate and fish communities, ecological indexing of community data.
- **Environmentally Sensitive Areas** - identification of wetlands, floodplains, steep slopes, stands of mature vegetation, aquifer recharge areas, areas of high water table, areas of rock outcrop, prime agricultural lands, and mines.
- **Air Quality** - regional quality and trends, data from local monitoring stations, reported exceedances of standards.
- **Sound Levels** - existing sound levels, sources of sound.
- **Land Use** - existing patterns of land use in region, regional planning for future use, zoning.
- **Demography** - censused or estimated population, recent trends and projections for future population.
- **Socioeconomics** - economic and social structure of communities, tax rates, characteristic types of development.
- **Infrastructural Services** - nature and status of human services such as police and fire protection, hospitals, schools, utilities, sewage, water supply, solid waste disposal.
- **Transportation** - layout and function of existing roadways, railways, airports; existing and projected capacities and demands.
- **Cultural Resources** - location and characterization of identified cultural resources (archaeological, historical, cultural, landmark), potential for unidentified resources to be present in project area.
- **Project Economics** - comparative analysis of proposed alternatives with present worth cost-effective criteria, cost/benefit criteria, or other methods.

Consider a Range of Alternatives: You should consider the impacts of three options: a) the *proposed project* under consideration; b) the *no-action alternative*[3]; c) and *other alternatives* to the proposed project. In most cases, legal requirements indicate that all three must be considered. Alternatives are different means of meeting the general purpose and need of a proposed action, project, or program. Some points to remember are:

- Identifying and describing feasible alternatives should be carried out as soon as possible after the purpose and need are established; in this way, project planning does not bias the assessment toward one alternative or another.

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3. It is important to stress the role of the no-action alternative as it serves as a baseline against which the other alternatives can be measured. When the environmental consequences of the other action alternatives are weighed against their projected benefits, the no-action alternative can sometimes be the preferred alternative and the one selected.

- Alternatives should offer legitimate and substantive choices. The alternatives evaluated should ideally provide the decision-makers with different geographical locations for the action and with different technical or planning solutions for achieving equivalent goals.

Identify Potential Impacts: This is where both the science and art of the process are applied. Although scientific methods should be used whenever possible, there are often limitations due to inadequate data, complex relationships, and limited time and resources. Therefore, seeking the input of knowledgeable local experts and applying experienced judgment are essential - where these are lacking, simple intuition and logical reasoning are useful for initial purposes.

There are many tools and methods, from simple to sophisticated, that can be applied; the art lies in knowing when to apply each tool and how to make important assumptions in the absence of complete information.[4] The simplest and most commonly used tools are *checklists, matrices, map overlays, and network analyses*, which are primarily used for impact identification. Other more sophisticated techniques can be employed, such as geographic information systems. Impacts can fall within several different classes, which can have bearing on their overall significance, as described below:

- **Direct (Primary) vs. Indirect (Secondary) Impacts.** ***Direct impacts*** are those effects that are generally associated with the construction, operation, maintenance of a facility or activity, and are generally obvious and quantifiable. ***Indirect impacts*** are those induced changes in the environment, population, economic growth and land use, and other environmental effects resulting from these changes in land use, population, and economic growth. Indirect impacts can include additional construction and/or development, traffic increases, increased recreational demand, and other types of off-site impacts generated by on-site activities.

- **Short-Term (Temporary) vs. Long-Term (Permanent) Impacts.** Impacts can be short-term or long-term depending upon the persistence or duration of the impacts. The duration of impacts may have a lot to do with project ***phase*** in which they occur: ***pre-operational*** (e.g. construction), ***operational***, or ***post-operational*** (e.g. after project completion or plant decommissioning).

  Impacts can also occur in anticipation of a project. The threat of an activity or project considered undesirable can lead to loss of land value, making it difficult to transfer nearby properties, even before the project occurs. Likewise the promise of an action considered desirable may induce people to move to the location, in hopes that they will become project beneficiaries. Concerns about relocation can be more intense before a move than the actual relocation. It is a common pitfall to ignore those impacts occurring in the planning and assessment phase or those that occur after the project has served its useful life.

- **Positive (Beneficial) and Negative (Adverse) Impacts.** Although the term "environmental impact" has come to be interpreted in the negative sense, many actions have significant positive effects that should be clearly defined and discussed. This is

4. Tools and methods are described in more detail in a later session (*"Methods and Tools"*).

particularly appropriate for redevelopment or remedial actions whose specific purpose and need is to remedy any undesirable condition.

- **Cumulative Impacts.** Cumulative impacts are those environmental impacts that result from the incremental impact of the proposed action on a common resource when added to other past, present, and reasonably foreseeable future actions. Circumstances generating cumulative impacts could include: water quality impacts from an effluent discharge that is combined with other point source discharges or from non-point source runoff; or loss and/or fragmentation of environmentally sensitive habitats (forests, wetlands, farmlands) resulting from several separate development projects. The assessment of cumulative impacts is difficult, in part due to the speculative nature of the possible future actions, and in part due to the complex interactions that need to be evaluated when considering collective effects. Water and air quality modeling provide a means to study effects of cumulative impacts.

Predict Potential Impacts: Once impacts are identified, the next step is to predict the extent of the changes in environmental conditions that are *caused* by the proposed action. To do so requires an understanding of the important *cause-and-effect relationships*. Environmental impacts will have a number of distinct characteristics which should, if possible, be separately forecast to give a complete picture of the anticipated change due to the project. Typical impact descriptors are (adapted from Takawira, 1995):

- **Magnitude**: the absolute or relative change in the size or value of an environmental feature. Uncertainty is likely in forecasting the magnitude of change, and some upper and lower estimates may need to be given.

- **Direction**: the impact will represent a beneficial or negative change. It is therefore important to know the direction of the impact as the beneficial impacts are welcome. It is the negative impacts which are cause for most concern.

- **Extent**: the area affected by the impact -- e.g., in hectares of productive agricultural land or kilometers of river. A distinction here between on-site and off-site impacts is often useful.

- **Duration**: the time period over which the impact will be felt. Some impacts may be very short term (i.e., during construction), some may occur over a number of years, and some may be permanent. It is often desirable to specify duration in terms of short-term (i.e., 1 year or less), medium-term (i.e., 1 to 10 years), and long-term (i.e., more than 10 years).

- **Frequency**: refers to the return period for impacts which will recur over and over again -- e.g. seasonal air quality problems. Categories of return period can often be used to advantage in specifying frequency (e.g. annually or less, 1 to 10 years, 10 to 100 years).

- **Reversibility**: refers to the permanence of the impact. Several distinctions are possible here. Impacts may be reversible by natural means at natural rates, or be reversible by various forms of human intervention at reasonable costs, or be, for all practical

purposes, irreversible. Irreversible impacts are likely to be more severe as this assumes permanent damage to the environment.

- **Likelihood of Occurrence**: refers to the possibility of a particular impact occurring as forecast. Here, an estimate is made about how certain the impact prediction is, given the limitations of environmental science. Again, establishing categories of analysis such as "definite," "probable" and "possible" may come in useful if they are well-defined.

In general, there are two approaches that are commonly used to predict ultimate impacts:

- ***Quantitative analyses*** rely on simulation models, such as air quality or water quality models, that aim to represent the linkages between ecosystem or other environmental components in simplified, mathematical relationships. Simulation modeling tends to be complex, expensive, and data-intensive. Their use may be limited due to data and financial constraints of most developing countries. Not all quantitative analyses need to rely on models, however. The number of people affected, such as those relocated or subject to some describable change in the environment, can be counted; the acres of habitat disturbed can be measured; the per capita amount of sewage or solid waste generated can be estimated; the loss of an economic resource and its income value can be calculated.

- ***Qualitative analyses*** rely on professional judgment or intuitive reasoning to predict cause and affect relationships and ultimate impacts. Often, these types of predictions are most appropriate given resource constraints. One straightforward way to consider impacts qualitatively but systematically is to think about linkages among impacts. Road-related noise, for example, is a function of projected traffic volumes and speeds, which, in turn, depend upon the type and kind of road and the employment or population in an area; the level and significance of impact would depend upon how many people might hear the noise and whether or not this would affect daily activities (schools or places of worship might be more significantly affected than more ordinary work places).

Determine Significance of Impacts: Significance of a predicted impact depends upon its context and intensity. Significance varies with the setting or context, e.g. the loss of one hectare of park in an urban setting may be more significant than the same quantitative loss in a more rural setting, unless of course that hectare is habitat for an endangered species (or belongs to you!). A new or rehabilitated road in an urban area could be far less significant than the same road in a remote or wilderness setting. The intensity of an impact depends upon the degree to which an action:

- affects public health or safety;
- affects unique characteristics of an area (culturally or historically important resources, park lands, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas);
- is likely to be highly controversial;
- is highly uncertain or involves unique or unknown risks;
- establishes a precedent;

- adversely affects nationally defined historic places, adversely affects endangered or threatened species or habitat and the like (Council on Environmental Quality regulations, 40 CFR 1508.27).[5]

Thus, determining "significance" involves a judgment, tempered not only by applicable national or international laws protecting the environment but by societal perceptions about what is important.

Compare and Evaluate Alternatives: Once the level of potential impacts has been predicted, you will need to weigh and compare the various types of impacts in order to decide on the preferred alternative. Of necessity, this process involves value judgments and trade-offs between environmental and economic gains and losses. Therefore, the methods you use to make the comparisons should be as explicit and transparent as possible. Although there are various systematic approaches that can help in this effort, such as *environmental indices*, *cost-benefit analysis*, *hypothetical choice approaches*, and *multi-criteria analysis*, they all involve subjective and value-laden premises, since comparisons must be made that are essentially like comparing "apples and oranges." Answering the question 'which is more valuable?' is problematic and subject to controversy because it is very difficult to compress information about attributes into a single monetary measure. For example, there is no objective criteria one can apply to compare the inherent value of an endangered species with the aesthetic value of a natural forest.

Identify Mitigation Options: Mitigation is the purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment. Mitigation is a general concept that could include the following list of categories:

- Avoiding impacts altogether by not taking a particular action;
- Minimizing impacts by limiting the magnitude of the action;
- Rectifying impacts by repairing or restoring particular features of the affected environment;
- Reducing impacts over time by performing maintenance activities during the life of the action; and,
- Compensating for impacts by providing additions to or substitutes for the environment affected by the action.

You should note that the above categories of mitigation approaches are arranged hierarchically according to their desirability. In other words, it is more desirable to avoid impacts than to have to rectify impacts or provide compensation for them (from Environmental Law Institute, 1991).

4. When Should Environmental Impacts Be Assessed?

The environmental assessment process ideally begins early, as early as the planning stage. Environmental considerations should be integrated with other planning to ensure that decisions reflect environmental values and to identify potential conflicts. The situation to avoid is having decisions made

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5. Please note that USAID regulations (22 CFR Part 216. 1(c)(11) define significant with respect to effects on the environment outside the US as doing significant harm to the environment, but this very particular definition is not common to environmental impact assessment in general.

and/or monies committed before the environmental assessment process occurs; in this case, the environmental assessment has little (or, certainly, less) influence on choices regarding project or activity design, siting, technology, scale, beneficiaries or the like. At worst, the environmental assessment can become simply an exercise to meet a requirement -- not an appropriate way to achieve environmentally sustainable development.

The assessment of environmental impacts is conceptually a continuous or ongoing process, linked to the project cycle; although assessment is typically thought of and done prior to project implementation, the principles and practice of environmental assessment should continue to be applied, once an action is approved and implemented. Following are some examples of when the principles and practice of environmental assessment can be applied:

- programmatic or generic review of recurring activities or projects, leading to criteria for implementation, generic modifications, or adoption of required procedures for screening or assessing project or activity sites and/or components;
- initial examination during a pre-feasibility phase;
- detailed assessment, if required based on an initial analysis;
- detailed mitigation plans as a follow-up to the initial examination or detailed assessment to accompany the design phase;
- monitoring (and adjustment as appropriate) of mitigative measures carried out, during construction and/or operation;
- re-assessment at decommissioning or abandonment of a project.

It is rarely too late to incorporate environmental concepts into a project or activity; the point is to consider long run environmental sustainability throughout a project or activity and, wherever possible, to consider environmental issues and concerns as part of the ongoing planning and development of an area.[6]

5. Who Should Be Considered When Assessing Environmental Impacts?

The sponsor of an action (the proponent or the group or institution that proposes the action) is typically biased in favor of the action. Despite this, it is common that the proponent will, at least initially, be responsible for assessing the environmental impacts. In some situations, a funding or lending agency (such as USAID, the World Bank, or sometimes even a mortgage lending bank) and/or a regulatory agency (such as a national or other level body) will have reviewing or even veto authority. Other agencies of government or even international bodies can be concerned, although not necessarily have statutory responsibility. For example, a Wildlife Department may be concerned about activities

6. Assessing environmental impacts can go beyond the project or activity level. The concept of "strategic environmental assessment" recognizes the importance of considering entire sectors, regions or policy level actions.

or projects in the vicinity of a protected area; activities that affect habitat for migratory birds could attract the attention of other nations or of international groups concerned about birds. It is extremely useful to understand the concerns of a reviewing or funding/lending agency, to know the limits of jurisdiction and the authority of regulatory agencies, and to involve them at the earliest stages.

Clearly, the concerns of directly or indirectly affected populations need to be considered. In this regard, it is important to recognize that activities affect segments of the population in different ways, e.g., old or young; healthy or infirm; male or female; rich or poor; farmer, pastoralist, transporter, businessman, etc. Populations are also differentially affected depending upon where they live or their use of resources relative to the proposed action. For example, a dam affects downstream users of a river differently from upstream users; alterations in river water flows or in water quality affect dryland farmers differently from farmers using irrigation, differently from herders, and differently from industries or urban areas withdrawing water. In assessing environmental impacts, it is important to think about who (and how many different "whos") stand to lose or gain from the proposed activity.

6. Some Practical Guidelines

Assessing environmental impacts typically requires that you understand the project or activity in detail, think about how it alters the environment (including people) and determine when, where and to whom the alterations occur and whether they matter. The steps you typically need to take include:

- review the literature,
- perform a reconnaissance,
- refine a data gathering approach and method,
- execute data gathering,
- analyze data,
- predict impacts,
- recommend mitigation measures, and
- communicate all of the above (typically in a document and often in meetings).

Module 8

8. Sustainability in the Host Country and Host Country Issues

Description/Objectives

This module addresses the question "Why is it important for NGO's engaged in small-scale development activities to pay attention to the host country's environmental impact assessment procedures, environmental policy, legislation, and programs?" The session emphasizes that host country Environmental Assessment requirements are likely to be similar to those of USAID's, but in some cases more stringent.

It also emphasizes the role host country environmental programs can play in supporting NGO environmentally-sound, small-scale development activities as well as how NGOs can be helpful to environmental regulation and management in the host country. It places emphasis on the need for partnership between NGOs and Government in developing host country environmental capacity and in supporting environmental mitigation and monitoring. The session gives the participants a sense of the issues and constraints host countries face in trying to strengthen their capacity to manage and regulate the environment and natural resoruce base for the long-term benefit of their people.

Readings

Selected background readings include:

Mwalyosi, Raphael and Ross Hughes, *The Performance of EIA in Tanzania: An Assessment*, International Institute for Environment and Development, Environmental Planning Group, IRA Research Paper Nol 41, Environmental Planning Issues No 14.

Environment - Related Literature for the USAID/Tanzania Partners Environmental Assessment Training Course: Sopa Lodge, Tarangire National Park, Tanzania

By

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1. Arhem, K. (1985) *Pastoral Man in the Garden of Eden: The Maasai of the Ngorongoro Conservation Area, Tanzania.* Uppsala Research Reports in Cultural Anthropology. Uppsala (B. Nangoro, CORDS).

2. Boesen, J.; Kikula, I.S. & Maganga, F.P. (Eds) (1999). *Sustainable Agricultur in Semi-Arid Tanzania*. DUP (Director, IRA).

3. Brew, D. and Lee, N. (1996). Monitoring Environmental Management Plans and Post-Project Analysis. EIA Newsletter 12: 10-11 (R. Mwalyosi, IRA).

4. Canter, L and Sadler, B. (1997). *A Tool Kit for Effective EIA Practice - Review of Methods and Perspectives on their Application: A Supplementary Report of the International Study of the Effectiveness of Environmental Assessment*. IAIA, June 1997 (R. Mwalyosi, IRA).

5. Clark, D; Bisset, and Wathern, P. (1980). *Environmental Impact Assessment*: A bibliography with abstracts (R. Mwalyosi, IRA).

6. Danida/Ministry of Foreign Affairs (1989). *Environmental Profile: Tanzania*. (Danida, Dar es Salaam).

7. Glasson, J; Therivell, R. and Chadwick, A. (1997). *Introduction to Environmental impact Assessment.* University College London Press (R. Mwalyosi, IRA)

8. Hitchcock, L. (1994). *Report on Existing Legislation Pertaining to Environment*. United Republic of Tanzania. May, 1994 (Director, Division of Environment, Dar es Salaam).

9. Howlett, D.J.B. and Nagu, J. (1997). *Agriculture Project planning in Tanzania: A handbook on cycles and sequences, participation, identification, planning and design, economic and financial analysis, and environmental assessment of agricultural projects.* Institute of Development Management, Mzumbe, Tanzania and Development and Project Planning Centre, University of Bradford, UK. (J. Nagu, IDM, Mzumbe).

10. IRA/IIED (1995). *Environmental Assessment in Tanzania: A Needs Assessment for Training*. IRA Research Paper No. 36 (R. Mwalyosi, IRA).

11. IIED/IRA (1999). *Orientattion Course on Environmental Impact Assessment in Tanzania: Resource handbook.* International Institute for Environment and Development/Institute of Resource Assessment (R. Mwalyosi, IRA).

12. IIED/IRA (1999). *Review and Quality Control Course on Environmental Impact Assessment in Tanzania.* International Institute for Environment and Development/Institute of Resource Assessment (R. Mwalyosi, IRA).

13. IIED/IRA (1999). *Introductory Course on Environmental Impact Assessment in Tanzania.*. International Institute for Environment and Development/Institute of Resource Assessment (R. Mwalyosi, IRA).

14. IIED (1994). *Whose Eden? An overview of community approaches to wildlife management.* International Institute for Environment and Development (R. Mwalyosi, IRA).

15. IIED (1994). *National Sustainable Strategies: Experience and Dilemmas.* International Institute for Environment and Development (R. Mwalyosi, IRA).

16. IIED (1997). Southern Africa Beyond the Millenium: Environmental Trends and Scenarios to 2015. International Institute for Environment and Development, Environmental Planning Issues No. 13 (R. Mwalyosi, IRA).

17. IRA/WCST/AGENDA (1996). *The Proceedings of the Workshop on 'Putting the Environment on the National Agenda'.* Institute of Resource Assessment/Wildlife Conservation Society of Tanzania/Agenda (R. Mwalyosi, IRA).

18. IUCN (1995*). Conserving Biodiversity Outside Protected Areas: The role of traditional agro-ecosystems.* IUCN Forest Conservation Programme (R. Mwalyosi, IRA).

19. Kikula, I. (1997). *Policy Implications on Environment: The case of villagization in Tanzania.* The Nordic Africa Institute, Uppsala, Sweden (I. Kikula, IRA).

20. Kiss, A. (Ed.) (1990). Living with Wildlife: Wildlife Resource Management with Local Participation in Africe. World Bank Technical Paper No. 130, African Technical Department Series. The World Bank, Washington, D.C. (R. Mwalyosi, IRA).
Mboya *et al.* (1995). Structural Adjustment and Sustainable Development in Tanzania.

21. MAC (1997). Agricultural and Livestock Policy. Ministry of Agriculture and Cooperatives, United Republic of Tanzania (Principal Secretary, Ministry of Agriculture and Cooperatives).

22. MLHUD (1995). *National Land Policy. United Republic of Tanzania.* Ministry of Lands, Housing and Urban Development, Dares salaam (Principal Secretary, MLHUD, Dar es Salaam)

23. MNRT (1998). *The Wildlife Policy of Tanania.* Ministry of Natural Resources and Tourism, United Republic of Tanzania, March, 1998 (Director, Wildlife Division) .

24. MNRT (1998). *National Forest Policy.* Ministry of Natural Resources and Tourism, United Republic of Tanzania, Dar es Salaam, March 1998 (Director, Forestry and Beekeeping, Dar es salaam).

25. MNRT (1998). *National Beekeeping Policy.* Ministry of Natural Resources and Tourism, United Republic of Tanzania, Dar es Salaam, March, 1988 (Director, Forestry and Beekeeping, Dar es salaam).

26. MTNRE (1994). *Tanzania National Environmental Action Plan.* A First Step. Ministry of Tourism, Environment and Natural Resources. United Republic of Tanzania, Dar es Salaam (Director, Division of Environment, Dar es salaam).

27. MTNRE (1995). *A Review of the Wildlife Sector in Tanzania. Volume 1: Assessment of the current situation.* Wildlife Sector Review Task Force, Ministry of Tourism Natural Resources and Environment, 1995 (Principal Secretary, MTNRE, Dar es Salaam).

28. Muir, A., (1994). *A situational Analysis of Pastoralism in Simanjiro District, Tanzania.* VETAID, Scotland (B. Nangoro, CORDS, Arusha).

29. Mwalyosi, R.B.B. (1990). *Integrated Resource Management Strategy for Lake Manyara Catchment Basin.* Final Report. Institute of Resource Assessment, University of Dar es Salaam, June 1990 (R. Mwalyosi, IRA).

30. Mwalyosi, R.B.B. (1990). *Resource Management in Semi-Arid Areas: The case of Masai Steppe of Northern Tanzania.* Ph.D. Thesis, Agricultural University of Norway, As 1990 (R. Mwalyosi, IRA).

31. Mwalyosi, R. and Hughes, R. (1998). *The performance of environmental assessment in Tanzania: an assessment.* IRA Research Paper no. 41/IIED Environmental Planning Issues no. 14 (R. Mwalyosi, IRA).

32. Mwandosya, M.J.; Luhanga, M.L. & Mugurusi, E.K. (1994). *Environmental Protection and Sustainable Development*: Proceedings of and papers from the workshop on National Environment Policy in Tanzania held at the Kilimanjaro Hotel, Dar es Salaam, 21-25 November, 1994 (Director, Division of Environment, Dar es Salaam).

33. NEMC (1994). *National Conservation strategy for Sustainable Development.* National Environment Management Council, Dar es salaam (DG, NEMC, DSM).

34. NEMC (1997). *Environmental impact assessment guidelines for Tanzania.* Draft proposal. National Environment Management Council, Dar es Salaam (DG, NEMC, DSM).

35. Ole Nangoro, B., (1997) "*Branding the Land: Maasai Responses to Pastoral Land Tenure Insecurity and Social Change.* In Horn, F., (ed) (1997), Economic, Social and Cultural Rights of the Maasai; pp 15-93; Northern Institute of Environmental and Minority Law, University of Lapland (B. Nangoro, CORDS, Arusha).

36. Raikes, L.P. (1981). *Livestock Development and Policy in East Africa.* Centre for Development Research. Publications, Scandinavian Institute of African Studies, Uppsala (R. Mwalyosi, IRA).

37. Roe *et al.* (1995). A Directory of Impact Assessment Guidelines. IIED/IUCN (R. Mwalyosi, IRA).

38. Roe, D. Leader-Williams, N. & Dalal-Clayton, B. (1997). *Take Only Photographs Leave Only Footprintss: The environmental impacts of wildlife tourism.* IIED Wildlife and Development Series No. 10 (R. Mwalyosi, IRA).

39. Sadler, B. (1996). *International Study of the Effectiveness of Environmental Assessment: Final Report: Environmental Assessment in a Changing World: Evaluating practice to improve performance.* CEAA/IAIA (R. Mwalyosi, IRA).

40. Shishira, E.K.; Yanda, P.Z.; Sosovele, H. and Lyimo, J. (1997). *Kilosa District Land Use and Natural Resources Assessment.* Report for Kilosa District Council/Irish Aid (Director, IRA).

41. Seaton Thomson & Associates (1997). *A Business Plan and Feasibility Study for the Development of a Luxury Game Lodge at Boundary Hill, Tarangire National Park, Tanzania.* Prepared for African Project Development Facility & The International Finance Corporation CFA, September, 1997.

42. TANAPA (1994). *Guidelines for the preparation of environmental impact assessments for Tanzanian National Parks.* Tanzania National Parks, Arusha (DG, TANAPA, Arusha).

43. TANAPA (1994). *National Policies for National Parks in Tanzania. Tanzania National Parks.* Arusha (DG, TANAPA, Arusha).

44. TANAPA (1994). *Management Zone Plan: Tarangire National Park.* Tanzania National Parks (DG, TANAPA, Arusha).

45. UNEP. Convention on Biological Diversity: Text and Annexes (R. Mwalyosi, IRA).

46. UNEP: United Nations Framework Convention on Climatic Change (R. Mwalyosi, IRA).

47. United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and Desertification Particularly Africa. May, 1995 (R. Mwalyosi, IRA).

48. URT (1997). *National Environmental Policy. Vice President's Office*, United Republic of Tanzania, Dar es Salaam (Principal Secretary, VPO).

49. Wathern, P. (1988). Environmental Impact Assessment: Theory and Practice, Routledge (R. Mwalyosi, IRA)

50. WHO/CEMP (1992). Environmental and Health Impact Assessment of Development Projects. A Handbook of Practitioners. Elsevier Applied Sciences, UK. (R. Mwalyosi, IRA).

51. Wood, C. (1992). Environmental Impact Assessment: A Comparative Review. Longman (R. Mwalyosi, IRA).

52. WWF/TANAPA (1999). *Management Requirements for Sustainable Conservation of Lake Manyara and Lake Burungi Wetlands*. World Wide Fund for Nature/Tanzania National Parks, April, 1999 (Director, WWF- Dar es Salaam).

TANZANIA'S RESOURCE ECOLOGY: AN OVERVIEW OF ENVIRONMENT/NATURAL RESOURCE TRENDS AND ISSUES

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1.0. INTRODUCTION

1.1 Definition

There are many definitions of the term 'environment'. Some of the common ones include:

* External conditions or surroundings, especially those in which people live and work (Collins Concise Dictionary)

* Surroundings, surrounding objects, region, or circumstances (Oxford Dictionary)

* Surroundings, circumstances in which a person or animal lives (Chambers Mini Dictionary).

All the above definitions emphasize the word 'surroundings'.
Other accepted terms are used to describe the collective influence of climate, geology, hydrology and biology in shaping the resource potential of a geographic area. Basically these are the conditions of life. Owing to the wide definition given to the word 'environment' it is often prefixed with other descriptive terms to give the term a more specific emphasis.

For example:

. The 'built-environment' is used to describe the collective perception of urbanization and industrial development and the conditions imposed by the process.

. 'Environmental Assessment' is the base line monitoring and compilation of data relating to the quantification of the important physical and biological characteristics of an area.

1.2. Historical Perspective

Over the last approximately 200 years our perception of the natural environment has changed dramatically. It began with the notion that 'nature' was inexhaustible, that we could use it all up and that it could assimilate all our wastes forever. At the other end of the spectrum is the emerging consensus that we are now approaching the productive and assimilative capacities of the natural systems, as demonstrated by the fundamental changes occurring at national (deforestation), regional (acid rain) and global (climate change) levels. Between these two extremes is a variety of approaches to environmental management that reflect differing perceptions of the problem and potential solutions.

Thus, in its simplest form, we have gone through five general stages in the evolution of environmental management, each with its attendant techniques and

approaches as will be explained in the paragraphs below.

The first stage was a desire to protect places of natural beauty and species of rare occupance, which gave rise to the conservation movement in the last century. This was reflected in the establishment of national parks and areas of protected species in virtually all regions of the world. Outside of these special reserves, however, the notion of 'endless bounty' prevailed.

The second stage was linked to the management of specific natural resources - forests, wildlife and fish. The objective was not to conserve the resources, but rather to maximise production for commercial, recreational or aesthetic benefit. This led to the development of professional resource managers in the early part of this century, a disciplinary approach which persists to-day.

The third stage emerged in response to the pervasive and growing pollution of air, water and soil. The focus at this stage was on environmental protection, as opposed to environmental management.

The fourth stage, which began to emerge in the s, arose as a result of the conflict among competing resource managers as well as the impact being felt by all resources from development. It is primarily concerned with the allocation of scarce resources among competing users.

The fifth stage, which is just emerging sees the concept of environmental management expand to encompass the economic and social contexts within which the competing uses for resources are granted. The Brundtland Commission's report called for an integration of economic and environmental decision-making at strategic (policy) levels. It also called for action in all sectors of society, including governments, corporations, NGOs and general public. This stage is characterized by:

* a comprehensive view of the links between environment and economy;
* a recognition of the need to influence decision at strategic levels;
* a commitment to involving all sectors of society in the decision-making process; and
* the requirement to consider the needs of the future generations in resource use planning.

The United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro in June 1992. It was the largest summit conference ever attended by 100 heads of state or government on recognition for the need to protect the environment and the pressures on it resulting from unsustainable development. The conference resulted in a number of historic agreements and confirmed the importance of environmental issues on the political agenda. But the conference must be seen as the start of a new, sustained effort to tackle these problems at all levels - globally, nationally and locally.

One of the dilemmas involved in the rapid evolution of the concept and practice of environmental management is that not all countries are at the same stage in the evolutionary process, for a variety of reasons. Basically, Tanzania only has financial and human resources to operate effectively in the first two stages.

2.0. MAJOR ENVIRONMENTAL ISSUES AND TRENDS IN TANZANIA

2.1. Introduction

Section 1.0 has defined the environment and introduced you to the evolution of environmental management in general. This section is a brief assessment of the

major environmental issues and trends related to natural resource management in Tanzania. Although this brief will not directly address the environmental management in the country, it will do so indirectly in the process of discussing the environmental issues and trends. These environmental issues are addressed in Sections 2.2 to 2.9 below.

2.2. Soil Degradation and Declining Productivity

Only about 22% of Tanzania's land has medium to high fertility. The rest of the land is not arable because of unreliable rainfall, infertile soils and rampant pests and vermin.

The high agricultural potential areas are often subjected to mechanized farming backed by the application of machine power and chemical fertilizers. Mechanized farming is mostly associated with the production of cash crops, e.g. coffee, tea, tobacco and sisal. In the absence of leguminous field plants, these crops require heavy application of costly and polluting chemical fertilizers. In the process, the complex mosaics of traditional food crops and trees are being replaced by monocrops at the cost of the environment through deforestation and soil degradation.

Thus, fertilizer use in Tanzania increased from 66,370 tons in 1973 to 100,225 tons in 1992. Such "modern farming systems" are not sustainable in the Tanzanian environment. This "heavy industry" form of agriculture is characterised by a relatively high fossil fuel use per person. Although this is very productive in terms of output but over a longer term it is unsustainable both ecologically and economically. These fuel-intensive systems are in effect designed to turn oil into food. The implications, even over the relatively short term, of such a system are clear: reduced soil and water quality through both heavy cultivation and the continual application of biocides and chemical nutrients.

The challenge now is to identify, restore and/or improve upon the traditional management systems which are likely to be sustainable.

Also, the high agricultural potential areas in Tanzania tend to support relatively high human population densities and growth rates. Consequently, land becomes inadequate for traditional shifting cultivation. Due to continuous use of the land, the soil rapidly loses fertility and productivity falls concomitantly. The response to the land shortage is often encroachment of cropland into public lands and protected areas (see Section 2.4).

One of the challenges here is to develop farming systems that can support the ever growing human population.

In the medium and low agricultural potential areas, natural population growth is augmented by in-migration from the crowded high potential areas. To compensate for the low yields in these areas, farmers expand farmland into marginal areas. These areas, when devoid of natural vegetation cover, become susceptible to wind and water erosion.

The crucial issue in this case is to develop resource management systems which are sustainable in marginal areas.

It must be pointed out that although Tanzanian farmers form the majority of the population, they lack political power (**unlike those in developed countries**) and are almost invisible in the national economy. Farmers are not given secure tenure, the right market signals or right information and do not receive payments for their harvests that are high enough to give them both the financial means and motivation to conserve their resource base.

Also, Tanzanian agriculture is depressed as opposed to that in developed countries where it is protected. Thus, Tanzanian farm produce is usually

cheap. Changes to this structure is being resisted by the developed world as was exemplified at the Uruguay Round of the GATT in 1990. In any case, freeing of trade will not automatically make Tanzanian agriculture more sustainable. In fact, it could lead to expansion of agriculture into marginal lands and deforestation which is contrary to the principles of sustainability.

Also, poorly conceived national policies can contribute to environmental problems. In Tanzania, **the best examples of such policies, is the Villagization Programme and the "farm or perish" campaigns**. Further, the withdrawal of agricultural subsidies in response to the ongoing economic adjustment policies in Tanzania, is a disincentive to the smallholder farmers who are likely to resort to soil mining and cheap but poor land husbandry practices. This will result into increased soil erosion, decline in productivity and further encroachment into marginal areas. The challenge is to develop strategic plans are responsive to the environment.

In addition, because of the Government's emphasis on agriculture, out of Tanzania's 6 million hectares of cultivated land, 450,000 ha (or 7.5%) are under wetland cultivation. Total wetland area identified as suitable for irrigation development is estimated to be over 1,164,600 ha. Todate significant amount of Tanzania's paddy is from floodplains in the Rufiji Basin, Kilombero valley, Usangu Plains and in Morogoro, Shinyanga, Mwanza and Coast Regions. Also, the Kilombero and Kagera floodplains produce significant amounts of Tanzania's sugar. Thus, potentials for expansion of wetland cultivation are high, as demand for more land for cultivation increases. This agricultural expansion will lead to destruction of wetlands and loss of biological resources.

Agricultural research and development in Tanzania have not been directed to small scale farming systems but to cash crop estates (of cotton, coffee, pyrethrum, tea, etc.) and high yielding cultivars (of rice and maize). Many modern and new tools and forms of crop husbandry, have been designed and tried in farming systems in Africa, but without success partly because it has been assumed that traditional crop production methods are poor, inefficient and/or erroneous. The truth is that the local farmers' knowledge of the environment in which they work is highly complex and organized, and research will only be useful if it is consistent, rather than at odds with, the well tried traditional methods.

2.3. Livestock and Overgrazing

About 60 million ha (or 50%) of mainland Tanzania is potential grazing land. The current livestock population in Tanzania is about 12.5 million cattle and 9.5 million goats and sheep (FAO, 1990) or 9.7 million Livestock Units (LU). This gives a stocking density of about 0.16 LU/ha, which is fairly low.

However, this national herd is not uniformly distributed in the country. About 60% of the livestock are kept on only 10% of all land in the country. Thus, livestock is concentrated in limited rangelands where stocking densities often exceed their carrying capacity (**eg. in the Lake Manyara Basin**). As a result, severe de-vegetation and deterioration of range condition has been reported for some areas.

Overstocking of localized areas is often due to the sedentarization of nomadic and semi-nomadic pastoral people, abolition of traditional land tenure systems and, the rapid growth in human population which demands more land for settlement and food production (**Examples from semi-arid areas**[2]).

The problem of over stocking in some areas is basically due to the failure of policies in de-stocking hence giving rise to low productivity and land degradation. This problem which is a long standing one dating as far back as the colonial days. In some instances, inadequate basic infrastructure and pursuance of uncoordinated and conflicting objectives on the use of land,

limit the more widespread distribution of livestock.

Parallel to the problem of overstocking is the problem of nomadic behaviour of pastoralists whose land tenure status is not clearly defined under the current land laws. Also, lack of support services due to severe shortage of competent field staff and equipment is yet another aspect that frustrate the livestock keepers. Thus, even though extensive programmes have been introduced to provide the basic knowledge, the shortage of skilled stockmen and farm managers continues to be a problem for the foreseeable future.

The major environmental challenge in the livestock sector is to correct the existing land tenure policy so as to allow for communal property ownership and to institutionalize the grazing control measures.

2.4. Forestry and Deforestation

Deforestation in this context refers to the depletion of woodlands and forests. There are several root causes of the pressures which lead to the unsustainable use of forests:

* an array of inappropriate, counter-productive government policies and instruments which undervalue forest resources and overvalue the results of clearing them;
* government acting as a weak, absentee landlord over forests it cannot control;
* insecure tenure both of those working in the forests and those outside;
* the high population growth rate;
* poverty which causes forests to be used for short-term economic gain.

Although Tanzania is still relatively well endowed with trees, they are disappearing fast. Records show that in 1938 forest estate was over 44 million ha (50% of the total land area). By 1987 this had declined to 38 million ha (43% of the total land area).

The 1987 report of the FAO/Government of Tanzania cooperative programme estimated that by 1980, 45% of the country suffered from desertification problems of one sort or another, while 35% of the rest was under threat. **The current extent of forest reserves in the country is shown in Figure 1**[3]. It is estimated that approximately 0.7% of forest and bushland are being cleared annually for agricultural purposes. **The ongoing project to map the forest cover in Tanzania will provide up-todate information on the current status.**

Despite covering an area of less than 2% of Tanzania's land surface, the remnant forests are important water catchments. Although many of these forests are forest reserves and national parks, they are still threatened by encroachment through cultivation, grazing and commercial logging. Commercial timber extraction is identified as the threat to the montane and sub-montane forest ecosystems.

Thus, for example, forests are being reduced at a rate of 55% per annum in the Kilimanjaro region and 30% in Mwanza and Mara regions. Deforestation due to expansion of cropland is particularly severe in the coffee/tea and cotton-growing regions.

A typical progressive deforestation process is exemplified by the East Usambaras[4]. Although man had been living in the area for at least 2,000 years, extensive forest still existed by the end of the 19th Century. The Germans expropriated most of the land as estates, planting coffee at higher altitudes. Under the British, some of the old German estates were converted to forest

reserves, but tea planting soon expanded from the 1940's resulting in extensive forest clearance. After independence (1961) there was a move towards more immediate exploitation of the natural resources through saw-milling and expansion of small scale agriculture resulting in degradation of substantial areas of the forest.

Other areas include those settled by refugees from Rwanda and Burundi. **Also, the coastal forests/thickets once covering about 59,300 km^2, now occur as isolated small patches in some cases as small as 2km^2** [5]. Similarly, only about 20% of the original mangrove forests are said to remain today.

The challenge is to re-establish plant native species and, to bridge the gap between forest harvesting and tree planting.

In the semi-arid areas such as the Manyara Basin, extensive deforestation for farming and the resultant soil erosion in some of the sub-catchments, has led to siltation of Lake Manyara. As a result, the lake level fluctuates with the rains causing major regular floods and habitat and species (both floral and faunal) changes in Lake Manyara National Park and the immediate environment.

Despite the extensive deforestation that has taken place in Tanzanian since the times of early explorers, over 90% of the Tanzanians still depend for many of their basic commodities (fuelwood, building materials, etc.) on what is left of the natural forest vegetation.

The total national demand for woodfuel now stands at about 44 million cubic metres per year. In most of the country, this energy demand and shifting cultivation where it is still practised, are sustained by the existence of primary, secondary and degraded forests. Even those who practice some form of sedentary agriculture, continue to depend on remnants of natural forest vegetation for their basic requirements. Therefore, with the ever increasing human population, deforestation and loss of biodiversity will continue to take place for a long time to come.

Conservation of forests should be regarded as a way of taking care of the country's unique ecosystems and biological diversity through appropriate management and utilization to meet the needs of the present without compromising the needs of the future generations.

Apparently, for a long time, forestry in Tanzania has not been concerned with large-scale fuelwood production. Instead, large scale industrial plantations have been established for timber and pulp. Village afforestation and community forestry programmes were initiated after the Arusha Declaration in 1967 and 1981 respectively, and mostly involved planting exotic Eucalyptus trees. Even these programmes have not been very successful because, often times, they did not pay attention to such issues as who had the right to plant, own and use the planted trees. The Green Revolution in agriculture is not concerned with fuelwood production either.

2.5. Water and Water Use

Water will become scarcer in the 21st century due to increasing demand from growing populations, urbanization, industrialization and irrigation. Most past development strategies have tended to take water availability for granted (**TANESCO, NAFCO**). Research on water scarcity as a constraint to development has been neglected and very few if any attempts have been made to incorporate water availability into development plans. Although some regional water master plans exist, they have either been inadequate or have not been used.

The main water uses in Tanzania are agriculture (irrigation), domestic, and industrial. There are vast discrepancies in the performance of irrigation systems in Tanzania and most irrigation methods are grossly inefficient. Overwatering leads to waterlogging and salinization (eg. **NAFCO' Dakawa**

Irrigation Project).

Water use in Tanzania is generally not priced. Failure to price water often leads to pervasive over-use and mis-use. Major irrigation systems are mainly built and operated by public agencies (**NAFCO**) that do not charge fully for services rendered. Large centralized irrigation schemes usually show the greatest inefficiencies in water use and often destroy the land being irrigated (**Examples include the Kagera Sugar Company).**

Deforestation and soil degradation are causes of water shortages in rural areas. Trees and other vegetation trap runoff water, reducing erosion and replenishing ground water supplies. In Tanzania, a large share of potentially valuable water runs off denuded hillsides in damaging floods (**Makonde, Tanga, Rufiji, Kyela).**

Industry uses fresh water for cooling, processing, cleaning and removing industrial wastes. Industry returns most of the water to the natural water cycle, but it is often heavily polluted with chemicals, heavy metals and heat. In many industries in Tanzania effluents are not treated. Thus industry and growing population will place heavy demands on water in and near the big cities in the country (**Msimbazi Creek, Pangani river, Themi/Kikuletwa rivers).**

Thus, fresh water is a complex and scarce resource, whose effective management requires careful balance between central government planning and control on the one hand, and individual initiatives and husbandry on the other. This balancing act is complicated by the peculiar nature of water: sometimes owned or controlled by individuals; sometimes, as rainfall, completely unowned and unpredictable; and sometimes, in an international river, the subject of vigorous international disputes.

2.6. Fish and Fisheries

Tanzania has about 53,000 km^2. of inland waters and 300 km of coastline. The introduction of the 200 nautical mile exclusive economic zone measured from the coast extending to the sea further extended the potential for the fishing industry.

Fresh water fisheries contributes 344,000 tones of fish per annum, or 80% of the total national fish production; the rest, (20%) comes from marine. Inland water fisheries employs about 53,000 full time and over 275,000 part time fishermen. For the past ten years or so, freshwater fisheries has increased from 164,000 tonnes in 1978 to about 357,000 tonnes in 1990.

Associated with fresh water fishing is the use of wood for smoking fish, which contributes to deforestation as can be evident around the Mtera and Nyumba ya Mungu reservoirs as well as around Lake Victoria.

Developments such as dam construction along the Great Ruaha and Pangani rivers; irrigation schemes in the Usangu, Kilombero and Lower Rufiji valleys; and the draining of swamps and estuarine forests (mangroves) reduce and destroy habitats suitable for fish, birds and other wildlife species. Other activities which have negative impacts on fish and fisheries include soil erosion and siltation as evidenced in Mtera and Nyumba ya Mungu reservoirs, and contamination of water and eutrophication in Lake Victoria.

Lake Victoria, had a naturally rich and diverse indigenous fish fauna. In the 1950's a suggestion was made that the Nile perch (Lates niloticus), a piscivorous species that grows to a large size, should be introduced into the lake. Although it was pointed out that simple ecological principles show that such an introduction would be detrimental, the idea was pursued by it's supporters and in 1960 the Nile perch found its way into the lake, apparently from nearby ponds into which it had already been introduced. Subsequently, this species was deliberately introduced into the lake. Since then the Nile

perch has spread rapidly throughout the lake.

The consequences of this invasion and of the establishment of the Nile perch in Lake Victoria are well known in Tanzania. Several indigenous fishes some of commercial importance have not merely declined but have virtually disappeared. Such a situation is inherently unstable and the ecology of the lake has been upset. To-date the landings from Lake Victoria are mainly dominated by Nile Perch. In 1987 out of 159,900 tons of fish produced in Lake Victoria, 97,500 tons was Lates.

It must be noted that such introductions are irreversible so that removal of Lates from Lake Victoria is now impossible and great damage has already been done to the Lake. Another recent disastrous introduction is that of the water hyacinth, which is proving difficult and expensive to eradicate.

The marine ecosystems of the Tanzanian coast have several diverse natural communities which are threatened by human activities including pollution especially from Dar es Salaam and Tanga where most of Tanzania's industries are located and discharge untreated wastes into the sea. Currently, there are about 50,000 fishermen who land about 50,000 tons of marine fish a year.

The fishing is largely artisanal although there is a growing semi-industrial component using trawlers for mainly prawn fishing. Due to poor operational range, fishing activities have concentrated to the near shore reef areas. These areas are already experiencing very heavy fishing pressure and are showing signs of over-exploitation. Coastal erosion, particularly around Dar es Salaam and the Zanzibar coast has been blamed for uncontrolled dynamite fishing, illegal sand extraction in the river beds close to the coast, as well as limestone quarrying from the sea bed.

Another disastrous development related to coastal fisheries is the introduction of prawn farming in the Rufuji Delta which is not only haphazard, but is a mining exercise which is unsustainable and will end up with the destruction of the natural prawn industry in the country.

2.7. Wildlife and Biodiversity

Wildlife is arguably Tanzania's greatest natural resource. It is estimated that nearly a quarter of all African megafauna are found in Tanzania. In Arusha, Kilimanjaro, and Tanga regions, wildlife conservation takes about 48% of all land. The three regions and Mara region form the Northern Zone Tourist Circuit. **Tanzania is one of the world's great wildlife strongholds. To-date there are 12 National Parks, 18 game reserves, and 49 game controlled areas, constituting about 25% of Tanzania's land area**[6]. Wildlife conservation laws and rules are very strict to particular areas like the National Parks and Game Reserves, but are less strict in Game Controlled areas.

Biological diversity is the variety of life forms (animals, plants and micro-organisms), communities/ecosystems and the ecological processes of which these components are a part. It is an umbrella term for the degree of nature's variety, including the number and frequency of ecosystems, species and genes in a given assemblage.

Biological diversity is normally considered at three different categories: (1) **Genetic diversity** which refers to the variation of genes (biochemical units of hereditary information) both within and between species; (2) **Species diversity** refers to the variety of species within a region and can be measured in various ways including species "richness" and; (3) **Ecosystem and/or community diversity** relates to the variety of habitats (e.g. wetlands, coral reef, deserts etc.) within which species occur.

Thus, Tanzania has been termed a "megadiversity" country due to the large number of species it contains. **Tanzania's high biodiversity is due to the**

large variety of phytochoria[7] and ecological zones[8].

The causes of biodiversity loss in Tanzania are many and varied. A few are discussed below:

2.7.1. Deforestation

Rapid and extensive deforestation in Tanzania has contributed to an unknown loss of biodiversity. The current major threat to the wildlife resources in Tanzania is the human encroachment into PAs and poaching of species of commercial value. **In some PAs, poaching has either eliminated entire wildlife populations or reduced them to very low levels[9].**

A less dramatic but more serious problem for the long term survival of the majority of large mammals and carnivores in Tanzania is the loss of critical habitats in areas outside or adjacent to PAs due to agricultural and settlement expansion. **Such persistent reduction or loss of natural habitats and blockage of animal migration corridors and the consequence on the migration pattern of wildlife is exemplified by the Manyara-Tarangire Ecosystem[10].**

On the other hand, the resulting insularization of reserves renders them non-viable because of enhanced extinction. Current wildlife habitat loss in Tanzania is estimated at 43% of the original. **The challenge is to conserve representative biodiversity and establish sustainable wildlife management systems (see Table 2). The most crucial issue here is to involve the local people in biodiversity conservation and to set up programmes for sustainable utilization of the natural resources within the administrative boundaries of villages.**

2.7.2. Tourism

Gross revenue from wildlife in Tanzania totals US$ 120 million a year, which includes an estimated US$ 50 million from illegal wildlife harvesting. In the recent years tourism has become a focus for economic development with government plans projecting it as the number one or two earner of foreign exchange in the near future. Thus, total earnings from tourism by the Wildlife Division for 1990/91 was US$ 2.57 million, while Tanzania National Parks earned over US$ 3.5 million for the same period.

In the recent years there has been increased determination to exploit wildlife resources in order to boost government revenue. This has been done mainly by encouraging private developers to invest in the tourism industry. Thus, many private tourist hotels have been established and many more are planned especially in the northern circuit. In the Serengeti alone, three new hotels with a total of 400 beds have been opened while seven more with a total of about 700 beds are planned or are under construction.

In Lake Manyara National Park, a total of 400 bed hotels are operational in addition to another 100 bed hotels planned for the area. Some of these hotel developments do not take into account the status of the resource base in the concerned areas. Others are built along migration routes, while others are located in ecologically sensitive areas.

Following the increased investment in tourism, the number of tourists in all Tanzanian National Parks shot up from about 30 thousand in 1986 to about 100 thousand in 1992. The environmental effects of increased tourists inflow in the National Parks is quite apparent in the northern circuit (Manyara, Ngorongoro and Serengeti). They include trampling and its associated de-vegetation and soil compaction mainly due to off-road tracking.

Tourism may also have a direct or indirect effect on wildlife populations.

Thus, for example, it has been shown that vehicles tend to interfere with animal activities particularly mobility. Restricted movement can interfere with other activities such as searching for prey, mates and cover. Such interference can particularly affect the survival of the three pressure-point species (cheetah, lion and leopard). The breeding performance of some large mammals and cats sensitive to disturbance may be adversely affected by the presence of large numbers of tourist vehicles.

2.7.3. Inappropriate conservation strategies

In Tanzania, conservation of biodiversity has mainly been equated with protection of areas with large numbers of wildlife species especially the large mammals. Little or no effort has been put on the conservation of areas with the greatest number of endemic or rare species or those combining both endemism and species richness (see Table 2). Similarly, little effort has been made in conserving endangered species (e.g. the rhinoceros) and vulnerable ones (e.g. the elephant).

Conservation in Tanzania like in the rest of East Africa does not consider the important sites and habitats, many of which are under serious threat, notably montane and lowland forests, montane grassland, Itigi Thicket, much of the area around Lake Rukwa, and the whole coastal and marine zone (including mangroves and coral reefs). Only recently is there a master plan to establish a marine national park on the Mafia Islands as well as to protect the Mangrove forests along the coast.

Prior to colonialism, wildlife formed an integral part of the lives of the indigenous people although the relationship was not always harmonious. People and wild animals always came into conflict, and crop damage was one of the less severe results. However, the disadvantages were at least partially offset by the "goods and services" game provided e.g. meat, clothing and medicinal products. This trade-off was disrupted by colonial governments, whose approach was fundamentally aesthetic and preservationist.

Thus, many indigenous communities were evicted from planned wildlife areas, and prohibited from any form of hunting. Examples include the indigenous Masai who were evicted from the Serengeti and the Ngorongoro Crater in 1951 and 1975 respectively. Since the introduction of the national park and game reserve concept, the local people came into conflict with wildlife authorities.

The major outcome of this protectionist conservation has been increased "poaching" in the reserves. A heavy toll has been particularly inflicted on the animals of commercial value (elephants and rhinoceros). Pressure from poaching has either eliminated entire populations or reduced population densities to very low levels.

Figure 2 shows the elephant population changes in four protected areas in Tanzania between 1976 and 1990[11]. In the Selous Game Reserve for example, the elephant population dropped from more than 100,000 in 1970s to the current 30,000. In Lake Manyara National Park the population dropped from 485 in 1981 to 284 in 1985.

Overall, Tanzania's elephant population has declined from an estimated 316,300 in 1979 to 85,000 in 1987 (a decrease of 73%) and to an estimated 52,400 in 1991. Today's population represents only 17% of the population present only 12 years ago, which translates into an average loss of approximately 60 elephants a day, every day during the entire period.

The rhino population has been reduced by over 98% in 10 years and the remaining numbers are only in the low hundreds. In the northern part of the Serengeti National Park, organized poaching for meat which is marketed in villages to the west of the park has reduced the buffalo population from over 30,000 in the 1960's to about 1,500.

A less dramatic but a more serious problem for the long term survival of the majority of large mammals and carnivores in Tanzania is the loss of critical habitats in the multiple use zones outside or adjacent to the protected areas due to agricultural and settlement expansion. Thus, wildlife habitat loss in Tanzania has been estimated at around 43% of the original.

Specifically, for example, elephants inhabited almost 90% of Tanzania until as recently as the mid 1950's. By the late 1980's, however, their range had shrunk to approximately 50% (501,000 sq km) of the country. Human habitation and cultivation has resulted in the closing off of some of the elephant's previous migration routes and the present range comprises large but increasingly isolated areas in the south, west/central and north/central parts of the country.

Concern about increasing isolation of Tanzania's protected areas as a result of land fragmentation and other human activities arises from the fact that species colonization is influenced primarily by the distance that an isolate lies from a potential source pool while species extinction is influenced principally by population size which in turn is influenced by the size of the isolate. As protected areas become increasingly isolated, the distance of a protected area from potential source pool increases while the effective size of the conservation area decreases.

The effects of reduction in colonization and decrease in the effective size of the protected area is increased number of local extinctions within a protected area. Thus, Lake Manyara NP has already lost 4 species of large mammals, Arusha NP has lost 2 species, Kilimanjaro NP 2 species and Tarangire NP 1 species. **Thus, without the protection of critical wildlife corridors, the smaller parks in northern Tanzania will almost certainly continue to lose animal species and are unlikely to remain viable in the face of the growing human population.**

2.7.4. Destruction of coastal zone resources

The coastal zone here refers to the interface where the land meets the ocean, and encompasses shoreline environments as well as adjacent coastal waters. This area is highly fragile and dynamic with frequently changing biological, chemical and geological attributes.

The coastal zone includes highly productive and biologically diverse ecosystems that offer crucial nursery habitats for many marine species. Some coastal zone features such as coral reefs, mangroves, beach and dune systems serve as natural defense against storms, flooding and erosion.

Coral reefs which are a predominant feature along the whole of the Tanzanian coastline, are often subjected to blasting by fishermen engaged in illegal dynamite fishing. Corals are also damaged by people collecting shells or by carelessly dropped anchors. Also, due to poor operational range, fishing activities have concentrated to the near shore areas. These areas are already experiencing heavy fishing pressure and are showing signs of over-exploitation.

Severe coastal erosion is particularly noticeable around Dar es Salaam and Zanzibar. This erosion is associated with uncontrolled dynamite fishing, illegal sand extraction in the river beds close to the coast, as well as limestone quarrying from the sea bed. Coastal erosion is already threatening infrastructure in affected area especially where planning has been poor.

Mangrove forests common along the Tanzanian coastline provide shelter for many important marine fish species and shrimps (prawns). Currently, these mangroves are subjected to intensive harvesting for poles and firewood. They are also cleared for cultivation and for salt production. In some localized areas, mangrove stands have been completely wiped out by industrial pollution and oil

spills from tankers. **The major challenge is to develop sustainable coastal zone management systems that will rationalize the use of coastal resources.**

2.8. Problems Associated with Urbanization

The world is moving into cities, for it is within cities that most new jobs, innovations and investments are concentrated. It is within an increasingly interlinked system of cities and smaller urban centres that world production, trade and communication take place.

The rate of urban growth in Tanzania stands at 6.8% per annum. It is estimated that by the year 2000 about 50% of all Tanzanians would be living in towns and cities. This growth rate far exceeds the capacity of the government to plan the direction and nature of that growth and to provide their inhabitants with basic services. Also, such rapid growth rate, puts tremendous pressure on the environment particularly because it is largely uncontrolled and there is a lack of enforcement of legislation and standards. Due to the acute shortage of housing in many urban centres in Tanzania, extensive squatters support up to 70% of the urban populations.

Almost in all squatter areas, the handling and management of wastes is problematic due to overcrowding, lack of physical planning, poorly functioning waste treatment plants or their total absence. The lack of adequate waste handling facilities is a major cause of pollution in the Tanzanian cities and towns. The challenge related to urbanization is to manage population growth and provide the necessary services and infrastructure for the urban dwellers.

Industrial development in major towns often causes alarming soil and water contamination through industrial and domestic waste disposal. This is a great danger to public health and environmental quality. **The challenge is to develop an environmentally- friendly industrial development strategy.**

To-day in Dar es Salaam and other cities, the sites of the new housing development are not chosen by the government or its planners, but by poorer citizens seeking to house themselves, or by landowners illegally selling land for housing without providing water, roads or drains. Often times shanty houses develop on land not wanted for other purposes.

Thus it is often unsafe and unhealthy land - often land difficult to reach with services like roads, sewerage, garbage removal and electricity. In Tanzania it is estimated that about 85% of the garbage is left uncollected for lack of trucks and other equipment. In Dar es Salaam alone, only 300 tonnes of solid waste is collected for dumping out of about 1,140 tonnes of refuse produced in the city daily.

Rapid urban changes is muddling distinction between rural and urban. In Dar es Salaam and other cities and towns, the poor increasingly plant gardens or keep livestock to feed themselves, giving areas of the cities a rural feel. The villagization programme has led to many villages developing into urban areas.

Looking from the point of view of sustainable development, the basic problem of our towns and cities is that of underdevelopment. The city dwellers cannot meet their basic needs for food, clean water, clean air, fuel, transport and an environment free of disease-causing microbes and worms. Most of our towns and cities have no or inefficient sewers.

2.9. Minerals and Mining Activities

There are relatively abundant mineral resources in Tanzania but only a few have been explored and even fewer are being exploited. The main minerals which have been explored are iron ore (85 million tons), coal (324 million tons), gypsum (2.6 million tons), kaolin (50 million tons), Lime and limestone (vast

reserves), magnetite (4.5 million tons), meerschaum (28,000 tons), phosphate (2.5 million tons), salt (vast reserves), plus substantial amounts of diamonds and gold reef (Economic Report, 1989).

Proven natural gas reserves at Songosongo are estimated at 0.72 trillion cubic feet. Petroleum exploration along the east coast has been going on for the past few years but there is no firm information about the proven reserves as yet.

The major environmental problems related to mining and quarrying in Tanzania are deforestation and land stripping in preparation for mining, timbering of mine pits and building of shelters and the use of wood for domestic purposes. Deforestation and land stripping is widespread in Kahama and Geita Districts as well as in Morogoro and Arusha Regions.

Extensive burrowing and quarrying is associated with road construction activities which are not accompanied by land reclamation and landscaping. The gapping burrow/gravel pits and quarries are a health hazard and aesthetic problem throughout the country.

Water pollution is another environmental problem common in mining areas. For example, careless handling of mercury by artisanal gold miners can lead to self poisoning. Also, coal mining can cause health and environmental problems due to poor disposal of slurry and ash, uncontrolled air emissions and disposal of process water.

Mining is also associated with sudden concentration of human population causing both social and ecological stress, as well as health problems due to inadequate sanitary facilities. The challenge is to introduce mining technologies that are relatively cheap, easy to adopt and are environmentally-friendly.

3.0. POLICY RESPONSES TO ENVIRONMENTAL PROBLEMS

3.1. Introduction

This section summarizes some of the current policy responses by the government to dealing with the environmental issues raised in section 2.0 above. The aim is to assess the adequacy and effectiveness of these measures. Most of these policies are sectoral and a few are cross-sectoral. These policies are discussed separately in section 3.2 and 3.3 below.

3.2. Sector-Oriented Policies

The sector-oriented policies relevant to this assessment relate to agriculture and livestock development, forestry, energy, wildlife and biodiversity, mining, tourism, and fisheries.

The overall objective of Tanzania's National Agricultural Policy (1983) is to create an agrarian community so as to achieve national self-sufficiency in food and raise the nutritional standard of Tanzanians through increased food output. The policy also aims to earn more foreign currency for the nation through agricultural exports and to provide raw materials for the industrial sector. Although the policy advocates the incorporation of conservation measures in all land use plans, this has not been implemented basically due to lack of follow-up.
Furthermore, the agricultural policy does not address some of the environment-sensitive issues like income distribution mechanisms following the adoption of trade liberalization policies. For example, the abrupt withdrawal of agricultural subsidies is not accompanied with calculated introduction of alternative sustainable farming systems, e.g. inter-cropping, agroforestry, organic farming, integrated pest control, etc.

In response to the increasing deforestation and loss of biodiversity in Tanzania, the revised Forest Policy of 1993 aims at designating the remaining forests as Protected Forest Reserves (FRs) which are to be managed by local or central authorities. It also aims at promoting the inclusion of community participation in the management of forests. Ideally, to be sustainable, the establishment of FRs should be based on the systems planning approach which is a new concept in Tanzania.

In addition, the Forestry Policy is not clear on issues like protection of forests against fires and diseases, the planting of native species and, the bridging of the gap between forest harvesting and tree planting. Also, the policy emphasizes land rehabilitation where degradation has taken place. Implementation of such projects (e.g. HADO, HASHI, etc.) require more comprehensive land husbandry strategies.

The national energy policy objectives include sustainable utilization of the country's indigenous energy resources so as to reduce the dependency on imported petroleum products, stem woodfuel depletion and/or use woodfuel in a sustainable and ecologically sound manner. It is notable that the energy policy acknowledges the shortage of indigenous manpower capacity in the sector, and the need to develop it.

The policy on wildlife and biodiversity is to ensure that the protected area (PA) network represents all the major habitat types in the country, including the ecologically sensitive areas. The policy adopts conservation approaches which contribute to local development by using multiple-use and community-based approaches. Again, these concepts are relatively new in Tanzania, and will take time to be adopted.

To address the environmental problems related to mining and quarrying in Tanzania, the revised mineral policy of 1993 aims to tap the mineral resources

in the country by introducing modern and environmentally friendly mining technologies. Nonetheless, the policy does not spell out how such technologies will be acquired. Moreover, the mineral policy is unexplicit about how to deal with water and air pollution impacts caused by mercury and sodium cyanide; siltation of rivers caused by washed away rock/soil debris; and the spread of diseases.

The potential environmental, socio-cultural and scenic impacts of tourism are appreciated and adequately dealt with in the revised policy on tourism. The policy underscores the development of eco-tourism and high per person value tourism to minimize the impact of large numbers of people on sensitive environments. The overall objective is to raise the contribution of the sector to the national economy while safeguarding the environment. Nevertheless, successful implementation of this policy requires expertise not only in tourism/recreation, tourism management and administration, but above all, the management of wildlife, wildlands and historic sites which may be inadequate.

To deal with the uncontrolled fishing and extraction of coastal and aquatic resources, the policy on fisheries stresses the need to carry out regular assessment of the status of fish stocks with the aim of setting fishing levels and methods which do not deplete stocks. The policy also aims to promote community participation in aquatic resource conservation. To put all this to practice will require more skilled manpower with specific expertise for example, on aquatic taxonomy, inventory and aquaculture which may be lacking or inadequate.

3.3. Cross-Sectoral Policies

It is now acknowledged that sectoral bias leads to contradiction among policies. Therefore, a unified natural resources policy is essential in order to engage the contradictions, minimize sectoral conflicts and overlap of activities. A cross-sectoral policy will also make sure that all government agencies are involved in the process of creating sustainable development.

Accordingly, therefore, the recent draft National Environmental Policy (NEP) for Tanzania Mainland, urges the responsible ministries to review and/or define all policies dealing with environmental concerns within the ministries and designate units/departments which will be responsible for environmental issues. Also, all regions and districts are required to develop lists of priorities of environmental concerns in their areas and draw plans for dealing with the priority environmental issues.

In addition, the NEP maintains that all public and private industries, companies and institutions must also review their operations to reduce destruction of the natural environment and to appoint environmental officers to deal with these issues.

Furthermore, the NEP advocates coordinated planning, conscious direction and control of policies and activities of various actors and sectors, and greater cross-sectoral consultation to reconcile long-term and short-term objectives.

Considering the number of ministries and regions/districts, the public and private institutions in the country, substantial expertise is required to execute the NEP. However, this issue has not been give due consideration.

4.0. STRATEGIES FOR SUSTAINABLE RESOURCE DEVELOPMENT

4.1. Introduction

According to the preceding discussions, so far, Tanzania is following a development path which is not sustainable. If this trend continues, conditions could become very unbearable for the future generations.

The solutions to the problem of non-sustainability are not technological because the technological innovations required are largely available. Given the right incentives, they can be further developed and disseminated. The difficulties seem to be centred around the pattern of economic growth, involvement of the people in the development process, divorsion of conservation and development and raise issues of the institutional frameworks for the development process.

Agenda 21 of the Rio Declaration recommends a global plan of action for achieving sustainable development. The Agenda 21 also discusses means of implementing, financing and cost evaluation, scientific and technological means, human resources development and capacity building. In any event, there appears to be a natural progression in the global approach to the management of the environment and natural resources. The environmental problems vary from country to country and the solutions to these problems should be different. Each nation will have to progress through the stages at a pace that their individual circumstances warrant.

4.2 Empowering People.

"Development" does not happen unless the people meant to benefit from the process actively participate in designing and executing the various ventures intended to improve their welfare. People, not governments, "do" development. Good governments give people the power to develop: bad governments deny them power. The World Commission listed as the first prerequisite for sustainable development " a political system which secures effective citizen participation in decision making".

The world Commission cited its "participation" prerequisite for practical rather than ideological reasons. Human environmental quality cannot be protected unless all individuals have the right and the desire to be informed about their environment both by their government and by a free press; unless they have the right and the desire to organize citizens' groups and demonstrate their views, unless they have the power and desire to vote out of office leaders who have become too insulated in capitals from environmental realities. This empowerment requires devolution of power by the government, decentralizing authority to local administrations and municipalities, bringing the government closer to the people. It means representative government at the local level -enabling framework for growth.

This approach challenges the government to be less interventionist, to provide a regulatory framework that "aims to release the energies of ordinary people by enabling them take charge of their lives". Such a framework will include taxes and other fiscal measures to internalize the costs of environmental damage. It will require sound macro-economic management, with the government encouraging private entrepreneurs and not competing with them in business.

The government should channel support directly to community-level initiatives or to institutions that support such initiatives. Achievement of sustainable development will depend on mobilizing the power, resources and capacities of community organizations and non-governmental organizations (NGOs) working with them.

External support should be given to such groups directly, rather than through

the central government. Another way is to empower women in order to reduce fertility and to lower population growth rates, which in turn helps to reduce major underlying causes of environmental destruction in the country. Empowerment of women also gives them the power they need to fulfil their responsibilities as environmental resource managers.

Tanzania cannot build sustainable cities if the cities continue to adapt "western" models and norms , codes and practices which have been borrowed wholesale from the West. The most important way in which the government can develop its cities is to realize that it cannot develop such cities by itself. The increasing demand for jobs, services and housing will overwhelm it as the population increases. The government must enter into a partnership with the people especially the poor majority.

The government should set up a framework in which poor people are helped to build their housing, their neighbourhood and their cities. They should be guided by advice, education and appropriate building codes. They should be helped with credit and infrastructure. They can be organized as equal partners of city governments in effort to collect garbage and clean drains.

4.3. Reviving Economic Growth

4.3.1 Land use and tenure

Prerequisites for sustainable development include a system of government which provides for relatively equal rights, including more equal distribution of land. Installing such a system will usually require among other things, measures to re-dress imbalances directed against the economically and politically disadvantaged e.g. women and tribal communities

For all types of owner and tenant relationship, some of the basic requirements for sustainability are security to tenure, and holdings of a size that can sustain families at a reasonable standard of living and that are not bound to one enterprise alone. Tenure concerns include sustainable management, intensification of land use and ecosystem conservation, and the capacity of local communities to manage common lands "common property resources" upon them.

The government should set the general land tenure framework and act as guarantor of rules which should also ensure that poverty does not prevail to the extent that people are obliged to break the rules. The costs of conserving resources must be equally distributed, locally, nationally and internationally.

Land use (and thus land allocation) should be preceded by zoning according to the use potential based on an analysis of all possible uses of the land. This must be done by trained specialists and local people working in equal partnership. Such planning should ensure conservation of high biodiversity and areas of special interest.

Evidence has shown that yields from farm lands can be increased three or four times using only resources locally available. This can be done by extending soil conservation projects to include development and increasing soil fertility making use of current concept such as integrated plant nutrition and minimum tillage.

In order to make farming in Tanzania sustainable, farmers should have access to education, credit and adequate returns from their harvests so that they may become self-reliant in managing land on a sustainable basis.

Farmers' knowledge on rainfall, soil quality, moisture , and so on, differ from place to place, and their response to these different conditions differ

widely too. Extension workers (and planners and researchers) must work in partnership with farmers, basing on farmers' already finely tuned response. Extension work must be done on a farmer to farmer basis, as farmers tend to believe fellow farmers before they believe outside advisors.

4.3.2. Technology

Progressive farmers in Tanzania especially in the Southern Highlands practice a "heavy industry" form of agriculture, with heavy fossil fuel use per person employed. This system is widely encouraged, and until recently, subsidized by the government and the donor community. This is very productive in terms of output, but over the long term, it is unsustainable both ecologically and economically.

The government should not subsidize agricultural systems which are entrenched into the use of fossil fuels as in effect they are designed to turn oil into food. Instead, the government should encourage sustainable technologies such as minimum tillage and integrated pest control which save energy, money and soil fertility without decreasing yields.

International donor countries should also stop subsidizing the production of certain crops. Instead, they should subsidize sustainable forms of land use which range from high technology (but not high-energy) growing of various crops, the planting forests and to the conservation of ecosystems in a more natural state. Technology transfer should encompass a whole range of technology that builds upon the risk-reducing, resource conservation aspects of traditional farming systems and draw on advances of modern biology, ecology and technology.

4.4. Merging Economics and Development

It is necessary to change the tools of economic decision-making to incorporate environmental change. Economics was once concerned with land, labour and capital. The present dominance of capital has largely removed the two other considerations from economic thinking; environmental and social concerns are in fact often refereed to by economists as "externalities". It is time to unite the sciences of economics and ecology (both of which deal with the distribution of scarce resources), especially as ecological degradation now threatens to act as a break on economic development.

A wide variety of goods and human practices are effectively being subsidized because their concomitant environmental costs are not covered by their prices. Such costs are not born by neither the produces nor the user of these goods and practices but by others in the society, thus reducing the incentives for environmentally sustainable consumption. Sustainable development must mean compensating the future for environmental losses by replacing those losses with other, equivalent assets in value terms and must be incorporated early on in the development process.

Developing "green" national accounts requires vast amounts of data, and the technique is as yet incompletely developed. But the government should begin to compile the requisite data bases to indicate the linkages between the environment and economic activity. In time, environmental accounts may be established as a complement to conventional national accounts to provide a measure of sustainable income.

Government policies often distort proper natural resource pricing through regulations or subsidies that subvert market mechanisms and create incentives for unsustainable behaviour. Instead, the government should intervene with fiscal measures to adjust market prices to account for environmental costs - the "polluter pays" principle which holds that the costs to society of pollution or pollution control should be included (internalized) in the costs of the polluting goods or services. The principle is already applied to some

degree in industrialized countries.

Valuing environmental damage correctly is the key to sustainable development. Methods now exist for valuing the environment. What is required is a new attitude and a new way of approaching economics among those who allocate resources for development. Sustainability requires that all those who make decisions which affect the environment take full responsibility for the impact of those decisions.

4.5. Conserving and Enhancing the Resource Base.

4.5.1. Forests

Given the pressures on forests, sustainable management of remaining forests is inadequate. The goal should be to choose the best uses of the presently forested lands, giving due attention to a large spectrum of concerns ranging from the livelihoods of the people in and around the forests to the need to limit global warming. Developed nations providing aid to this sector should also abide to this. The outcome should be a mix of uses:preservation, conservation, modification (harvesting) and conversion to other uses, e.g. farming. Additional measures to ensure sustainable forest management involves:

* Setting aside large permanent national forest estates. The government should own and manage only those forests of significant national and international importance. The less important ones should be left in private ownership.

* Establishing long-term clarity and continuity in forest ownership, in government authority and operational control, and in market, fiscal, land tenure and legislative conditions facing forest owners and users.

* Developing policy and procedural measures that stress the values of the whole forest, rather than just timber.

* Introducing sustainable management practices in natural forests, including improved logging and systems for yielding multiple products and services.

* Investing in plantations.

* Controlling demand for the products and services of forests.

* Protecting pristine examples of different forests types of biodiversity.

4.5.2. Water

Sustainable water management requires an approach to planning that incorporates the interactions of rainfall, soil, vegetation and atmosphere with water availability in aquifers and rivers, and relates total supply to demand. Water availability from all sources must be gauged and explicitly built into future development plans.

Various government bodies responsible for various types of water management need to coordinate their management regimes: forestry department, water boards, agriculture ministry and recreational department.

Activities which use water (agriculture, industry) should be reviewed in terms of efficiency of water use and not just in terms of returns upon investment. Irrigation techniques which cut down water consumption should be encouraged (centre-pivot sprinklers and trickle systems).

Greater attention needs to be given to small-scale traditional schemes and

techniques to make better use of rain water to increase food production and minimize environmental degradation. Smaller projects which focus on improving productivity of water and allow farmers to participate actively in planning building and maintaining canals, are likely to be efficient and productive.

Sustainable industrial water management will require re-using water, charging polluting industries for the costs of water pollution and improving government regulating and then enforcing them. In some cases it will require application of standards for water use. There is need to create a raised sense of discipline in water use.

4.5.3. Energy

Present energy systems based largely on the burning of fossil and biomass fuels are the most obviously non sustainable of the human activities. Present levels of use of fossil and biomass fuels are warming the planet, and eroding the resource base; yet population growth will require more and more energy. To sustain the resources and minimize environmental degradation/pollution, there is need to move away from reliance on fossil and biomass fuels. Effort should be made to replace these fuels with other types of technology,. e.g. hydropower.

Effective approach to minimize energy related problems is to make the energy services the starting point and work backwards the energy supply. Government should economic institutions to encourage the use of more efficient light bulbs, stoves and refrigerators, and vehicles that go further for a given amount of fuel, than large amounts of money and fuel thus save energy and minimize pollution.

4.5.4. Sustainable level of population

Economic growth is necessary to break the vicious circle of poverty, population growth and environmental degradation. However, growth must be based on technologies that neither overuse resources nor overpollute; and it must happen in social and political system that spread the benefits of growth equitably. This growth must raise the per capita incomes of the poorest.

4.6. Institutional Capacity and Viability

Achieving sustainable development will require changes in institutions (organizations, laws, customs and practices).

We have noted in Section 2 that Tanzania is faced with major environmental problems which are related to unsustainable resource development. Also, Section 3 has shown that the development policies intended to address environmental issues are at most sectoral and their coordination is difficult.

One of the issues which is not adequately contemplated in these development policies is the availability of expertise for resource management and environmental conservation. Expertise levels in different aspects of natural resource management and environmental conservation in Tanzania varies considerably. Moreover, expertise is concentrated in a few sectors, especially agriculture and Forestry. In many other sectors expertise is either inadequate or totally lacking.

Expertise is also concentrated in a few regions especially in Dar es Salaam. Other regions have relatively low expertise. The practical experience of the individual experts in the various fields of natural resource management and environmental conservation also varies greatly. But, generally, the majority are inexperienced.

The demand for trained manpower in the fields of resource management and environmental conservation is indisputably high in Tanzania. This demand will continue to grow as more environment-related institutions and programmes are established in the country.

Moreover, the Tanzanian society is undergoing rapid and far-reaching political and economic changes. The economy is changing from closed to de-confined market economy. Also, the change to a multi-party system necessitates more and further decentralization. All these changes will increase the demand for better quality expertise to manage the natural resources and conserve the environment. Therefore, there is need to build capacity in the corporate sector, among NGOs and private institutions.

Unfortunately, output of trained manpower from institutions of higher education in the country is extremely low. A country of the size and population of Tanzania could usefully absorb over 10,000 biological scientists and technologists in the productive agricultural and biological fields alone. However, this "need" is not translated into effective demand. This is basically because of lack of adequate training.

Since the concept of environmental management is relatively new, environment-related fields are still accorded low priority in training in Tanzania. This is alluded from the lack of a concrete policy on training and capacity building in the field of resource management and environmental conservation. The existing National Environmental Policy for Tanzania Mainland in particular, does not consider this crucial issue. The existing policies on education and manpower development are generally vague on policy implementation.

Given the expected high future demand for experts and the current low output of professionals from the existing institutions of higher education, competition for the few experts will persist for a long time in the future. As organizations continue to search for more and better quality experts, the existing capacities will prove inadequate to meet the increasing demand. Otherwise, the existing expertise will have to be seriously over-stretched in order to meet the demand. This is particularly so, given the large size of the country and the complexity and gravity of its problems which are related to natural resource management.

It is, therefore, important that student enrolment is deliberately expanded and the essential tools for the teaching-learning task at high levels are ensured. Capacity for training of the relevant professionals can be significantly improved by establishing an Environmental School, by combining efforts of the Ardhi Institute, Geography Department, the Institute of Resource Assessment, Faculty of Science, Faculty of Engineering and the Faculty of Education, all of the UDSM.

Social, Cultural and Land Tenure Issues Affecting Natural Resources and Environmental Management in Tanzania

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SOCIAL, CULTURAL AND LAND TENURE ISSUES AFFECTING NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT IN TANZANIA

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Introduction

Depletion of renewable natural resources takes a serious toll in Tanzania. Land degradation hampers the ability of the nation to meet expanding demands for agricultural commodities, and the benefits of water, forestry, wildlife resource development in Tanzania are jeorpadized by this degradation.

Concern over the national consequences of depletive human interaction with the natural environment has stimulated assessment of factors that impinge on natural resources and environmental management in Tanzania (cf. Bagachwa, et al., 1995; Reeds, 1996).

This paper addresses social cultural and land tenure issues affecting natural resource and environmental management in Tanzania. It will specifically focus on protected areas and community based natural resources management and tourism development in Tanzania. Social, cultural and land tenure issues as regards natural resources and environmental management are contextual, contingent and always changing.

To put these issues in perspective, the article first highlights major elements of Tanzania's natural resources. This is then followed by an analysis of social, cultural and land tenure issues and their effect on natural resource and environmental management in Tanzania. Social, cultural and land tenure issues are not separate, unrelated categories. In fact they are fused together and become part of a broad social structure of a particular society. In this article however, and for the sake of analysis only, they will be treated separately in order to highlight certain points. The article closes with a summary of key issues and a discussion of policy implications and suggestions.

Natural Resources of Tanzania: A Brief outline.

Tanzania is endowed with a wide range of land related natural resources including extensive areas of arable land, a coastal and marine zone, wildlife reserves and parks, forests, rivers and lakes. The major land-use categories include grazing lands (50.1%) forest and woodlands (43%) (Berry et al.,1982). National parks and game reserves occupy 5.4% and 6.6% respectively, of the total land are. Game controlled areas, another category of wildlife resources areas occupy about 13% of the land area.

Crop Production

A range of tropical and temperate crops are grown, including export crops such as coffee, cotton, sisal, tobacco, cashew nuts and food crops such as maize, wheat, rice, cassava, beans to mention a few. Cultivated land is estimated to be 6-8% of the total land are(URT, 1994a, World Bank, 1994). About 9% of the soils are medium to high fertility and 23 % are of low to medium fertility. Much of the land

(80%) is unsuitable for agriculture because of unreliable rainfall, infertile soils and pest problems. Consequently, most of the productive land is already densely settled and, as population pressure continues, more people are settling and cultivating marginal land, and encroaching into forest reserves and wildlife and pasture lands.

Grazing and Livestock Keeping

Figures from the last livestock census (1983) shows that Tanzania had a livestock population of just over 12 livestock units and that 260 million hectares of grazing land were available. The potential carrying capacity was calculated to be 20 million LSU (Kauzeni et al., 1993). However, although range land account for 68 % of the total land are, much is tse-tse infested bush and woodland. Likewise, due to diminishing pasture land, some livestock keepers have moved into wetlands (e.g. Usangu Plains, Ruvu River Basin), forest reserves and wildlife areas.

Forest and Woodlands

Forest resources (forests and woodlands including other land-use types such as national parks) accounted for 43 % of the total land area in 1982 (Berry et al., 1982.). The most common are miombo woodlands which cover nearly half the country (TFAP, 1989). Mangrove forest are found along the coast and account for about 0.3% of total forest/woodland are. There is increasing depletion of mangrove forest, especially in the Rufiji, Lindi, Mtwara and Bagamoyo areas, for firewood, building poles, salt works and export to Middle East.

Biological Diversity

Tanzania is renowned for its wildlife. Currently there are 12 National Parks and 18 Game Reserves covering more than 12 % of total territory. This area is supposed to be completely uninhabited. Also, there are 49 inhabited game controlled areas which cover 13% of the land area (TFAP, 1989). In 1962 the Ngorongoro Conservation Area was created as a legal entity as an attempt to reconcile the need of wildlife and land conservation and those of the resident Maasai people.

In addition to wildlife resources, a variety of eco-systems exist in which rare and endemic species of flora and fauna are to be found. In this respect 15 % of the country is listed as World Heritage, including Kilimanjaro National Park, Ngorongoro Conservation Are, Selous Game Serengeti National Park (IUCN, 1992). Furthermore, the country has renowned centers of plant diversity (e.g. the East Usambara Mountain, Udzungwa Mountain National Park) and of endemic birds in the Eastern Arc Mountain. The biggest threat to the country's biodiversity is increasing poaching, grazing, wood felling, bus fires and farming in the eco-systems containing these resources.

Fisheries Resources

Tanzania has about 53,000 km^2 of inland waters, 19,000km^2 of coastal shelf and a 200 nautical mile exclusion zone offshore. This implies great potential for fishing although the volume of fish exported has declined dramatically since the mid-1970s. Freshwater fisheries contribute about 80% of total fish production. Coastal fisheries are equally important in the supply of fish, producing about 50 000 tones of marine fish a year (Bagachwa, et al., 1995). Fishing efforts includes simple equipment such as hooks and lines, nets,

traps and light fishing craft. Semi industrial trawling is limited to prawn fishing. Illegal dynamite fishing and the use smaller mesh sizes are common and threatens the fishing sector.

Minerals and Energy Resources

There are abundant mineral resources, but only a few are being exploited. Available minerals include iron ore, coal kaolin, gypsum, phosphate, meerschaum, lime and limestone, salt, nickel, gas, gold, rubies, diamond, tanzanite etc. Whilst large scale mining is not substantial, there is a lot of small-scale mining scattered where deposits are found.

Social, Cultural and Land Tenure Issues.

Although Tanzania is endowed with a rich resource base, why, how and who exploits these resources have greater implication on the use and management of the natural resources.

Social Issues

Natural resources are exploited in a process of production within a particular social setting. However, societies are not homogeneous, people are stratified in various social categories: gender, age, poor/rich, rural/urban people, classes etc. These stratifications do not make any sense on their own. Essentially it is the emerging social relationships and processes which are based on these categories which constitute critical social issues (cf. Mung'ong'o, 1995). The emerging social relationships together with their corresponding social values, norms and beliefs centers around production process and thus gives greater influence to the way in which resources are used and managed.

In a traditional social setting, the use of these resources was regulated by a structure of rules and conventions which defined the individual vis-a-vis others as well as their access to the resource in question. These rules and conventions constituted what one may call *traditional social institutions* which further defined the rights and duties of the various users and sanctions that should be imposed should lack of compliance be observed.

In Tanzania, most pastoral communities practiced these traditional systems. For example, the Barabaig who occupied the plains around Mount Hanang in Hanang District, have practiced efficient common resource management systems using traditional institutions (Lane, 1990, Bradburry et al., 1995, Potkanski, 1994).

In a nutshell, the Barabaig's economy was based on livestock production in which herds of cattle, sheep and goats utilized the forage, water and salt licks found scattered throughout their territory. In order to utilize pasture when it is most productive, and rest it to allow recovery, the Barabaig devised an eight part seasonal grazing rotation that exploited the forage regime at different times of the year (Lane 1990).

To ensure that everyone had not only the *right* of access to the resources, but was also *duty bound* to protect it, the Barabaig evolved a hierarchy of jural institutions (e.g. the neighborhood councils, the Barabaigs' public assembly and other committees) that control access and use of land, interpret customary rules and adjudicate in rare conflicts over rights and duties (Lane, 1990, Lane and Pretty, 1991).

Sanctions against those who infringe common property rules were usually given by whatever judicial moot which had authority in the case. Sanctions included a fine (i.e. livestock); beating, for a young offender; ostracism, during which time the offender may be in confinement, is not greeted by the community, and will not receive assistance from the community even if sick; cursing; outcast; and, when a conflict between the Barabaig and another tribe cannot be resolved, the ultimate solution was war (Bradbury, et.al., 1995).

Women had their own council which had involved itself with land issues. Women's interest in land was related to their special role in Barabaig spiritual life and their jurisdiction in matters involving offense by men against women. Such offenses included desecration of sacred land or the failure of men to protect such property allowing sacred land to be ploughed up for farming (Lane, 1990).

Similar example could be cited from other communities in Tanzania. Overall, such practices shows that rural communities had sophisticated systems of natural resource management which were sustainable. The main social elements of these systems include: strong linkages amongst members of the communities and between communities; equitable patterns of resource access; means for negotiating and controlling access to natural resources between and among groups; clearly defined territories; low-cost mechanism for conflict resolution; support for community management institutions from a wider social, political structure etc. However these management systems have weakened gradually, first under colonial government and then as a result of population growth, nationalization of resources and commercialization of the economy (IIED, 1994).

With an increase in government control of natural resources, development initiatives have tended to cast a blind eye to the needs and diversity of communities. This has led to problems of equity over access to resources and distribution of benefits. For instance, the lack of success with some projects can be attributed to their gender-blind nature. Gender relations, resources ownership and management rights within a community are often not understood prior to the start of projects. However, in some case projects fail because they segregate activities by gender and interfere with the community's relationship with a particular resource.

This has been particularly critical in protected areas such as forest reserves and wildlife areas. In these areas, and in view of population pressure, people have moved into these areas in search of resources. In other cases, communities have been using these areas for various functions without unduly affecting the resources (e.g. the Maasai and other livestock keepers in the Ngorongoro Conservation Area and, Serengeti District. However the establishment of the protected areas has denied these people access to the resources in the pretext that they cause environmental degradation.

In established protected areas, conservation authorities employed a strategy of policing and exclusion in which coercive methods rather than interactive dialogue were dominant. This system led to the emergence of hostile relationships between the state and the people. The government has been unwilling to support participation of the communities in the management and use of the resources apparently for no meaningful reason. However, with declining government capacity and ability to provide effective management of

natural resource use, local management systems are currently beginning to re-assert themselves in some areas.

Examples of this approach include community game guard schemes and income-generating activities based on the needs of the local people (IIED,1994). In Tanzania such cases would include for example the community wildlife management around the Selous Game Reserve and Serengeti Community Conservation Services. These initiatives may help communities gain an ever greater share of the benefits of wildlife management and may, reduce poaching. However, in the absence of stable local social institutions they can entail greater cost for the community.

In many cases institutional capacity building at local level is not addressed and, often, institutions remained underdeveloped. Even where NGOs have been formed, these have proven to be so much restrained by financial and leadership problems. Numerous examples exists where local institutions are not democratic and initiatives fail because the benefits are not distributed equitably. Problems also arise where projects are imposed without committed support from all concerned parties and continue to depend on outside funding, which stifles attempts to make management more self-supportive. Furthermore, schemes that seek to involve the communities can still fail where societies are highly stratified.

Cultural Issues

In production or resource utilization, communities are guided by many things including complex aspects that are known as culture. Anthropologist have grappled with the issue of culture for many years and it may be a waste of time to review that debate here (cf. Freilich 1972, Moore, 1994). However, the essential elements of

culture appear to be known but they have never been pulled together artfully and, formulated in ways likely to explain a complex system. Some of these elements include "knowledge, beliefs, art, morals, law, custom, and any other capabilities or habits acquired by man as a member of society" (Taylor, 1871). These elements are constantly changing within and between communities over time.

Citing the same case of the Barabaig, we can notice a range of cultural elements such as the Barabaig's belief in certain sanctions and rituals associated with certain tree species. Their knowledge on forage and pests; their laws, morals values and their belief in the system. Some of these cultural elements further defined the roles of members of the society - e.g. the role of women in the cattle economy. These elements were built in the system of production and have sustained that unique pasture management system for many generations. Population pressure and economic development have led to the breakdown of these systems, and new cultural elements are now emerging.

Today, projects are initiated without adequate understanding of local cultures and how these can coexist with the intended changes. As a result, activities have been undertaken for the wrong reason. For example, the Ngorongoro Conservation Area is a joint wildlife/pastoralist land use area. Suspicion that the pastoralist contribute to environmental degradation and decrease in wildlife population, conservation authorities proposed the expulsion of 25 000 pastoralist from the crater (Homewood and Rodgers, 1991).

Likewise, since tourism is considered by the state to be important for foreign currency generation, several tourism development projects are established without consulting the people. In many

cases tourism facilities are established in order to satisfy foreign clients whose culture are different from the local environment. Inevitably culture conflicts ensure as a result and in some cases not only is the local culture affected, but also, people's rights over certain resources are affected (eg. beaches, wildlife etc). Often economic gains are lower compared to social, cultural and ecological loss that a community may suffer due to such developments.

Land Tenure Issues

The Land Ordinance was enacted by the British colonial administration in 1923. It has since remained the basic legal framework defining and regulating land tenure in Tanzania. According to this Ordinance, all land in Tanzania is public land and subject to the disposition of the President.

There are several treatises on the issue of land tenure in Tanzania (cf. James and Fimbo, 1973; Shivji, 1994; Tenga, 1992; World Bank, 1992; URT, 1994b and Kauzeni et al.,1993 to mention only a few). Most of the available literature has focused on access rights and usage rights, and paid very little attention to man's mastery over the environment as a process of tenure[1].

The main forms of land tenure in Tanzania include:

a) **Right of occupancy** defined as a title to the use and occupation of land and includes the title of a native community lawfully using or occupying land in accordance with native law and custom (Tenga, 1992). The Right of Occupancy is further divided

[1] Lane 199 and Potkanski, 1994 are discussing this aspect with reference to the Barabaig and the Maasai respectively.

into two forms of land tenure: the Granted Right of Occupancy, issued by the President, under which land is held for up to 99 years: and the Deemed Right of Occupancy where the law deems customary landholders as lawful occupiers.

b) **Customary or Traditional Land Tenure** are based on customs or by-laws which reflect a community consensus about what can and cannot be done with land and other related resources (World Bank, 1992). The land under this tenure is held under perpetuity.

c) **Communal Land Tenure.** This is defined as land which is held under the control of corporate unit (e.g. a village) and has not been allocated for use to any community other than itself (James and Fimbo, 1973). Such land includes forest lands, grazing lands and hunting lands.

In practice most agricultural land is held under either customary or communal systems. This land was the center of attention when the Regulation of Land Tenure (Established Villages) Act No. 22 of 1992 was passed with the view to extinguish customary rights to land for certain villages (Kauzeni et al., 1993; Shivji, 1994). Act No.22 was challenged in the High Court and declared unconstitutional. The matter is now before the Court of Appeal waiting judgment (Shivji, 1994). If passed, Acts No. 22 would have the effect of upsetting the existing land tenure system (Shivji, 1994). In the mean time great confusion remains concerning land tenure. Amidst this confusion "land grabbing" continues taking advantage of weak and even more confusing land allocation procedures.

Major issues of concern regarding land tenure in Tanzania include unclear allocation procedures, uncertainty about the law and biases against certain land users.

Whilst all land is under the President, the Ministry of Lands manages, administers and allocates land on behalf of the President. However, other authorities are also permitted to allocate land. For example, local government, Capital City Development Authority (CDA), and the Ministry of Land. For some time now there have been major conflicts amongst the allocating authorities and the people arising from double (or even more) allocation of land. Land allocation committees were established from the district to the ministerial level however, the system was not strictly adhered to in practice (URT, 1994b). Other problems related to allocation include arbitrary allocation to government institutions, allocation without clearing third party interests, allocation of large tracts of farm or pasture land at the expense, and against the wishes, of villagers and allocation on conservation areas eg. beaches and wetlands (URT, 1994b).

Land administration (allocation, surveying titling etc) is in many cases treated as an administrative matter in which the people as the ultimate users are not involved. Often this has led to the problem of alienating traditional land users from their lands in favor of non-local users. Consequently, long developed land husbandry practices are destroyed giving way to environmental degradation. Numerous complaints from cultivators and pastoralists have been made that too much land is being reserved without involving them and some of this should be made available for their use.

Even where the people are said to be involved as in community participation in wildlife management, experience shows that bringing together management, ownership, tenure rights and equitable distribution of costs and benefits is complicated (IIED, 1994). Example exists where wildlife institutions and local governments have been unwilling to devolve real responsibility and power to local communities, and pass on full revenue generated. Furthermore, failure to address the issue of decentralized control also thwart local attempts at land use planning, especially around buffer zones where land rights are a crucial issue. Often, there is a lack of legislation and the policy frameworks are inappropriate. In the absence of proper legislation, force is often used to ensure compliance especially from the local population, thus exacerbating even further people's discontent on the protected areas.

Other forms of biases include gender inequality with regard to ownership and control of land. Numerous studies indicate that most tenure systems in Africa give women access to land, not in their own rights but as wives, divorcee or widowed, daughters or sisters of males within their families (Bruce 1993, Moore, 1988, Mtengeti-Migiro, 1990, Mbilinyi, 1988, Kironde et al., 1996). Gender inequality is particularly dominant under customary systems.
The most acute problem arise out of inheritance, which in turn is embedded in custom and culture which work against the interest and welfare of women.

Currently, the status of land matters is uncertain because a new land policy which aimed at addressing, among other issues, land tenure and ownership was completed and is now being drafted for presentation to the parliament as a law. In the meantime, however,

there is the much feared Act No.22 which will change the direction of land tenure in Tanzania if the appeal is upheld.

The ultimate consequences of unclear allocation procedures, biases and unclear policies and laws is the insecurity of tenure. Several case studies have shown that fragile environmental problems are often a manifestation of underlying tenurial crises (Bromley and Cornea, 1989). Proponents of this position argue that tenure insecurity reduces the innovativeness and willingness of land users to invest in the land either for economic, environmental or other purposes (cf. Dodo et al., 1991; Tibaijuka, et al., 1989).

Inevitably, as a solution to this problem, land titling and registration have been suggested. Discussing the same issue , the National Land Commission noted that most of the assumptions for individualization, titling and registration of the land in Tanzania do not hold. Empirical evidence from Kenya shows that the system does not work as it is supposed in theory. Furthermore, none of the African governments has the resources to implement and maintain a complicated system of land titles and registration (URT,1994b).

Instead, the Commission suggested the development of broad policy, legal and structural framework on land on the basis of people's custom and their full participation (URT, 1994b).

Summary of key issues

In this article an attempt is made to highlight social, cultural and land tenure issues affecting natural resource and environmental management in Tanzania. The following key issues were identified:

* Tanzania is endowed with abundant natural resources the use of

which is influenced by among others s, social, cultural and tenurial issues.

* Social issues that may have implication on the use and management of natural resources include: social structure and population changes (ie. stratification of age, sex, rich/poor, urban/rural, class etc); social institutions (e.g. values, rules, norms, beliefs). These elements shape social relationships. and population changes.

  In traditional society these social elements were built in the production process and helped to regulate access, use and management of natural resources. The disintegration of these systems due to population pressure, globalization and commercialization of the local economies has created demands for new systems which hitherto have not been effective in ensuring sustainable use of natural resources. Often programs are imposed by the government whilst ignoring peoples needs, knowledge and rights.

* In traditional social setting people's culture (beliefs, knowledge etc.) were part and parcel of the production process. Today, projects are established without adequate understanding of local culture.

* There is still so much confusion in matters related to land tenure in Tanzania. The law, policy and allocation procedures are still fragmented and not in favor of the majority of the people (i.e. those who depend on customary systems for access and right over land).

In most of the protected areas or areas allocated to other users (e.g. tourism infrastructure), the inability to bring together management, ownership, tenure rights and equitable distribution of costs and benefits so that adjacent communities can fully benefit have further alienated local users from the resources and in many case led to environmental degradation.

Policy Implications and Recommendations

* Social, culture and land tenure issues are crucial components for sustainable natural resource use. Prior to the establishment of any project or program, it will be necessary to undertake a detailed analysis of these issues so as to identify key areas of concern.

* Whilst the ultimate users of natural resources are the people, it is crucial that they are involved in management programs. This would require basing management institutions on community led formal and informal structures rather than depending wholly on state imposed structures.

* As regards the critical question of land tenure, care must be taken to ensure that the changes that are proposed now would not make the people worse-off than before in as far as their rights and access to land is concerned. In this respect, in case land is being needed for a particular purpose, the people who have been traditionally using that land must be consulted before decisions are made. In other words, there is need to "*democratize land tenure control and administration by locating control over land at the level of the village assemblies, elected local communities and national parliament*" (URT, 1994b).

References

Bagachwa, M.S.D; Fanuel C. Shechambo; Hussein Sosovele; Kassim A. Kulindwa; Alexis A Naho and Elizabeth Cromwell (1995). Structural Adjustment and Sustainable Development in Tanzania. Dar es Salaam University Press: Dar es Salaam.

Berry, L., O. Mascarenhas and S.Stewart (1982). East African Country Profile: The United Republic of Tanzania. Worcester, M.A.: Clark University.

Bradburry, M., S. Fisher and C. Lane (1995). Working with Pastoralist NGOs and Land Conflicts in Tanzania. A Report on Workshop held in Terrat, Tanzania, 11th-15th December, 1994. International Institute for Environment and Development, London.

Bromley, D., and M. Cornea (1989). The Management of of Common Property Natural Resources: Some Conceptual and Operational Fallacies. Discussion Paper no. 57, World Bank, Washington. D.C.

Bruce, J.L. (1993). "Do Indigenous tenure Systems Constrain Agricultural Development ?" in Basset and Crumley (eds).Land in African Systems. pp.35-56.

Dodo, J. Thampapillai and J.R. Anderson (1991). "Soil Conservation in Developing Countries: A Review of Causes and Remedies" in Quarterly Journal of International Agriculture 3 (30). September 1991.pp 210-223.

Freillich, M. (ed) (1972). The Meaning of Culture. Lexington, Mass: Xerox College Publishers.

Homewood, K.H. and Rodgers, W.A. (1991). Maasai Ecology: Pastoralist Development and Wildlife Conservation in Ngorongoro, Tanzania. Cambridge Studies in Applied Ecology and Resource Management, Cambridge University Press: Cambridge.

IIED (International Institute for Environment and Development)(1994). Whose Eden ?. Nottingham, Russell Press.

IUCN (1992). Masterworks of Man and Nature: Preservng Our World Heritage. Patonga. (Australia): Harper-MacRae.

James, R. W. and Fimbo, G. M. (1973). Customary Land Law of Tanzania: A Source Book, Nairobi: EALB.

Kauzeni, A.S., I.S. KIkula, S.A. Mohamed, J. Lyimo and D.B. Dalal - Clayton (1993). Land use Planning and Resource Assessment in Tanzania: A Case Study. IRA Research Paper No 35.

Kironde, J.M and H.M Kayuza (1996). The Relatonship Between Gender, Access to Land and Poverty in Tanzania: Cases from the Bukoba area of Tanzania. Paper prepared for the first REPOA Research Workshop held in Dar es Salaam, 16-18 April, 1996.

Lane, C. (1990). Barabaig Natural Resources Mangement: Sustainable Land Use Under Threat of Destruction. Discussion Paper No. 12. United Ntions Institute for Social Development: Geneva.

Lane, C . and J.N.Pretty (1991). Displaced Pastoralists and Transferred Wheat Technology in Tanzania. Gatekeeper Series no. 20. International Institute for Environment and Development, London.

Mbilinyi, M. (1988). "Agribusiness and Women in Tanzania". Development and Change Vol.19.4.

Moore S. F. (1988). Social Factors and Fabrications: "Customary Law on Kilimanjaro 1880 - 1980." Cmabridge.

Moore, J.H. (1974). "The Culture Concept as Ideology". American Ethnologist 1:pp 537-549.

Mtengeti-Migiro, R. (1990)." The Division of Matrimonial Property in Tanzania". Journal of Modern African Studies, Vol.28, No 3, pp 521-526.

Potkanski, T. (1994). Property Concepts, Herding Patterns and Management of Natural Resources among the Ngorongoro and Salei Maasai of Tanzania. Pastoral Land Tenure Series No. 6. International Institute for Environmnet and Development, London.

Reeds, D. (ed) (1996). Structural Adjustment, the Environment, and Sustainable Development. Earthscan:London

Shvji, I.G. (1994). A Legal Quargmire: Tanzania's Regulation of Land Tenure (Establishment of Villages) Act. 1992. Pastoral Land Tenure Series No. 5. International Institute for Environment and Development, London.

Taylor, E.B. (1871). Primitive Culture. London:J.Murray

Tenga, R. (1992). Pastoral Land Rights in Tanzania. International Institute for Environment and Development, London.

TFAP (Tanzania Forest Action Plan)(1989). Tanzania Forest Action Plan 1990/91 - 2007/8. 2 Vols. Dar es Salaam:Ministry of Tourism, Natural Resources and Environment.

Tibaijuka, A. K., Kisanga, J.H., and M. Abubakar (1989). Strategies to enhance Women's Access and Effective Utilisation of Institutional Credit in Tanzania:Report on a Survey on Women's Land Rights in Tanzania, Report to the Presidential Commission of Inquiry into Monetary and Banking Systems in Tanzania: Subcommitee on Women's Credit Facilities, Dar es Salaam.

URT (1994a). The Rolling Plan and Foward Budget for Tanzania for the period 1994/95 - 1996/97. Vol.1,Dar es Salaam: Government Printers.

URT (1994b). Report of the Presidential Commission of Inquiry into Land Matters. Vol. 1. Land Policy and Land Tenure Structure. Ministry of Lands, Housing and Urban Development, Dar es Salaam and The Scandinavian Institute of African Studies, Uppsala, Sweden.

World Bank (1992). Empowering Villages to Manage their Natural Resources: Rural Land Policy in Tanzania. A World Bank White Cover Paper. Washington. D.C.

World Bank (1994). Tanzania Agricultural Sector Memorandum, Report No. 12294TA. Agriculture and Environment Operations Divisions, East Africa Department, Washington D.C. The World Bank.

An Introductory Guide to EIA in Tanzania

Institute of Resource Assessment,
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International Institute for Environment
and Development, London, UK

February 1996

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National Environment
Management Council
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Environmental Planning Group

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The report was prepared by Prof. Raphael B.B. Mwalyosi, Prof. Idris Kikula, Dr. Sitna Mohamed (IRA), Dr. Hussein Sosovele and Ross Hughes (IIED).

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An Introductory Guide to the EIA Process in Tanzania

This briefing paper explains the role of Environmental Impact Assessment (EIA), summarises the basic procedures involved in its implementation and explores its potential role in contributing to improved decision-making and development planning in Tanzania.

Introduction

EIA is now increasingly being seen and used within the wider context of serving 'sustainable development' objectives. This role was highlighted at the United Nations Conference on Environment and Development (UNCED) in 1992. Principle 17 of the Rio Declaration, agreed at UNCED, and to which Tanzania is a signatory, states:

> *"Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority".*

African environment ministers recently reaffirmed this commitment and pledged to formalize the use of EIA within legislative frameworks at the project, programme and policy levels. It is hoped that this briefing paper will help to improve understanding and awareness of the potential role of EIA in Tanzania still further.

What is EIA?

Environmental impact assessment (EIA) is a process which can be used to improve decision-making and ensure that development options under consideration are environmentally, socially and economically sound and sustainable. It is concerned with identifying, predicting and evaluating the foreseeable impacts, both beneficial and adverse, of proposed development activities, alternatives and mitigating measures, and aims to eliminate or minimise negative impacts and optimise positive impacts. EIA relates to a process rather than a particular activity and the environmental impact study itself is only one component of the process.

The terms 'impact assessment' and 'environmental impact assessment' are umbrella terms frequently used to cover a broad range of techniques, e.g. social impact assessment, risk assessment, environmental impact assessment. To date, EIA itself has been applied generally at the project level, but increasing attention is now being given to its role at the level of policies, plans and programmes (when it is known as strategic environmental assessment). These related techniques are described later in this paper.

The EIA process is designed to provide clear and systematic information to decision-makers and the public throughout the project cycle. Increasingly, impact assessment is also being viewed as a key mechanism for involving the public in the planning process through participation.

Why is impact assessment important?

Impact assessment is an important management tool for improving the long-term viability of projects. Its use can help to avoid mistakes that can be expensive and damaging in environmental, social and/or economic terms. Usually, the cost of undertaking an EIA accounts for only a small proportion of total project costs - a recent analysis of World Bank-supported projects in Africa found that EIA usually costs less than 0.1% of overall project costs. Importantly, savings to the project from an impact assessment can often be considerably more.

Who is involved in the EIA process?

Five principal groups of stakeholders should be involved. These include :

(i) **Project proponents** who are responsible for commissioning and paying for the EIA process. Proponents usually include government ministries and departments, private sector companies and development agencies.

(ii) **Service providers** who undertake or provide inputs to the EIA process. They include individuals; organizations; research and academic institutes; NGOs; and both local and international consulting companies.

(iii) **Reviewers** who are responsible for 'quality control'. They are responsible for determining the level of environmental assessment required (screening), and ensuring that work proceeds according to agreed, clear and comprehensive terms of reference. They also review the EIA process and communicate their findings to decision-makers. Although currently there are no agencies currently fulfilling this function on a statutory basis in Tanzania, in future they are likely to include government ministries, universities and colleges, and environmental NGOs, together with local and international experts.

(iv) **Decision-makers** who are responsible for making decisions on project development once an environmental impact statement (EIS) has been submitted.

(v) **The public** who are the most important stakeholders. The public can contribute ideas and information that can help to avoid unforeseen problems, improve project design and contribute to monitoring. Experience also shows that development projects imposed on local communities often fail or under-perform because they lack a sense of local ownership and public support. They can also result in conflict. EIA provides a mechanism for public involvement in decision-making. The public also includes interest groups. These are groups that might not be directly affected by a development proposal, but which have interests in particular aspects of the environment, such as conservation organisations. Many of these groups can make valuable contributions to EIAs.

When should the EIA be undertaken?

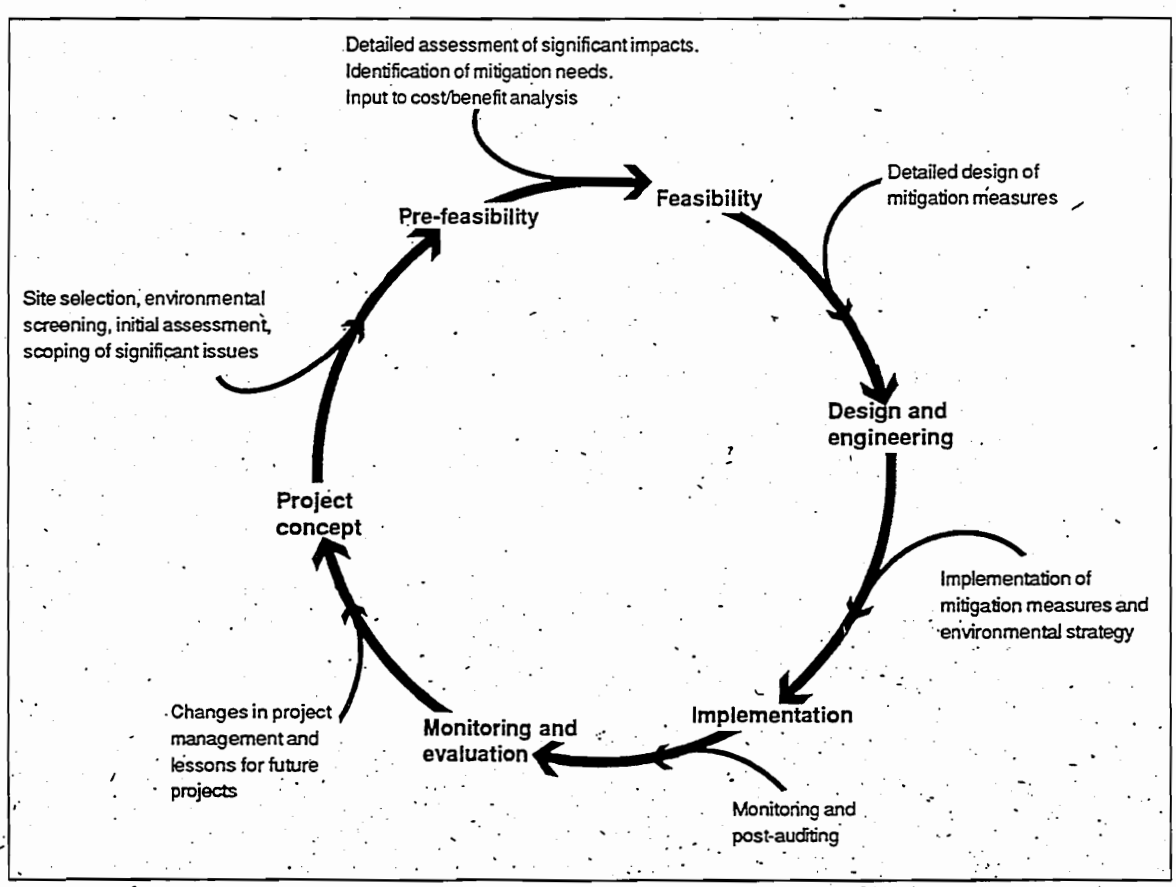
EIA should be initiated as early as possible in the project cycle and should include a provision to cover the monitoring of project implementation and operation, and eventually an audit of the project. In some cases, it will also be important to include project decommissioning within the EIA. *(See Figure 1).*

EIA and Tanzania

There is currently no national legal requirement for EIA in Tanzania, nor supporting institutional mechanisms. There is also a lack of awareness at governmental level of the potential benefits that EIA can bring. Despite this, a number of EIA studies have been undertaken in Tanzania during the past 15 years. These have focused mainly on large development projects supported by development assistance agencies.

Various initiatives are underway which have the potential to create a policy environment that could be more supportive of EIA. These include a national environment policy; an Environmental Protection Bill; a National Environmental Action Plan; a National Conservation Strategy for Sustainable Development; and a proposed new land policy. All of these initiatives refer explicitly to role that EIA could play although, as yet, there has been no clear statement of proposed institutional procedures, responsibilities or legislation.

Figure 1: EIA and the Project Cycle



Making EIA Effective

Tanzania still has much work to do in developing the resources and conditions required to enable EIA to function effectively. Considerable effort will be required to ensure that EIA procedures and guidelines are tailored to the specific context, needs and resources available to EIA in Tanzania. These include:

• *Institutional and Political Conditions*

Clear and explicit procedural guidelines, together with institutional and legal provisions, are prerequisites for effective EIA. Strong political commitment is also vital to ensure that the EIA process is resourced, developed and respected by the government, private sector and public alike. A robust review process can also play an important part in making EIA more effective.

• *Human Resources*

Awareness and understanding of the role of the EIA process, and the contribution it can make to improved decision-making and planning, is crucial. In Tanzania, there is an urgent need to raise such awareness of the potential value of EIA. There exists a wealth of skills and expertise in Tanzania relevant to EIA. However, careful targeted training will be required if these resources are to be employed effectively. The availability of human resources trained to undertake and manage EIA is another crucial prerequisite.

• *Financial Resources*

Financial resources are needed for the initial establishment of EIA institutional structures. However, the financial cost of undertaking EIA is usually a small proportion of total development costs - usually less than 1% of project costs. In fact, the cost of not undertaking EIA may often exceed the initial cost of the EIA process.

The Environmental Impact Assessment Process

The EIA process consists of a number of different steps or elements (see box 1 and figure 2).

Box 1. Steps in a Typical EIA Process

1. Registration
2. Screening
3. Preliminary assessment
4. Scoping
5. The EIA study
6. Review
7. Monitoring
8. Post-project auditing
9. Decommissioning

But, not every development project requires each element of the EIA process, and *screening, preliminary assessment* and *scoping* are used to determine the extent and focus of assessment required.

The following steps are undertaken as components of most EIA processes:

Registration is a simple administrative procedure which requires project proponents officially to register their intention to undertake a development activity. It allows all new projects to be screened for their potential impacts by the appropriate authority. Responsibility for registering a proposed project lies with the proponent.

Screening determines the level of assessment necessary. Past experience shows that certain types of project are not likely to have serious adverse environmental consequences, and therefore do not require detailed assessment. By contrast, other types of projects have the potential to cause significant impacts and routinely require a comprehensive EIA.

Preliminary assessment is used to identify key impacts on the environment; describe their magnitude and significance; and evaluate their importance for decision-makers.

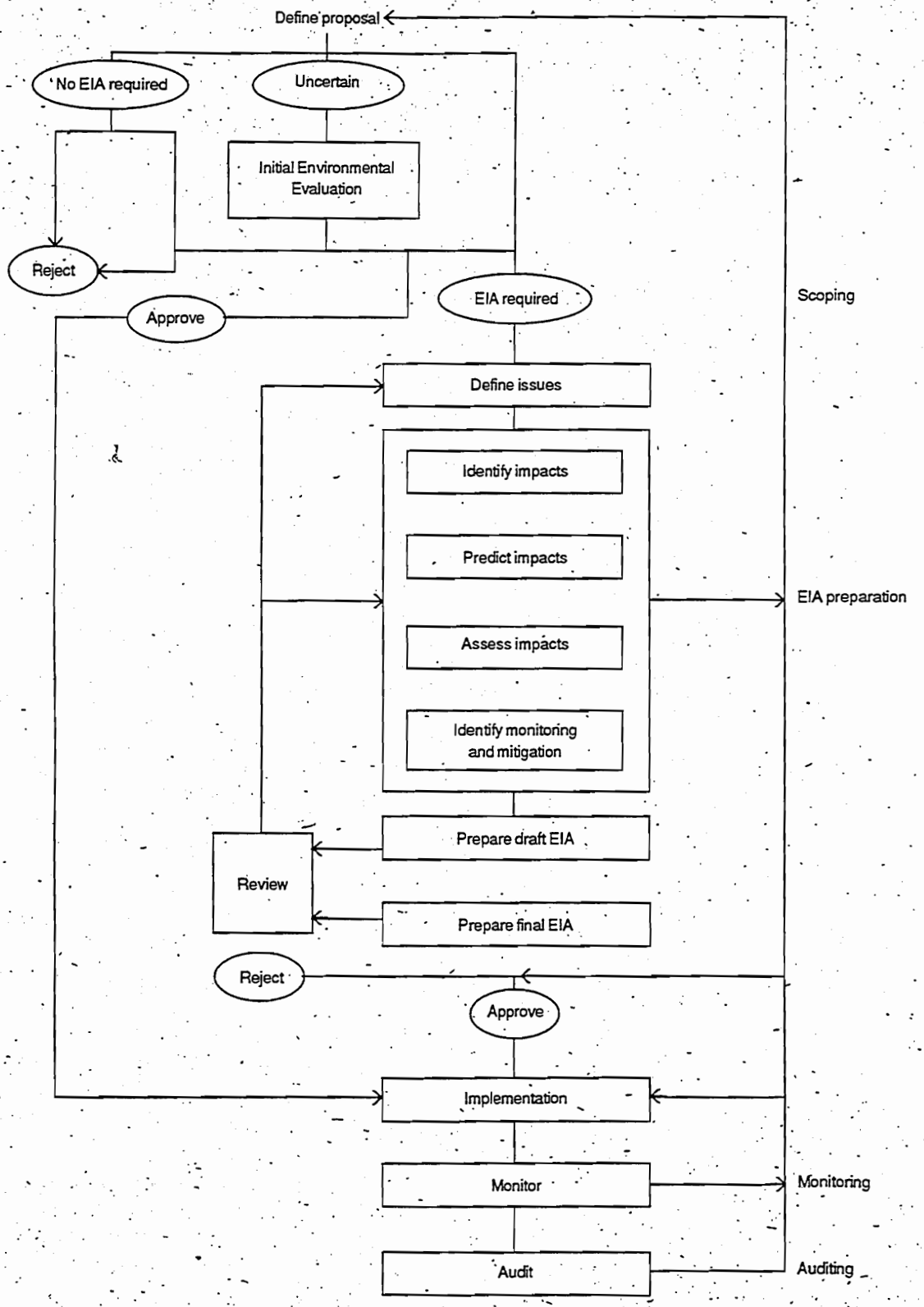
Scoping is used to focus the EIA on the key issues for decision-making; identify information needs and review alternative options to the project. Scoping is also used in the preparation of the terms of reference for the subsequent EIA study process. It also offers a crucial opportunity for facilitating public participation in the project. In some countries, such as the Netherlands, independent commissions are involved in the process to ensure that scoping is undertaken without bias.

The environmental impact assessment study. EIA studies attempt to predict which impacts will occur as a result of the project and their likely significance. Importantly, they also identify measures to mitigate or avoid these impacts, or optimize the benefits of the project.

Most EIA studies include the following steps :

- *Impact identification* specifies those impacts that should be investigated in detail;
- *Examination of alternatives* considers alternative sites for the project and, where practicable, alternative designs and operating processes; and the environmental implications of each;
- *Evaluation and assessment of impacts* attempts to determine the significance of impacts at a local, national and international level;

Figure 2: Stages in the EIA Process (after Wathern, 1988)



- *Development of mitigation options* seeks to determine measures to prevent or reduce impacts as early as possible in the project cycle, so that these can be built into project design. Ideally, these measures are drawn together into a coherent *environmental management plan* which should be included in the overall budget for the project;

- *Information dissemination and documentation* is achieved conventionally through the compilation of an environmental impact statement (EIS). A common misconception is that EIS have to be large, and highly technical documents. They do not! Experience elsewhere indicates that technically good EIA studies may fail to influence the decision-making process because of poor presentation and communication. Careful report organization, and the inclusion of clear summaries, maps and figures, can improve communication considerably. The inclusion of carefully defined recommendations (e.g. the location and design of mitigation measures, alternative route alignments, erosion control measures) is vital to project design. Ideally, an EIS should contain the following:

    - an executive summary of the EIA findings;
    - a description of the proposed development project;
    - baseline data;
    - a clear statement of the major environmental and natural resource issues that need clarification and/or elaboration;
    - a clear statement of predicted impacts, their likely significance and a rationale of how these conclusions were reached;
    - a clear statement of the proposed mitigation measures required;
    - a clear statement of those impacts that are likely to remain after mitigation is implemented (the so called residual environmental impacts); and
    - a description of the monitoring procedures required to ensure that mitigation and unforeseen impacts are assessed once project implementation begins.

Alternative and complementary methods can also be used to improve communication and information exchange. These methods include local language videos, local radio programmes, meetings and workshops. These can be particularly effective in areas where literacy, social of cultural barriers prevent local people accessing the EIS. A summary of the EIS, which should focus on issues most relevant to decision-making, should also be made available. This should also be made available in local languages where these differ from that used in the main statement.

Review. The review phase is an essential component of an effective EIA process: It is used to ensure that the EIA study has adhered to the agreed terms of reference, and provides an impartial mechanism for assessing the quality of the EIA and its adequacy for decision-making. In most countries, a draft version of the EIS is made available for review and public comment. It is important that draft copies are accessible to a broad range of stakeholder groups, including local communities. In some countries, such as the Netherlands, an independent commission provides a review of each impact assessment. Guidelines to assist in the review of the quality of EIA, and to provide a framework for coherence and consistency of review quality, have now been prepared for a number of countries.

Monitoring assesses the effect of the project on the natural and cultural environment. Inclusion of a framework for monitoring can improve significantly the effectiveness of EIA since it can provide a mechanism for ensuring that mitigation measures have been carried-out and determining whether predictions were accurate. In theory, the results of monitoring can then feedback into the project cycle so that appropriate revisions to project design and operation can be made. In practice, attention to monitoring is often inadequate, in many cases because inadequate provision is made for monitoring in project costs and design.

Post-project audit. Auditing provides a mechanism to learn from experience, and to refine project design and implementation procedures. Auditing also provides regulatory agencies with a framework for checking compliance with, and the performance of, an environmental management plan. In most instances, the auditing process will depend heavily on the existence of relevant and good quality monitoring data.

Related Impact Assessment Techniques

A number of other specialist disciplines fall under the umbrella terms of 'environmental assessment' or 'impact assessment'. In some cases, these techniques maybe incorporated as part of an EIA. Some of the more prominent of these techniques are as follows:

Social impact assessment (SIA) identifies and quantifies the impacts on human populations resulting from changes to the natural environment. The technique has now developed as a discipline in its own right and is applied in many countries.

Environmental health impact assessment (EHIA) provides a comprehensive and rigorous mechanism for identifying, predicting and appraising environmental factors which might affect human health. Factors can include ge-

ology, vegetation, demography, economics, pollutants (physical, chemical or biological) as well as the availability of health services.

Risk assessment addresses risks to human and ecosystem health and welfare posed by development initiatives. Risk assessment has been widely adopted by, for example, the chemical industry as a process to help avoid major disasters.

Strategic environmental assessment (SEA) is a process for identifying and addressing the environmental consequences (and associated social and economic effects) of policies, plans and programmes (PPPs). It can also be applied to enable cumulative impacts between projects, policies and programmes to be taken into consideration. It provides a mechanism to ensure that plans, programmes and policies are more sustainable and helps avoid costly impacts or problems at the project level. The technique is still in its infancy, and it will be some years before there is sufficient experience to implement SEA effectively, especially in developing countries.

Cumulative effects assessment (CEA) is used to predict the combined effects of multiple activities, rather than the effects of specific development activities. For example, it might be used to predict, and find ways of addressing the environmental and social implications of power generation or tourism policy. Most elements of the process are similar to 'conventional' EIA. The most important difference is the inclusion of larger spatial scales in the analysis. These may translate into regional patterns of change. Examples of cumulative effects include the long-range transport of environmental pollutants, groundwater depletion and pollution, and linkages between fisheries declines and wetland losses.

Finding Out More About EIA

A number of agencies and organisations can provide general and technical advice on environmental management (including EIA) in Tanzania. They include:

The Institute of Resource Assessment (IRA)
National Environment Management Council (NEMC), Vice President's Office
Division of Environment (DoE), Vice President's Office
AGENDA - Business Care
The Ardhi Institute
Centre for Energy, Environment, Science and Technology (CEEST)
Environmental Society of Tanzania (EST)
Journalists Environmental Society of Tanzania (JET)
Wildlife Conservation Society of Tanzania

A more comprehensive list of organisations with experience relevant to EIA can be found in :

Environmental Assessment in Tanzania : A Needs Assessment for Training (1995). IRA Research Paper No. 36. IIED Environmental Planning Issues No. 9. Institute of Resource Assessment/International Institute for Environment and Development. August 1995.

Available from the Institute of Resource Assessment, University of Dar es Salaam, Tanzania.

A useful review of existing impact assessment guidelines can be found in :

A Directory of Impact Assessment Guidelines (1995). Compiled by Dilys Roe, Barry Dalal-Clayton and Ross Hughes. IIED, London.

Available from the International Institute for Environment and Development, 3 Endsleigh Street, London, UK.

IRA Research Paper No. 41
.nvironmental Planning Issues No. 14

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Preface

Since the 1972 UN Conference on the Human Environment in Stockholm, acceptance of the importance of environmental issues in development has grown enormously. This acceptance evolved, through a succession of highly influential initiatives, including the World Conservation Strategy (IUCN/UNEP/WWF, 1980) and the Brundtland Commission (WCED, 1987), into the concept now known as '*sustainable development*'. Sustainable development provided the dominant theme of the 1992 UN Conference on Environment and Development (UNCED), which universally endorsed the concept, particularly in Agenda 21. It has often proved easier to define activities that are *unsustainable*, such as growing consumption, poverty, resource degradation, than those that are *sustainable*. Hence, sustainable development is usually defined in broad and generalised forms. One of the most widely cited definitions of sustainable development is that endorsed by the Brundtland Commission:

> "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". (WCED, 1987).

Crucial to the concept of sustainable development is a recognition that all development intrinsically involves 'trade-offs' between potentially conflicting goals, such as between economic growth and conservation, between fisheries and agricultural production, or between traditional and modern approaches to production. The objective of sustainable development is to *optimise* these trade-offs between and across the three systems basic to development – the ecological system, the economic system and the social system (Barbier, 1987; Holmberg *et al*, 1991). Emphasis has now switched to finding ways of implementing sustainable development. This raises a number of crucial issues, not least determining *who* should make trade-offs and *how* these trade-offs can be made.

Environmental impact assessment (EIA) is now widely viewed as one of comparatively few tools that can be used to improve the way in which trade-offs are made and improve the quality of development planning. This view is now enshrined in national and international declarations and considerable resources and efforts have been devoted to promoting the adoption of EIA by national and international development agencies. For example, Principle 17 of the Rio Declaration on Environment and Development, agreed at the 1992 United Nations Conference on Environment and Development, and to which Tanzania is a signatory, states:

> "Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority".

A recent meeting of African environment ministers (in which Tanzania participated), reaffirmed this commitment and went further by pledging commitment to formalising the use of EIA within legislative frameworks for development planning and decision-making, at the project, programme and policy levels (Goodland *et al.*, 1996).

Over half the countries in the world now have formal EIA systems, and most development assistance agencies have introduced their own guidelines (see Roe *et al*, 1995), designed to encourage or mandate the use of EIA for development projects. In 1986, the World Bank included EIA in its project appraisal process, an initiative followed by other multilateral agencies (including the African

Development Bank), bilateral aid agencies and UN organisations. While the original purpose of EIA was frequently project-focused, it is increasingly being seen and used within the wider context of serving 'sustainable development' objectives and more attention is now being given to applying environmental assessment to plans, policies and programmes (strategic, sectoral and policy assessment are all examples of this new focus of interest).

Despite such widespread and wholesale promotion of EIA, few studies have sought objectively to assess the influence and effectiveness of EIA in assisting national governments to implement sustainable development objectives. A recent initiative, the International Study of the Effectiveness of Environmental Assessment (Sadler, 1996), attempted a comprehensive review, but its focus was mainly on experience in Northern industrialised countries. Few studies have focused on experience in developing countries, where the efforts of development assistance agencies are now focused. This study is the first in a series of national case studies that seeks to fill this gap. Further ones are planned for South East Asia and Latin America. The report challenges a number of widely held assumptions that underlie the notion of EIA as an effective tool for sustainable development.

The study has come at an opportune time for Tanzania. The Government of Tanzania is now in the early stages of formulating a framework for Tanzania, a framework which is likely to encompass institutional, legal and procedural considerations. The outcome of this process is likely to define the way in which EIA will be managed and implemented in Tanzania for a long time to come. This study report aims to guide and inform this process, and stimulate debate and thinking of relevance to other developing countries in Africa and beyond.

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Executive summary

This study is one of the first attempts to determine objectively the influence of environmental impact assessment (EIA) on decision-making at the national level. It comes at an opportune time – as the Government of Tanzania is currently in the process of formulating national EIA guidelines. With few exceptions, previous studies of EIA effectiveness have relied heavily on indirect and impressionistic evidence. Often this evidence has been collected by questionnaire surveys from the growing numbers of EIA practitioners and aid bureaucrats – that is, from those who may be perceived to have 'vested interests' in the perpetuation of EIA as a planning tool.

Based on a detailed, systematic review, the study shows that EIA has had very little impact on decision-making in Tanzania. In most cases, EIAs were extremely late in starting, under-resourced and generally omitted to involve other stakeholders to any meaningful extent. Most focused on outputs and paid little attention to process. There are few examples where dialogue between EIA practitioners and proponents led to design modifications before the submission of the EIS. In most cases, the EIS did not define, cost and integrate environmental management into project design, and few defined compliance responsibilities. Compliance with the recommendations of EIA has been the exception rather than the rule. Perhaps, not surprisingly, there is a considerable body of opinion, particularly prevalent amongst the private sector and within senior tiers of government, that views EIA in its conventional form as an impediment to much-needed development – and a process that has been 'imposed' by donors.

Interestingly, the study found no evidence that donor-supported EIA processes led to more effective EIA, even though they often harnessed the skills of expensive international consultants, and used donor guidelines. This appeared to be because donor interest in the process generally dissipated once the EIS had been prepared and internal agency needs had been fulfilled. The study found no examples where donor agency interest extended to ensuring that EIA recommendations were adhered to during implementation, post completion or audit phases of the projects concerned. Hence, not only have expensive EIA processes failed to make much of a difference, but donor agencies have failed to learn from their own experience. This 'institutionalized amnesia' has meant that desk officers and other in-country agency staff could generally say little if anything about the performance of the EIA processes they had commissioned.

However, the study has revealed one or two signs for optimism. For example, where EIA processes were introduced early in the project cycle, and where EIA was taken seriously by the proponent, then there is some evidence to indicate that this led to 'positive' design modifications. In one case in the Ruifiji delta, an EIA process became the focus of intense debate over the appropriateness of a major aquaculture development proposal.

The study presents a number of recommendations which are relevant to both the national context of Tanzania and to international donor policy. Our findings have implications for the considerable faith and financial resources invested in EIA each year. Whilst Tanzania still lacks a robust legislative and procedural framework for EIA, this is by no means unusual in many aid-recipient countries, particularly in Africa.

The extent to which experience in Tanzania is representative of experience elsewhere in Africa or the South is open to question. It is for this reason that further national studies are planned for countries with different types of EIA frameworks and institutional capacity.

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Glossary of terms and acronyms

AISCO	Agricultural and Industrial Supplies Company
BICO	Bureau of Industrial Cooperation
CBA	Cost Benefit Analysis
CPS	Cathodic Protection Stations
EA	Environmental Assessment
EHIA	Environmental Health Impact Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ERB	Environmental Regulatory Body
EU	Environmental Unit
IAIA	International Association for Impact Assessment
IEA	Institute of Environmental Assessment
IIED	International Institute for Environment and Development
IRA	Institute of Resource Assessment
IUCN	International Union for the Conservation of Nature (now known as the World Conservation Union)
NAFCO	National Food Corporation
NCI	National Chemical Industries
NCSSD	National Conservation Strategy for Sustainable Development
NEAP	National Environmental Action Plan
NEMC	National Environmental Management Council
NEPA	National Environmental Policy Act
NGO	Non Governmental Organisation
pEIA	Preliminary Environmental Impact Assessment
SIA	Social Impact Assessment
TANAPA	Tanzania National Parks
TAZAMA	Tanzania-Zambia (Pipeline Ltd.)
TANESCO	Tanzania Electricity Supply Company
TCMB	Tanzania Coffee Marketing Board
TISCO	Tanzania Industrial Studies and Consulting Organization
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WCST	Wildlife Conservation Society of Tanzania
WWF	World Wide Fund for Nature
UNCED	United Nations Conference on Environment and Development

1 Introduction

1.1 The study

This report has its origins in a training needs assessment study for EIA in Tanzania (IRA/IIED, 1995). The study surveyed legislation relevant to current and future EIA implementation and the institutions involved in various aspects of resource management relevant to future EIA implementation in Tanzania. The study also provided an assessment of implementation capacity and training needs in the country. A striking finding of the study, was that little could be learned about the *EIA process* as a whole (for example, the extent to which the EIA process involved different stakeholders, the extent to which it influenced project decisions *etc.*). Nor was it possible, using reviews of environmental impact statements (EISs) alone, to determine the effect of the EIA process on the planning, design and implementation of development projects.

Few studies have objectively reviewed EIA effectiveness in Africa, and none have attempted to do so by including an objective and comprehensive review of past performance. Thus, the objectives of this study were to:

- evaluate the quality of environmental assessment processes undertaken in Tanzania;
- evaluate the effect of EIA on decision-making and planning processes;
- determine the factors that contribute to better EIA performance; and
- identify lessons and define policy implications to improve EIA performance.

This study is retrospective and holistic in nature. It reflects on 16 years of EIA practice in Tanzania. It also sheds light on the current and potential effectiveness of EIA as a planning tool and, in a more general sense, its role in supporting planning for sustainable patterns of development. Importantly too, the study draws from this experience and identifies lessons of relevance to EIA policy and practice. Whilst these are based on EIA experience in Tanzania, many are relevant to EIA practice elsewhere.

To achieve its objectives, the study comprehensively reviewed past EIA practice, and explored the way in which EIA has contributed, directly or indirectly, to the activities and processes of planning and decision-making. In many cases, the impact of EIA on the planning process proved difficult to determine, and not all impacts could be evaluated in quantitative terms. Hence, to some extent, the analysis has depended on the use of qualitative indicators.

Examples of direct impacts of EIA on planning and project implementation include:

- alterations to the way in which development projects are planned and implemented;
- decisions not to proceed with projects where the EIA has identified potentially significant environmental and social impacts; and
- decisions to adopt alternative approaches or project designs to achieve objectives as a result of alternative design options identified by the EIA.

Examples of indirect impacts of EIA on planning and project implementation include:

- changes in attitudes or organizational culture attributable, at least in part, to the EIA process;

- the stimulation of public debate on environmental and social issues arising from development proposals; and
- the use or adoption of EIA as a focus for public debate and negotiation.

In order to address these issues, an adaptive approach to review was adopted. From the outset, the research was guided by the views and perceptions of those with experience of environmental assessment practice in Tanzania. It combined the use of structured desk review techniques, with interviews and in-depth case study analysis. Importantly too, the draft findings have been thoroughly reviewed and discussed by a broad range of contributors prior to the finalisation of this report.

1.2 Selection of national case studies

This report comprises the first of a series of national case studies focusing on EIA performance assessment (subsequent case studies are planned in South East Asia and Latin America). Each case study will focus on the performance of EIA from contrasting contexts (or 'enabling conditions') and each will use structured approaches broadly similar to the methodology developed by this research process. This will allow comparison between case studies. But why start with Tanzania? A number of considerations informed the choice of the case study:

- Tanzania is on the threshold of adopting a national framework for EIA, thus offering an opportunity to tailor the findings of this research to make a practical contribution to national EIA policy;
- Tanzania has accumulated considerable experience of EIA on which to reflect;
- Tanzania, in common with many developing countries, appears to lack many of the characteristics thought to be critical for effective EIA, such as robust planning frameworks, strong environmental management institutions, well trained human resources and available financial resources (see Ebisemiju, 1993). Hence, Tanzania provides an opportunity to reflect on the potential role and limitations that EIA may have in a large number of developing countries, and in which development assistance agencies are currently investing heavily in EIA;
- the large number of donor-supported EIAs undertaken in Tanzania provided a good opportunity to reflect on the impact of donor guidelines on EIA practice, especially where these are applied in the absence of a supportive national EIA framework – a situation typical of many countries in Africa, Asia and Latin America.

1.3 Wider policy implications

Great faith and resources have been invested in environmental assessment as a means of 'achieving sustainable development (see Box 1.1). EIA is now 'big business'. Today, it is estimated that more than 100 countries have national EIA systems in place. When autonomous provincial jurisdictions are added, the number of EIA regimes is thought to be around 200 (Sadler, 1996). Fueling this interest requires substantial financial resources from private and public sources which could be allocated elsewhere, at least theoretically.

In 1993, the President of the Canadian Federal Environmental Assessment Review Office stated:

"Has environmental assessment achieved its goal of helping... reach better decisions? This is the fundamental question that all... practitioners must begin to address systematically" (Dorais, 1993).

Four years later, there is still a lack of empirical research on the influence of EIA on decision-making and implementation, particularly in developing countries. Most studies that have commented on EIA performance have focused on experience in developed countries and most have not addressed two key questions facing EIA: Firstly, does EIA represent 'good value for money'. If not, would funds currently devoted to EIA be better targeted elsewhere? Secondly, is EIA being applied in a way that is relevant to decision-making in the country? If not, should EIA be adapted or redesigned to suit the context in which it is used. Most policy-makers and development planners, particularly those working within international development organizations, are not in a position to determine whether funds currently devoted to EIA would be better re-targeted, nor whether they need to adapt or reform the way in which EIA systems are designed and applied.

Box 1.1. Big business: the spread of EIA worldwide

EIA is now widely institutionalized and accepted throughout the world, and interest continues to grow. In 1994, the International Institute for Environment and Development (IIED) published a review of EIA guidelines for:

- Fifty five countries and federations;
- All six multilateral development banks (including the World Bank and most regional development banks);
- Eleven bilateral development agencies;
- Eight United Nations organisations (including the United Nations Development Programme, the Food and Agriculture Programme and the World Health Organisation);
- Six intergovernmental organisations (including the European Commission and the Organization for Economic Cooperation and Development).

Since publication of the IIED review in 1995, an even greater number of countries have adopted environmental assessment in policy, legislation and/or practice.

Source: Roe *et. al.* (1995).

What is known about the influence of EIA on decision-making? Until recently, surprisingly few studies had addressed this key question. Where studies had commented on EIA performance, these had primarily been undertaken in the industrialized countries. These include those for EU member states (CEC, 1993); and for the United States, New Zealand, Australia and Canada (Wood, 1995). The results of most studies paint a mixed picture of performance, with some elements of the EIA process scoring moderately well, and others scoring rather poorly.

In contrast, the International Study of the Effectiveness of Environmental Assessment – commonly referred to as the 'effectiveness study'[1] (Sadler, 1996) concluded that:

> "What comes through is a clear indication that EA can and does make a difference to decisions taken and that it supports environmentally favourable actions in implementing development."

This conclusion is based largely upon the results of a questionnaire survey of EIA stakeholders, mainly practitioners, undertaken as part of the 'effectiveness study'. A component of this survey explored respondent perspectives of the influence of EIA on decision-making. In summary:

- EIA was considered 'very' or 'moderately' successful in ensuring that the 'full range' of environmental considerations were taken into account during decision-making, but only 'marginally successful' or 'not successful' in ensuring that social factors were taken into account;
- EIA was perceived as being moderately influential in establishing terms and conditions of approval; and
- EIA was seen as having marginal or no influence on ensuring that appropriate follow-up arrangements are in place.

One of the key conclusions of the Effectiveness Study was that a 'sharpening' of EIA tools is required. Yet the preliminary indication from earlier work in Tanzania (IRA/IIED, 1995) suggested otherwise, and pointed to a need to address more fundamental issues (such as institutional capacity and organization and political support) if EIA is to contribute effectively to planning. This study report, which essentially represents a 'widening and deepening' of the 1995 study, reflects on these issues further, and is based on a comprehensive review of EIA in practice.

[1] The study was launched in 1993 and examined the status of environmental assessment world-wide. The study was led by the Canadian Environmental Assessment Agency in collaboration with the International Association for Impact Assessment (IAIA).

2 EIA in Tanzania

2.1 Evolution of EIA in Tanzania

The first 'formal' EIA process in Tanzania was undertaken for the Stiegeler's Gorge Power and Flood Control project undertaken in 1980 (RUBADA, 1980)[2]. Since then, EIA practice has evolved only slowly. The development of national EIA policy and legislation, in common with experience throughout Africa (Ebisemiju, 1993) has been even slower, and remains incomplete. Of over 26 genuine EIAs assessed by this study, 18 (70%) have been undertaken to fulfil donor requirements.

There have been signs of emerging political interest in EIA in the country. In 1995, African environment ministers and government representatives met in Durban to discuss EIA and areas for priority action. The Tanzanian delegation signed the communiqué pledging affirmative action to promote EIA as a planning tool (Box 2.1), suggesting a growing commitment to the process. Recently, the President of Tanzania has reaffirmed commitment to pledges made at the 1992 United Nations Conference on Environment and Development (WCST/IRA/Agenda, 1996). However, lack of resources, expertise and institutional capacity continue to present formidable barriers to the implementation of these pledges. National EIA guidelines are currently under preparation (section 2.3), but improvements in political support will still be required if these new guidelines are to make a real difference.

A number of sectoral policies, such as those for tourism, land and energy, advocate the use of EIA in project planning. For example, the proposed National Land Policy will require EIA studies prior to every major project. Some development legislation, such as the Mining Act (1979) also requires proponents to take account of environmental and social issues. However, neither of these instruments is supported by guidelines, and there has been little compliance with such legislative and policy provisions. Various environmental policy documents, such as the National Conservation Strategy for Sustainable Development (NEMC, 1994) and the National Environmental Action Plan (MTNRE, 1994) recognise explicitly the need for an effective environmental framework, but lack legislative backing (see Hitchcock, 1994; IRA/IIED, 1995).

National capacity for the management and implementation of environmental assessment is extremely limited (IRA/IIED, 1995). Box 2.2 summarises the results of a recent analysis of EIA capacity in Tanzania. Furthermore, with 120 districts throughout the country, the only institution with potential to manage such a process, the National Environmental Management Council (NEMC) will find it extremely difficult to implement the emerging guidelines effectively. These conclusions were supported by a regional review of institutional support for environmental management, undertaken for the United Nations Food and Agriculture Programme (Spooner, Singh and Mugabe, 1994). This review recommended that immediate attention is given to : building capacity to undertake EIA within national institutions and academic organisations; strengthening national capacity to collect baseline information; and developing appropriate institutional structures.

[2] Although a number of environmental studies of earlier development projects had been undertaken prior to 1980.

Box 2.1: Areas for immediate priority action identified at the 1995 African Ministers meeting on Environmental Impact Assessment

"We, the African Ministers and government representatives responsible for the environment...identified the following areas for immediate priority action:

(a) promoting the use of EIA as a continuous planning tool and the strengthening of institutional and legal frameworks for this purpose to ensure the enforcement of EIA by fully integrating this tool, including biophysical and socio-economic aspects, from the early stages of policies, plans, programmes and project formulation, implementation, monitoring the commissioning and evaluation.

(b) sensitising policy and decision makers...

(c) establishing (an EIA database, a geographic information system, information exchange and a network of experts etc...)

(d) promoting co-operation (exchange of experiences and developing guidelines)...

(e) promoting co-operation between developed and developing countries...

(f) promoting capacity-building, based primarily on the use of African expertise and institutions, and urging our countries to:

- develop curricula and other training programmes to incorporate environmental education and EIA at all levels of education and training;
- encourage governmental and non-governmental organisations active in environmental management to participate in all related capacity-building activities, as well as in regional training programmes;
- enhance public awareness and popular participation, particularly of NGOs, women, youth and community level organisations, in the development and use of EIA; and
- encourage all environmental movements active in the region to promote the development and use of EIA in all their activities..."

Source: Extracts from the communiqué co-signed by all ministerial delegations present at the Africa High-Level Ministerial Meeting on EAs in Africa, held in Durban, South Africa, June 1995 (in: Goodland *et al.*, 1996).

2.2 EIA in sectoral policies

Despite slow progress at national level, there are some notable initiatives to incorporate EIA through sectoral policies and planning. These include:

- Tanzania National Parks (TANAPA)

TANAPA's policy now requires the preparation of an EIA for all developments and activities within and adjacent to the national park boundaries (TANAPA, 1994). This policy includes all development activities proposed by TANAPA, as well as other government agencies and private sector proponents. EIA is also being extended to cover the General Management Plans currently being prepared for each national park (eg. TANAPA Planning Unit, 1994).

- Department of Wildlife

Department of Wildlife draft policy requires all 'significant' development proposals within Tanzania's protected areas (which includes game controlled areas, game reserves and forest reserves) to be subjected to EIA (Department of Wildlife, 1996). The Ngorongoro Conservation Area Authority has a similar policy. However, these policies are not supported by legislation.

Box 2.2: Key training needs for EIA in Tanzania

A recent study of EIA development in Tanzania reviewed past experience, assessed expertise available for EIA and identified priority training needs. The study found that EIA studies undertaken in Tanzania have relied heavily on international consultants and expatriate expertise, limiting the development of domestic capacity to undertake EIA. However, it also concluded that the increasing influence of the private sector on national development and the enactment of national-level EIA legislation will significantly increase the demand for indigenous expertise.

The study found that there is a considerable amount of expertise relevant to EIA in Tanzania, and suggested that ways need to be found of harnessing this expertise so that it can better serve the EIA process in the country. It showed that in the short and medium term, training needs to be targeted at:

- improving awareness of the role of EIA in national policy and planning and redressing popular misconceptions, especially at a senior policy and decision-making level; and
- enhancing management capacity for EIA, and focus on improving capacity for screening, scoping and EIS review.

Source: IRA/IIED, (1995)

- Tanzania Electric Supply Company (TANESCO)

TANESCO has made EIA mandatory for all power generation projects and for the construction of transmission lines.

2.3 Efforts to introduce national EIA guidelines

National guidelines are currently being formulated. Draft guidelines have been discussed at two cross sectoral national workshops and one district consultation involving forty four districts (NEMC, pers comm.) and they envisage the formulation of EIA legislation. They propose the establishment of a national Environmental Regulatory Body (ERB) which will oversee Environmental Units (EUs) at district and sectoral levels. It is envisaged that the ERB and EUs will be responsible for screening projects and the review of EIA reports and that the ERBs will also be consulted during scoping, although this will be the responsibility of the proponent. The ERB will also be responsible for approving terms of reference prepared after scoping. Reporting guidelines are likely to follow standard procedures used in other countries, particularly those of the Republic of South Africa (DEA, 1992), Ghana (EPA, 1996) and those prepared by the Tanzanian National Parks (TANAPA, 1994).

In a context where environmental awareness is low, and corruption and the abuse of power is pervasive, a clear legislative framework provides the only realistic option for making EIA effective. Legislation would also strengthen the government's resolve to enhance the attention given to environmental considerations in decision-making processes, a pledge recently made by Tanzania's President (WCST/IRA/Agenda, 1996). Disagreements among certain government departments, and a lack of environmental leadership and commitment within government, have so far prevented progress on this key issue. In the meantime, EIA will continue to rely upon administrative provisions, such as those contained within the National Conservation Strategy for Sustainable Development (NCSSD) and the National Environment Action Plan (NEAP).

2.4 Practical experience of EIA

There is no documented list of EIAs so far undertaken in Tanzania. This study identified over 40 documents described or purporting to be environmental assessments. Of these, only 26 were considered to be 'genuine' EIAs. These are listed in Box 2.3 and their location shown in Figure 2.1:

Box 2.3: Environmental Impact Assessments undertaken in Tanzania

1980

- Stiegeler's Gorge Power and Flood Control Project (RUBADA, 1980)

1992

- Madibira Rice Project (Halcrow, 1992)
- Kilombero Valley Hardwood Project (IIED/IRA, 1992)
- Development on Changuu (Prison) Island, Zanzibar (Ross, 1992)
- Construction of an Oil Terminal at Tanga (Nikundiwe *et al*, 1992)

1993

- Small Scale Mining: A Case Study of Merelani, Kahama, Nzega, Geita and Musoma (CEEST, 1993)
- Mine Development Project, Merelani Block "C", Kiteto District, Arusha Region (BICO, 1993)
- Cathodic Protection Stations in Mikumi National Park (IRA, 1993a)

1994

- Ikwiriri-Somanga Road Project (IRA, 1994a)
- Redevelopment of the Hydro-Electric Power Station at Pangani Falls (Norplan, 1994)
- Serengeti Serena Lodge Project (IRA, 1994b)
- Grumeti Serena Tented Camp Project (IRA, 1994c)
- Songo Songo Gas Development Project (HBT Agra, 1994)
- Tanzam Highway Rehabilitation Project (IRA, 1994)

1995

- Mutukula-Bukoba-Lusahunga Road (MoW, 1995)
- Refugees Influx in Ngara and Kibondo Districts (Norplan, 1994)
- Singida-Nzega Road (Rites-M-Konsult, 1995)
- Manyoni-Itigi-Tabora-Ipole-Mpanda-Kigoma Road (Gannett Fleming Inc, 1995)
- Dakawa Integrated Project (Dakawa II) (TANCONSULT, 1995)
- Makuyuni-Oldeani, Ngorongoro Access Roads Study (Gauff Ingenieur Consulting Engineers, 1995)
- Moshi Pesticides Plant (SCANDIACONSULT, 1995)
- Lower Kihansi Hydropower Project (Norplan, 1995)
- Tanesco Ubungo Generating Site Emergency Power Plant (Agra Earth *et al.*, 1995).
- Shrimp Farming Project in the Rufiji Delta (Boyd, 1996)

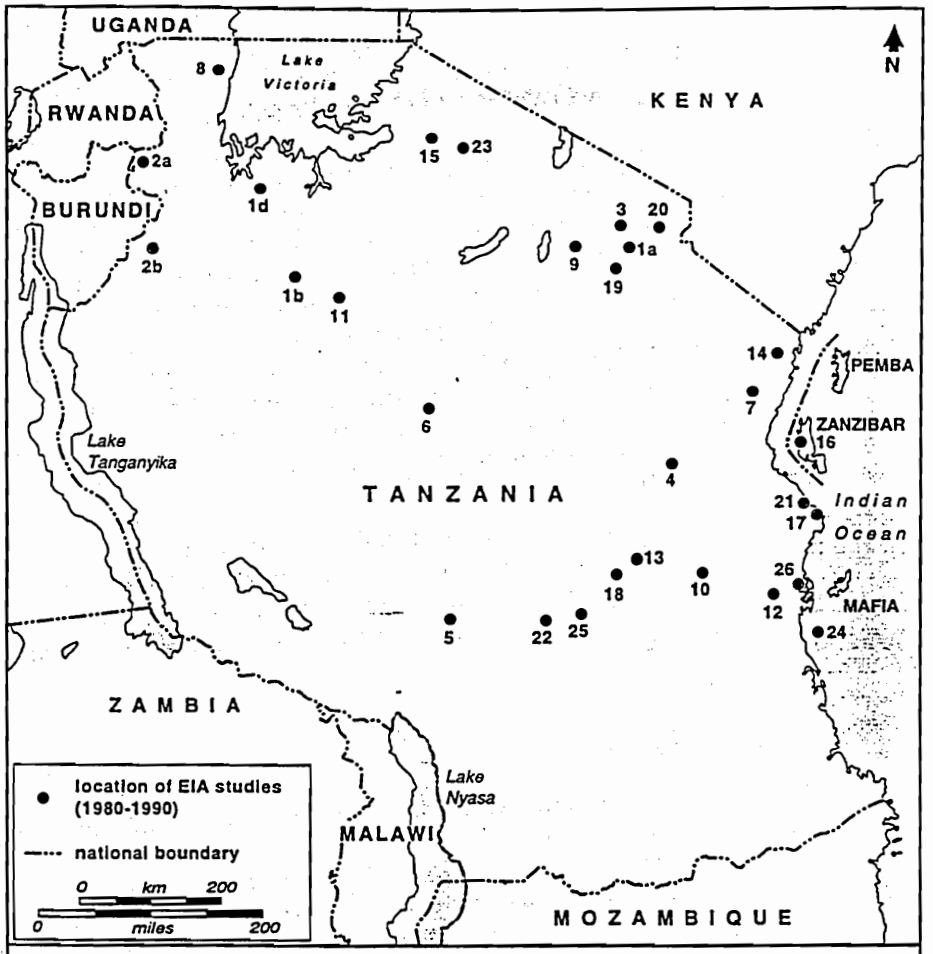
1996

- Ikela Water Scheme (IRA, 1996)
- Upgrading of the Makuyuni-Musoma Road (Norconsult, 1996)

1997

- Prawn farming in the Rufiji Delta (Ndimbo *et al.*, 1997)

Figure 2.1: Location of EIAs reviewed in this study



Location of EIA studies (1980-1990)

1a Small Scale Mining (Merelani)
1b Small Scale Mining (Kahama)
1d Small Scale Mining (Geita)
2a Refugee Influx (Ngara)
2b Refugee Influx (Kibondo)
3 Graphite Mining Project (Merelani)
4 Dakawa II Integrated Project
5 Madibira Rice Project
6 Manyoni-Kigoma Road Project (Iligi)
7 Pangani Falls Hydropower Project
8 Mutukula-Bukoba-Lusahanga Road Project
9 Mukuyuni-Musoma Road Project (Mukuyuni)
10 Stiegler's Gorge Power & Flood Control Project
11 Singida-Nzega Road Project (Nzega)
12 Ikwiriri-Somanga Road Project
13 Cathodic Protection Station (Mikumi NP)
14 Tanga Oil Terminal Development
15 Grumeli Serena Tented Camp Project
16 Changuu Island Development (Zanzibar)
17 Tanzam Highway Rehabilitation Project
18 Ikela Water Scheme
19 Makuyuni-Oldeani Road Project (Makuyuni)
20 Moshi Pesticide Plant
21 Ubungo Emergency Power Plant
22 Lower Kihansi Hydropower Project
23 Serengeti Serena Lodge Project
24 Songo Songo Gas Development Project
25 Kilombero Valley Hardwood Project
26 Rufiji Delta Shrimp Farming Project

3 Research approach

The following activities were undertaken as part of the study:

3.1 Methodology development

A desk study of existing EIS review literature was undertaken to help guide the development of an outline EIA performance review approach. This outline approach was then discussed at the project inception workshop hosted by the Institute of Resource Assessment at the University of Dar es Salaam. Here, a broad range of stakeholder representatives exchanged views on EIA performance, and expressed their own expectations for the study. Participants included representatives from government and private sector 'proponents', such as the national electricity generating utility (TANESCO), a government environmental agency – the National Environmental Management Council (NEMC), academic and research institutes, and non governmental organisations.

The plenary presentations and the discussions held during the working groups led to the adjustment of some of the specific goals of the study, helped the study identify new case studies, and contributed to the process of refining the working methodology. A summary of the research methodology is outlined in Figure 3.1.

3.2 Interviews

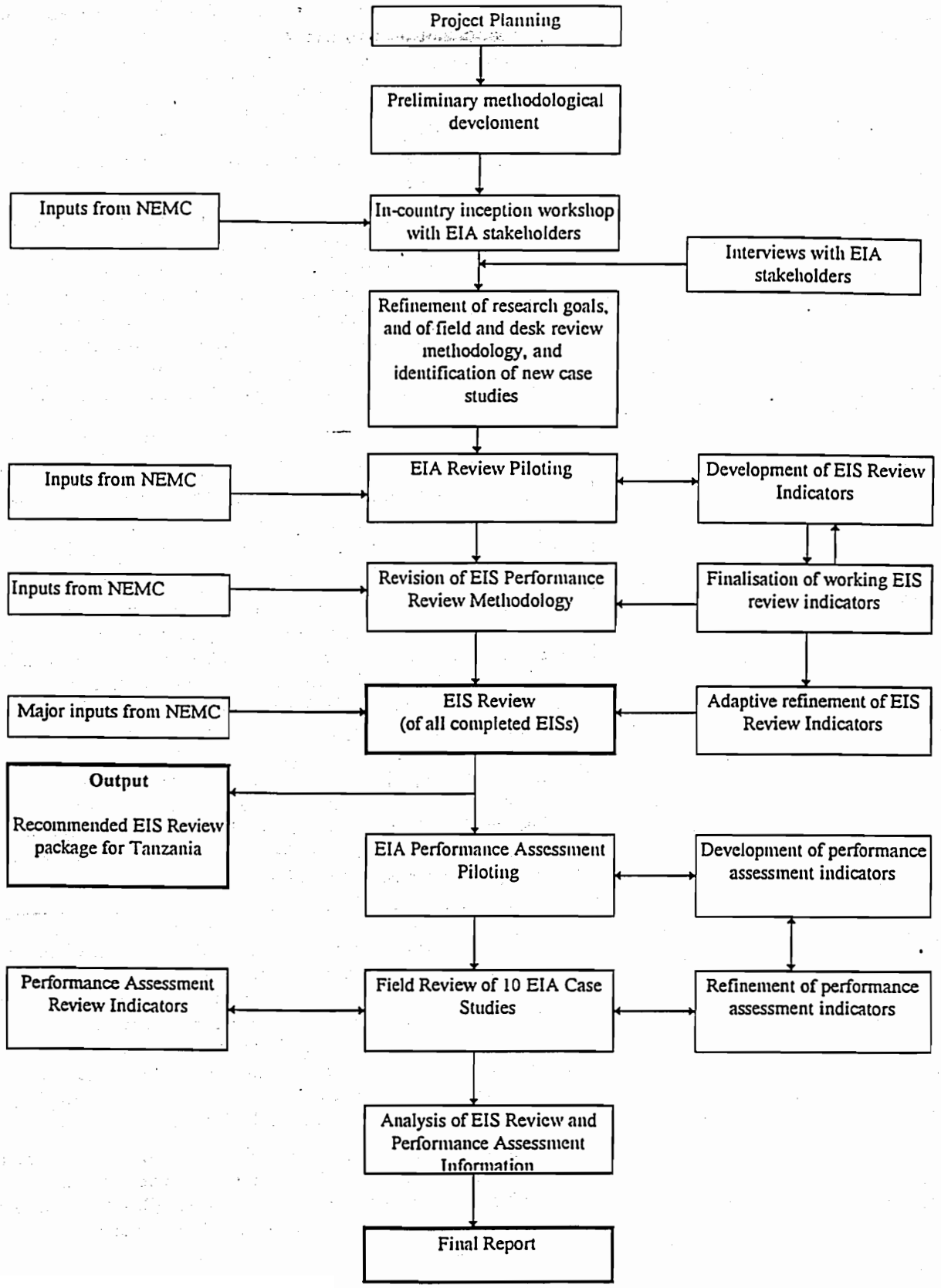
Interviews and meetings were conducted with a broad range of organizations and individuals with experience of EIA in Tanzania, and with EIA user-groups, such as government-owned utilities, private sector organizations and non governmental organizations. Interviews were structured to explore user perceptions of the utility and efficacy of the EIA process in Tanzania, and to seek inputs as to how the process might be improved to meet the needs of user groups whilst better serving environmental management objectives. An additional objective was to explore the extent to which EIA exposes planners, decision-makers and proponents to the environmental and social implications of development. Interviews were also used during the field review stages, to explore project-specific features of the EIA process.

In most cases, the EIAs under review had been completed several years ago. This made it difficult to locate all of the key project staff to interview – some had moved on, others retired, etc. The time lags also introduced the risk that recollections had become tainted with the benefit of hindsight and/or subsequent experience. Care was therefore taken in the use of information provided in these interviews, and wherever possible, this was 'triangulated' by comparing with other document and non-document sources.

In general, face-to-face interviews were found to be the most appropriate way of obtaining information on the EIA process, and often revealed a great wealth of experience and insights into practical issues associated with EIA implementation as a whole. Where face-to-face interviews were not possible, questionnaire surveys, targeted letters or telephone interviews were used.

The research team's previous experience of semi-structured interviews in environmental research in Tanzania found that 'over-structuring' of the interview process led to rather stilted and fragmented interviews. Therefore, an approach was adopted which focused first on the broader issues and then dealt with more specific issues.

Figure 3.1 Research methodology



3.3 Review of EIA statements

The next stage of the research involved developing, through an iterative process with stakeholders, a structured, objective and replicable approach to desk review of EISs and associated documentation. The use of a structured review methodology was important for two reasons. Firstly, it enabled comparisons to be made between different types of EIS. Secondly, it helped identify a quality control mechanism that matched Tanzania's needs with available resources, and that was appropriate to the Tanzanian context. As a result, the study was able to contribute to efforts to establish such a mechanism as part of Tanzania's evolving EIA framework.

A number of existing EIS review approaches were first tested in a pilot exercise undertaken with the National Environmental Management Council. Two systematic approaches emerged as having potential for providing the basis of a quality control mechanism in Tanzania (Box 3.1): an adapted version of the widely used methodology of Lee and Colley (1992), and review criteria developed by the Institute of Environmental Assessment (IEA, 1990). The pilot exercise concluded that the IEA criteria were the more appropriate. These criteria were then modified to improve their utility for this study.

Box 3.1: Comparative utility of two well-established EIS review approaches

Two EIS review processes – Lee and Colley (1992) and IEA (1990) were compared in a pilot exercise. The analysis was undertaken by a team from IRA working with a representative of the National Environmental Management Council – the organization with current responsibility for overseeing EIA in Tanzania.

The IEA criteria were found to be user-friendly and flexible, and were considerably less time-consuming than Lee and Colley's approach. In contrast, the highly-structured and mechanistic characteristics of Lee and Colley's approach lent itself to higher levels of replicability. Their downside was that difficulties were experienced in applying this method to many of the environmental impact statements under review – especially those that did not conform to a conventional EIA format. On balance, it was decided that the IEA approach should be used for the purposes of this project. The heterogeneous nature of the 26 statements under review demanded a flexible method, and one that could be applied relatively quickly. The IEA method was first modified to improve its utility and applicability to EIA in the Tanzanian context, rather as Boyle (1995) has modified the Lee and Colley's approach for use in Zimbabwe.

In this study, we identified over 40 projects and plans for which some form of environmental assessment report had been prepared. However, the term 'environmental impact assessment' appears to have been used rather loosely in Tanzania. Many of the environmental reports reviewed, although often termed EIAs, consisted of reports that might be better considered as environmental screening documents. This study considered that only 26 of these documents could be described accurately as environmental (impact) assessment statements. This sample formed the basis of this review.

Each of the 26 EISs was then reviewed against two sets of criteria: the modified IEA criteria (listed in Box 3.2); and a series of indicators designed to extract additional information required for the analysis (Box 3.3). Some of these indicators also provided a 'second opinion' on the results obtained using the IEA criteria.

The review team engaged in round table discussions to agree on an aggregate

rating for each individual component of each EIS. The EIS review process was also used to identify key individuals and issues for follow-up in subsequent stages of the performance assessment review (see below).

Box 3.2 : Review criteria used in EIS review (modified from IEA, 1990)

- Description of the Development, the Local Environment and the Baseline Conditions
  Description of the Development
  Site Description
  Residuals
  Baseline Conditions
- Identification and Evaluation of Key Impacts
  Identification of Impacts
  Prediction of Impact Magnitude
  Assessment of Impact Significance
- Alternatives and Mitigation
  Alternatives
  Mitigation
  Commitment to Mitigation
- Communication of Results
  Presentation
  Balance
  Non-Technical Summary
  Terms of Reference
  Gaps and Uncertainties
- Stakeholder Involvement in the EIA Process
  Government
  Expertise
  Local People Involvement

3.4 Detailed case study review

As highlighted in Chapter 1, environmental impact *statements* often reveal very little about the EIA *process* as a whole. Nor do they usually describe their impact on the project design process. For this reason, detailed *post hoc* reviews of a number of EIAs were undertaken to determine:

- the strength and weaknesses of each EIA process;
- the influence of the EIA on project design, planning and implementation; and
- the indirect influence of the EIA, such as its role in promoting learning or in conflict resolution.

Of the 26 projects in Tanzania which were considered to have been subjected to a genuine EIA, only nine have so far proceeded to implementation. Each of these was subjected to detailed literature review, and discussions were held with project field staff, local people and district government officers. For each case study, whenever possible, key staff responsible for project design and implementation were interviewed, and also the practitioners responsible for preparing the EIS. Examples of issues discussed during the semi-structured interviews are shown in Box 3.4. Case study profiles were then developed, based on field assessment and the interviews. Whilst all examples provided some lessons of value to EIA policy, seven case studies were selected to illustrate different characteristics of EIA performance.

Box 3.3 : Indicators used for EIS and field review

- Type of EIA process (preliminary or comprehensive)
- Initiation of the EIA process (stage of project cycle)
- Proponent – EIA practitioner interaction*
- Inclusion of terms of reference (ToR)
- Inclusion of an integrated CBA/economic evaluation
- Inclusion of an integrated SIA/social analysis
- Assessment of health impacts/inclusion of an EHIA
- Assessment of ecological impacts
- Determination of impact significance
- Examination of project alternatives
- Environmental management and monitoring
- Compliance with mitigation recommendations*
- Compliance with monitoring recommendations*
- Central government involvement
- Local government involvement
- Involvement of expert institutions
- Involvement of local people and communities
- Influence on project design*
- Influence on project operation*
- Clarification/statement of links with national policy/legislation.
- Use of domestic or foreign expertise
- Other significant omissions

Those marked by an * indicate those that could only be verified by detailed case study review.

Box 3.4: Examples of issues raised in semi-structured interviews

General

- How could the EIA process have been improved for this particular project?

Influence on decision-making

- Did the *EIS or EIA process* influence the decision-making process (such as for finalizing project design, selecting project sites, or for the final approval of the project)?
- Was the project design modified as a result of the environmental assessment process?
- Did other material considerations 'override' the findings of the EIA process?

Public involvement

- What approaches to public involvement were adopted as part of the EIA process?
- To what extent were the 'public' involved in the scoping process (or if no scoping process was undertaken), defining the ToR for the project?
- Which groups of stakeholders were involved in a formal public involvement process?
- What proportion of time was devoted to trying to involve local communities in the EIA process?
- Did the results of public involvement within the EIA process influence the decision taken?
- Was the EIS statement made available for public comment?
- If so, in what way? (eg. were local language summaries made available? were the findings of the EIA process explained verbally to non-literate communities? etc.)
- Was there 'too much' or 'too little' public involvement in the EIA process?

EIA Process

- Did the EIA team work closely with those responsible for project design and implementation?
- Was some form of scoping undertaken?
- When did the EIA process begin in relation to the project design and implementation phases of the project?
- Was a review of the EIS undertaken? If so, by whom?

Technical and Procedural Aspects

- What mitigation measures recommended by the EIA process have been implemented and what effects have these had on the project and environment?
- Did the EIA practitioners use guidelines and were these found to be appropriate?
- Were project alternatives considered as part of the EIS?
- Is there an environmental monitoring programme related to the project?

4 Research findings

In this chapter, we summarise the results of the three components of the performance assessment process:

- interview surveys conducted with EIA stakeholder groups (Box 4.1);
- the review of environmental impact statements, and;
- detailed case study analysis.

4.1 Interview surveys

The different stakeholders interviewed are listed in Box 4.1. The view that EIA can contribute to better decision-making is by no means universally held in Tanzania, particularly because of the lack of a robust institutional and legal framework. Previous studies have also noted similar scepticism (IRA/IIED, 1995; Guilanpour, 1995). However, there is support for better EIA within key stakeholder groups, notably amongst government agencies, practitioners and the private sector.

Box 4.1: Stakeholder groups and organisations interviewed

Project Proponents

- Ministry of Works (MoW)
- Ministry of Industries (MoI)
- National Chemical Industries (NCI)
- National Food Corporation (NAFCO)
- Tanzania Electric Supply Company (TANESCO)
- Tanzania-Zambia Pipeline Limited (TAZAMA)
- Serena Group Limited
- Danish International Development Agency
- Graphtan Ltd.
- Kilombero Valley Teak Project

EIA Practitioners

- Centre for Energy, Environment, Science and Technology (CEEST)
- Agenda Business Care Limited
- Institute of Resource Assessment (IRA)
- Bureau of Industrial Cooperation (BICO)
- Norconsult

Regulatory Agencies

- Tanzania National Parks (TANAPA)
- Serengeti National Park
- Mikumi National Park
- National Environment Management Council (NEMC)
- Division of Environment (DoE)

4.1.1 Legal and institutional issues

- Most government agencies support the introduction of EIA legislation

There were several expressions of general support for the introduction of EIA. For example, a representative of the Ministry of Trade and Industries expressed the view that "*EIA balances various interests [in project planning], and therefore is appropriate in Tanzania*". Tanzania National Parks (TANAPA) bases its support for EIA on experience, since many development projects within the national parks cause tangible direct impacts. Until recently, TANAPA has lacked an appropriate mechanism to deal with these impacts.

TANAPA – the only government agency to have adopted EIA in policy – is now strongly committed to EIA as a regulatory and decision-making tool. The authority has found that a) EIA has helped ensure that development projects within the national parks take greater account of environment and social considerations; b) that EIA has provided proponents with an incentive to improve the environmental performance of development projects within parks; and c) that EIA has helped define operating rules, and foster better working relationships between private sector proponents and TANAPA.

- Reluctance to adopt EIA is still prevalent within the private sector

Some private sector proponents viewed EIA as 'time wasting' and a 'waste of resources'. EIA was also seen by some as an 'impediment' to development. Respondents expressing this opinion included the staff of some private sector companies and government ministries, including the Ministry of Works and TANESCO. Scepticism has often been faced by EIA practitioners working in Tanzania. Box 4.2 outlines a range of views encountered during this and previous studies (IRA/IIED, 1995; Guilanpour, 1995) on attitudes towards EIA in Tanzania.

- There is a need to adapt EIA to the national context

The view that donor guidelines are often inappropriate or insensitive to the cultural and political realities of Tanzania was commonly expressed. One senior government official summarises this widespread view succinctly:

> "no single environmental problem is the same everywhere...we know our own problems, we know our own people and there are aspects which are country-specific .... guidelines should be left to individual countries".

A number of respondents argued that donor EIA guidelines tended to favour donor priorities for environmental management, and these were not necessarily compatible with, or appropriate to Tanzanian environmental management priorities.

4.1.2 Public involvement and 'ownership' of the EIA process

- There is a strong consensus that public involvement should be central to EIA practice

Opinion on the issue highlights an interesting paradox. Despite the near absence of public involvement in EIA practice in Tanzania, there was a consensus that this should be a central feature of EIA. Different views prevailed as to why this might be the case (see below).

- Inadequate scoping, poor terms of reference and insufficient time constrain public involvement

Practitioners cited these factors as the main reason for the absence of attention

to local concerns and issues during EIAs in Tanzania. EIAs are often commissioned as 'after thoughts' in the project planning and implememtation processes, leaving little opportunity for public involvement, nor the consideration of alternative poject options.

Box 4.2: Misconceptions and attitudes to Environmental Impact Assessment

Nuisance arguments

- 'EIA is just a symbolic exercise to satisfy the rules. We don't really need to take it seriously'.
- 'We know all about the issues involved. We have already decided on the action we are going to take. An EA is not necessary'.
- 'EIA is an obstructive nuisance – it interferes with getting on with our projects'.

Time and money arguments

- 'EIA takes too long – we need to get this project finished quickly.'
- 'We can't afford EIA – it adds extra costs to project planning'.

'We Know Better' arguments

- 'EIA and participation is all very well, but local environmental issues obscure national requirements'.
- 'What is the point of involving the public. What do they know? EIA is a technical issue that should be carried out by qualified experts'.
- 'The public are only likely to raise difficult questions and create difficulties for us'.

'Skeletons-in-the-Cupboard' arguments

- 'Can't you say something more favourable about this project in your EIA report. It paints a very poor picture of the project! We need to say positive things when we submit the proposal...'.
- 'We must use our own technical staff to undertake the EA. They are more likely to look upon the project favourably'.
- 'An EIA would run the risk of our project being cancelled'.

'We're Not Good Enough' arguments

- 'We can't use experts from our own country. There is no-one in the country with expertise in EIA'.

- Socio-cultural factors constrain stakeholder involvement in Tanzania

A number of interviewees argued that the culture of decision-making in Tanzania works against the involvement of different levels of government, the involvement of different sectoral departments or agencies, and against involving local people. In his study of the effectiveness of EIA in Tanzania, Guilanpour (1995) reports that survey respondents asserted that the country was socio-culturally, a 'non-participatory society'. This is manifested in attitudes, and also in institutional and legal provisions. For example, Tanzania lacks any statutory public disclosure legislation or a public inquiry system geared to localised issues. Such public interest 'safety nets' often perform as bulwarks in mature EIA systems elsewhere.

- There are widespread misconceptions that EIA documentation is 'confidential'

There is a widespread belief that EIA documentation should be confidential. For example, one practitioner stated that *"EIA was the property of the one who finances the project"*. Guilanpour (1995) recorded an observation that *" the documents we produce are confidential to our clients; it is up to our clients whether they wish to publish or otherwise"*. The National Food Corporation believed that, since the African Development Bank (AfDB) funded the EIA for the Madibira Rice Project, then the EIA was AfDB's 'property' and was therefore not a document they needed to consider – even though they were the proponents! The cost of reproducing EIA documents for public review was also cited as a constraint.

- Non-governmental organisations are distrusted by the private sector and parts of central government

Practitioners working on behalf of the government and private sector are not encouraged to work with NGOs (at national or local level) in the EIA process.

4.1.3 EIA review

- EIA review is *ad hoc* in Tanzania

Project proponents expressed their frustration that there is seldom feedback from government regulatory or donor agencies on the adequacy of draft environmental impact statements. Respondents cited the reasons as a) poorly defined responsibilities for undertaking EIA review at government level b) a chronic lack of expertise and resources and c) lack of co-ordination. One engineer stated that an absence of comments was taken to mean that the EIS was 'OK'.

4.1.4 Monitoring and audit

- Post-completion follow-up is almost non-existent in Tanzania

Several EIA practitioner organisations expressed the view that, for those EIAs prepared for donor-supported projects, proponents felt little if any 'ownership' of the EIA process, or accountability for the recommendations contained within the EIS. This problem is exacerbated by confidentiality, making it easy for proponents to avoid compliance activities.

- The absence of institutional mechanisms and legislation hinders compliance enforcement

In the absence of institutional mechanisms and legal backing, it is unlikely that compliance with the findings and recommendations of an EIS will improve. Voluntary adherence to the findings of an EIS generally imposes short-term operational costs, and these are rarely perceived as being financially justified by most proponents. Several respondents suggested that compliance monitoring should be overseen by an independent commission or agency, and should not be entrusted solely to the project proponent.

4.1.5 Use of Tanzanian expertise

- The use of national (Tanzanian) expertise can bring long term benefits to EIA

Creating an indigenous pool of expertise, through on-the-job training, was viewed by many representatives of government agencies, proponents, and practitioners as an important means of developing environmental management capacity. Conversely,

dependence on foreign consultancy inputs – a characteristic feature of many EIAs in Tanzania to date – means that valuable experience is generally lost to the country. Foreign consultants were also seen as expensive and often insensitive to local cultural issues. Despite reservations about the appropriateness of the current dependence on such foreign consultants, there is widespread recognition of the lack of skilled and competent Tanzanian practitioners. Several proponents referred to the poor or unprofessional quality of EIAs prepared by Tanzanian expertise[1].

- Mechanisms are required to enhance and maintain quality control amongst consultants

A number of EIA practitioners suggested that mechanisms are required to ensure that practitioners deliver a high standard of EIA. Suggestions included the introduction of a voluntary code or ethics, and the establishment of a professional association of practitioners which could impose a certain level of self-regulation.

4.1.6 'Cost/benefit' perceptions of EIA

- EIA is sometimes perceived as impeding development

The view that EIA is inappropriate in Tanzania and can potentially impede development, is common in the country. Guilanpour (1995) quotes a donor representative in Tanzania as saying that EIA is unlikely to be influential in view of pressing economic and development needs. Representatives of the National Food Corporation (NAFCO), an agency of the Ministry of Agriculture, were also strongly of the opinion that economic considerations will always override environmental issues. NAFCO cited the African Development Bank's Madibira Rice Project (Mbeya Rural District) as an example where the findings of an EIA process were over-ruled by economic considerations. EIA is also perceived as adding substantially to project costs, and concerns were also raised about 'inflated' fees being demanded by some EIA practitioners.

- EIA can avoid environmental damage and costs

One participant at the inception workshop gave examples of projects where significant costs could have been saved had EIA been applied. The chemical fertiliser factory in Tanga, north east Tanzania, provides one good example (see Box 4.3). Another is the under-performance of the Mtera hydroelectric facility in central Tanzania, where increased water use and diversion within the catchment has reduced water availability downstream and has led to national power shortages. This, in turn, has required the development of additional new generating facilities.

4.1.7 Balance

- EIA practice is perceived as being biased against development

Senior government officials and private sector proponents alike felt that EIA was generally 'biased' and 'anti-development'. This is an interesting paradox, and the perception does not appear to be based on any objective evidence. In fact, the review of environmental impact statements (described in the next section) revealed that where an EIS appeared to be biased, this was generally *in favour* of development.

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[1] Although it should be noted that foreign consultants were found also to be responsible for producing poor quality and 'unprofessional' environmental impact statements

Box 4.3: A recurring nightmare – the case of the Tanga fertilizer factory

The Tanga Fertilizer Plant was established in the late 1970s, within the Tanga Municipality, and without environmental assessment. Once operating, the plant became the source of serious marine and air pollution, resulting in significant impacts on marine resources, and threats to human health. Pollution issues soon became a source of considerable local concern, and eventually became the subject of debate in the national parliament. The economic costs of rectifying these problems, combined with a worsening economic climate, led to the eventual closure of the plant in the late 1980s. Unfortunately, the problems continue to this day – 2000 metric tonnes of liquefied ammonia have remained on site since the factory closed. Storage of this ammonia has proved extremely costly and continues to pose a risk to health and the environment, should there be spillage or leakage from the (now ageing) storage tanks. Thus, the plant remains an economic and environmental liability. An EIA prior to the commissioning of the project would have identified the unsuitable nature of the site selected for the plant (it was close to sensitive ecological systems and to human settlements). Furthermore, a competent EIA would have addressed decommissioning issues, so that these could have been considered carefully before decision-making.

- Improved commissioning and review procedures would improve the balance of EISs

The absence of an objective commissioning and review process was cited as a major factor in allowing proponents to exert undue influence over the EIA process. It was argued that by influencing the work of EIA practitioners, proponents commonly were able to dilute or reduce environmental management responsibilities.

4.1.8 Effect on decision-making

- Early commissioning of EIA leads to greater influence over project design

There was consensus amongst practitioners, proponents and donor agencies that the sooner the EIA process was initiated, the more beneficial was its influence on project design. Early commencement of EIA was also thought to provide greater scope for dialogue and joint problem-solving. The EIAs of the Kilombero Valley Hardwood Project (IIED/IRA, 1992) and the Kihansi Hydropower Project (NORPLAN, 1995) were cited as examples.

4.2 The review of Environmental Impact Statements

4.2.1 Introduction

This section presents the results of the review of 26 environmental impact statements using a modified version of the review criteria published by the Institute of Environmental Assessment (IEA, 1990). The results are presented in Table 4.1. Of the statements reviewed, 22 were preliminary in nature, although this was often not clearly stated. Only four statements were considered to report on 'comprehensive' environmental assessment processes, and all of these were for large infrastructure development projects. Supplementary data is drawn from review indicators developed as part of the research, and outlined in Table 4.2.

Table 4.1: Results of the review of 26 Environmental Impact Statements against modified IEA review criteria.

Review Criteria	*Review Grade*							
	A	B	C	D	E	F	N/A	No Data
Basic Information								
Description of the Development	3	16	5	2	0	0	0	0
Site Description	6	10	6	2	1	1	0	0
Residuals	0	9	11	4	1	0	1	0
Baseline Conditions	6	13	5	1	0	1	0	0
Key Impacts								
Identification of Impacts	7	8	8	2	1	0	0	0
Prediction of Impact Magnitude	1	12	9	1	1	1	1	0
Assessment of Impact Significance	3	8	5	8	0	2	0	0
Alternatives and Mitigation								
Alternatives	0	8	6	6	2	4	0	0
Mitigation	1	13	8	4	0	0	0	0
Commitment to Mitigation	1	9	10	1	3	1	1	0
Communication of Results								
Presentation	1	11	8	5	1	0	0	0
Balance	4	10	10	1	1	0	0	0
Non-Technical Summary	0	15	5	3	0	0	0	3
Terms of Reference	4	6	2	3	0	1	0	0
Gaps and Uncertainties	3	8	8	4	2	1	0	0
Stakeholder Involvement								
Government	2	3	11	3	2	2	0	3
Expertise	3	9	5	6	3	0	0	0
Local People Involvement	1	1	8	6	5	3	0	2

Key: (A): Excellent, no tasks left incomplete; (B): Good, only minor omissions and inadequacies; (C): Satisfactory despite omissions and inadequacies; (D): Parts are well attempted, but must as a whole be considered unsatisfactory because of omissions and/or inadequacies; (E): Poor, significant omissions or inadequacies; (F): Very poor, important tasks poorly done or not attempted; (N/A)Not applicable; (No Data): No data available.

4.2.2 The EIA process

The environmental impact statements reviewed often revealed information about the way in which the EIAs were undertaken. For example, usually it was possible to determine when an EIA was initiated in the project cycle, how much time was available to the EIA practitioners, and the types of expertise included in the EIA team. Key points arising from the review are summarised below:

Table 4.2: Results of EIS review of 26 Environmental Impact Statements against supplementary review criteria

Supplementary review criteria	*Percentage of statements in each category*		
	None	Poor/ superficial	Adequate/ comprehensive
Inclusion of an integrated CBA/ economic evaluation	54	31	15
Inclusion of an integrated SIA/ social analysis	4	42	54
Assessment of health impacts/ inclusion of an EHIA	0	50	46
Assessment of ecological impacts	0	38	62
Clarification/statement of links with national policy/legislation	16	42	42
Involvement of expert institutions	8	23	62

- Project proposals have not been subjected to appropriate levels of environmental assessment

In the absence of rigorous screening processes, development proposals in Tanzania are generally subjected to much lower levels of environmental assessment than would be the case if, say, World Bank screening criteria had been used. Table 4.3 shows that, of the 26 projects EIAs reviewed, only 7 (27%) were actually 'full' and in-depth EIA processes. Had the World Bank's screening criteria been used, 17 (65%) would need to have been subjected to a 'full' EIA process.

- EIA processes are usually initiated too late in the project cycle to influence project design

Almost 40% of EIA processes were initiated after the design of the project had been completed, in some cases even after projects had been constructed and were in operation. In most of the remaining cases, EIAs were not started until design work was well advanced.

- Time limitations are a major constraint to EIA quality

In many cases, it appeared that restricted time was available for the EIA and this constrained significantly the quality of the process. In such cases, the EIA process generally became 'output-driven', with little attention given to working with other stakeholders, including local people, other government departments, or expert groups. In several cases, lack of time appeared to have contributed to the omission of key issues. For example, EIA practitioners responsible for preparing the EIAs for two lodge developments within the Serengeti National Park were given only one day in which to collect field data and conduct field assessments. A number of the deficiencies detected in these statements could be attributed to a lack of time.

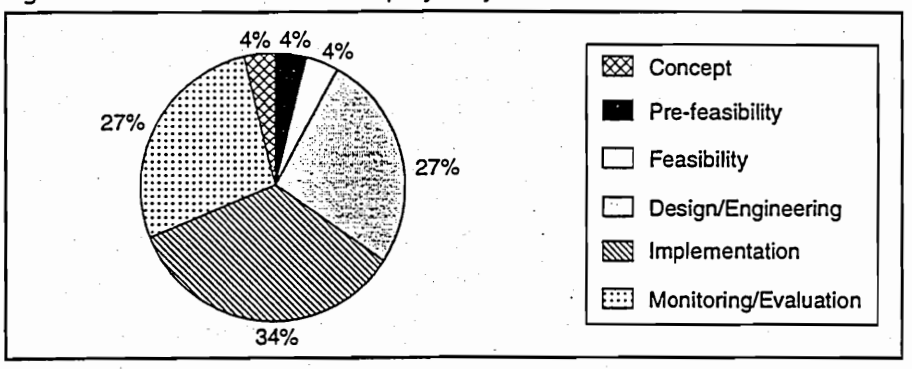
- EIAs are generally undertaken as 'stand alone' processes

In all but two cases (ie. over 90%), there was minimal interaction between EIA practitioners and those responsible for designing and implementing the project. In the vast majority of cases, the relationship between proponent and practitioner was restricted to a one-way flow of background information, from proponent to practitioner.

Table 4.3: Levels of environmental assessment applied to projects, compared with levels expected using World Bank screening criteria

Level of assessment	*Actual*		*Expected using World Bank screening guidelines*	
	No. of statements	% of total	No. of statements	% of total
Number of 'full' EIA statements	7	27	17	65
No. of IEEs[2] or pEIAs[3]	19	73	9	35

Figure 4.1: Initiation of EIA in the project cycle



- EIA expertise is frequently inappropriate to the type of project being assessed

The composition of EIA teams was questionable in over one third of the EIAs reviewed. Teams frequently lacked expertise crucial to the issues under consideration. Often the imbalance in expertise was reflected in subsequent reporting. For example, the EIA team for a major irrigation project was dominated by biodiversity experts, and lacked social, health and hydrological expertise. Consequently, the EIS focused strongly on 'on site' biodiversity management issues, whilst other issues, for which information would have been crucial to decision-making (eg. impacts on downstream hydrology and water users, potential health impacts), were given less prominence. Expertise in social, health and economic issues were particularly poorly represented in most EIA teams.

- Foreign expertise dominates the environmental assessment industry in Tanzania

About 70% of the EIAs were undertaken by international consulting firms. Where these companies used Tanzanian expertise, this was generally only in a supporting role, for example, as translators or research assistants. In 23% of cases, local expertise was completely excluded. EIA training (for Tanzanian nationals) was a component of only one EIA process.

- Little attention is given to involving local people

In only 2 EIAs could the level of public involvement be described as being 'meaningful' (see Figure 4.2). In both cases, there was tangible evidence that

[2] IEE – Initial Environment Assessment

[3] pEIA – Preliminary Environmental Impact Assessment

Figure 4.2: Involvement of local people in the EIA process

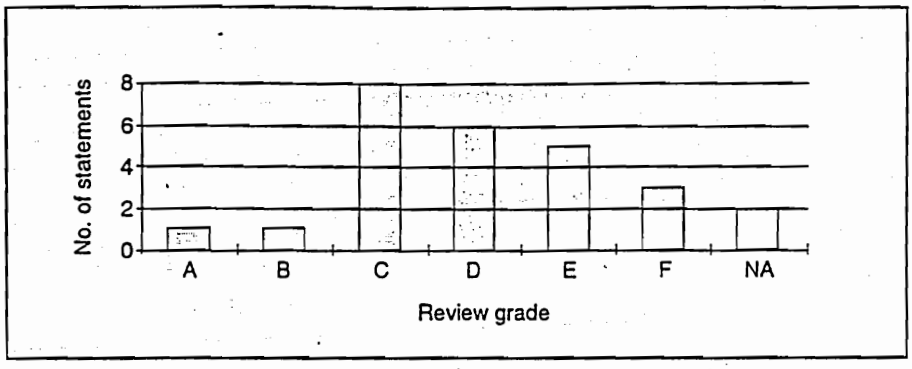
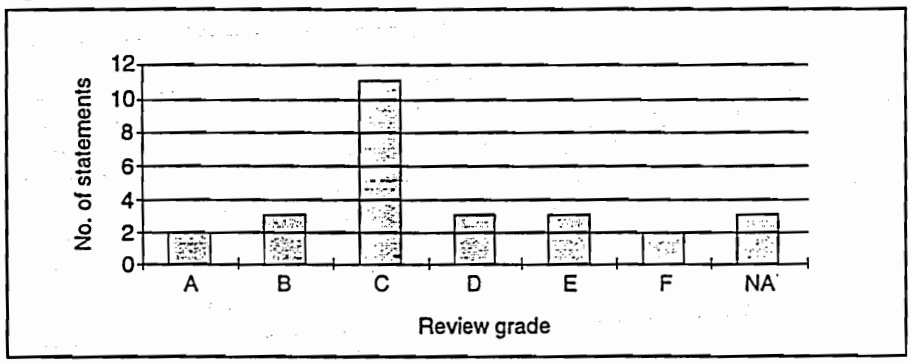


Figure 4.3: Involvement of government agencies in the EIA process



public involvement had improved the quality and value of the EIS for decision-making. In the remaining 90% of EIAs, the involvement of local people was either restricted to extracting information, or was omitted entirely. In these cases, the value of the EISs was often severely curtailed, since the statements said little about local concerns, or how local people would be benefited or impacted. In at least two cases, the absence of local involvement in the environmental assessment process (and in project design in general) had led to severe conflicts between proponents and local people.

- Little attention is given to involving stakeholder groups other than local people

Less than 20% of the EIAs adequately involved relevant stakeholder groups other than local people.

4.2.3 The quality of EIS for decision-making

One of the principal roles of EIA is to provide information that can be used to improve decision-making. To perform this role effectively, an EIS should be technically and analytically sound, balanced, and clearly presented. The review identified a number of problems in this regard:

- EISs tend to be descriptively strong, but analytically weak

Background information (eg. descriptions of baseline environment conditions and project descriptions) in the statements reviewed was generally of adequate quality (Figure 4.4) and, encouragingly, over 90% of EISs appeared to identify impacts satisfactorily. However, the *analysis* of issues and impacts identified by the EIA study was often very weak. For example, only 40% determined clearly how significant these issues were. Few EIAs considered the costs of environmental management recommendations, and none integrated these into

Figure 4.4: Adequacy of the description of baseline conditions

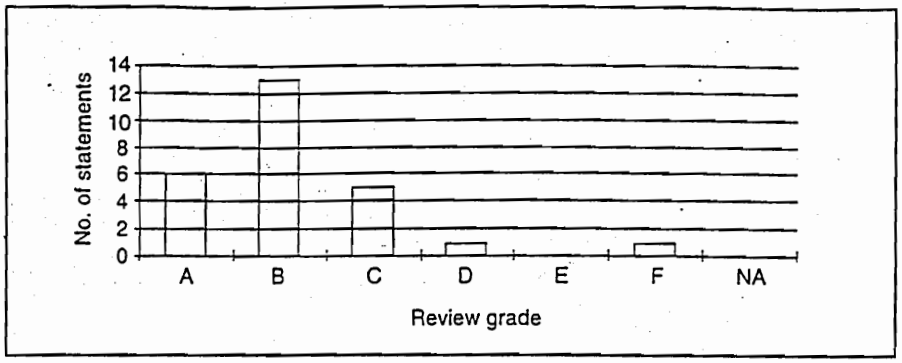
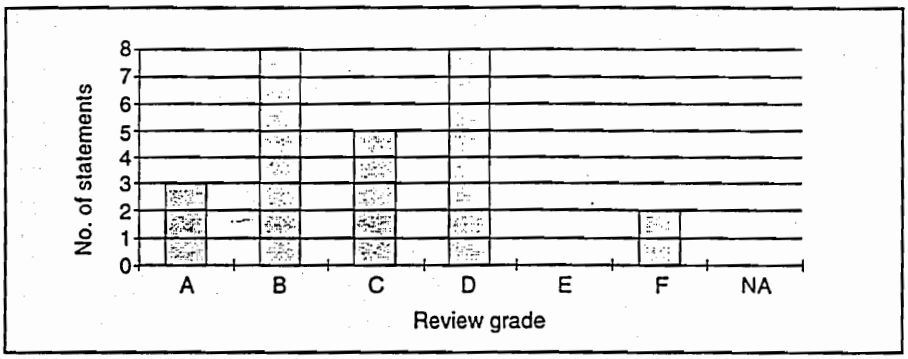


Figure 4.5: Adequacy of the evaluation of impact significance



project budgets. Most EIAs made recommendations for environmental management and monitoring, but these were generally presented in vague and general terms, making compliance monitoring difficult or impossible. Far too many EISs contained large amounts of data which was often irrelevant to the accompanying analysis. This was particularly true for large infrastructure development projects.

- Key components of many EIAs are weak or missing

Only half of all EIAs addressed socio-economic and health issues adequately. Only 20% discussed or presented data on financial and economic costs (for example, on environmental management costs), and only one attempted to integrate an environmental economic analysis into the EIS.

- Most EISs are balanced in nature

Encouragingly, EISs were generally well balanced, with due attention given to positive and negative impacts. Where bias occurred in presentation, it generally *favoured* the proponent.

In some notable examples cases, the style of presentation of information clearly contributed to a mis-representation of issues (eg. Box 4.4).

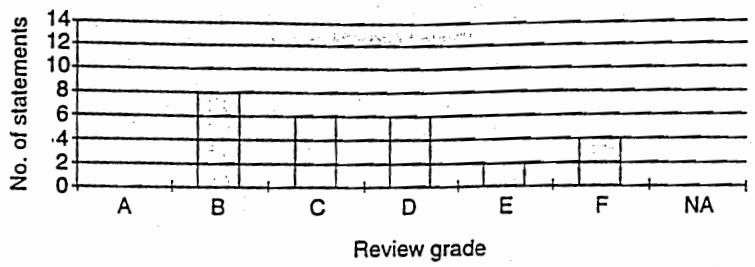
- Cumulative impacts have not been considered in Tanzania

To date, no EIAs have considered cumulative impacts even where these subsequently proved to have a direct impact on project performance (see case study 7).

- Alternative project options were poorly considered

There were no examples where an EIA led to the substantial redesign of a

Figure 4.6: Adequacy of the treatment of project alternatives



project. Only one third of EISs discussed and assessed alternative sites or approaches to development in a comprehensive manner. The remaining two thirds failed to address alternatives adequately and most failed to mention them (Figure 4.6). In some cases, the terms of reference for the EIA actually specified that alternative options should *not* be considered.

Box 4.4: Bias or balance? The case of an EIS prepared for a prawn-farming project in the Rufiji Delta

Following opposition to a proposal to develop a large-scale shrimp farm in the Rufiji Delta, one of the most productive and ecologically-important wetland systems in East Africa, the proponent commissioned the preparation of an EIS from a US-based aquaculture consultant (Boyd, 1996). The EIS appeared to *justify,* rather than *assess*, the issues associated with the development proposal. The document's sub-title referred to 'An *Ecologically-Responsible* Shrimp Farming Project', giving a message of positive findings from the outset of the presentation. The executive summary concluded by recommending that the project be '*...developed as planned*', thus suggesting that there was no need to implement mitigation or monitoring activities. More subtle techniques were also used throughout the document. For example, impact issues were referred to as *'allegations', 'assertions' or 'exaggerated claims'*. In most cases, these were presented as arguments forwarded by *'environmentalists'*, rather than by the local people and national experts who had actually presented these views. This created the impression that environmental and social concerns were driven by hidden agendas and were, for (unspecified) reasons, 'anti-development'. The selection of photographs in the report included an unusual proportion of 'degraded' or 'denuded' mangrove. No photographs were included of the healthy stands of mangrove which cover much of the delta, or of people using these resources. Because of critiscism of the poor quality of the EIS, a second EIA process was subsequently required. Despite a review of this (second) EIA undertaken by NEMC, the government now appears to have approved the project anyway!

Source: adapted from Hughes (1996).

- **Poor presentation of impact statements obscured issues and recommendations**

In only one third of cases were recommendations in EISs sufficiently clear that proponents could reasonably be expected to use them. Less than half of all EISs contained clear and comprehensive executive summaries that provided suitable information for decision-making. Only two statements included a Swahili translation of the executive summary, hence limiting use of the document to English readers only.

- Compliance issues were often unclear in the statements

In no cases did the EIS indicate whether the proponent had actually agreed to its findings. Thus, it was generally easy for proponents to avoid complying with recommendations for environmental management. On a second issue critical to quality control, less than 40% of statements included the original terms of reference for the EIA, thus making it impossible to determine practitioner compliance.

4.3 Detailed case studies

4.3.1 Introduction

Detailed case studies of individual EIAs proved to be the most effective means of reviewing and evaluating the performance of the EIA process. In this section we present the results of an analysis of seven case studies, each following the methodology outlined in Chapter 3, and then summarize the key issues and lessons. The seven case studies selected represent *all* projects where EIA were undertaken for projects.

4.3.2 Case Study 1 – teak plantation establishment, Kilombero

Background

The project, now several years into implementation, seeks to establish around 10,000 hectares of private sector teak (*Tectona grandis)* plantations in the Kilombero Valley, within the Kilombero and Ulanga Districts of Morogoro region. Most of the area consists of miombo woodland, although pockets of evergreen forest, and floodplain grassland also occur in the area. The two most significant blocks of evergreen forest lie within two forest reserves (Matundu and Nambinga). There is a healthy world market for teak and a healthy return on investment is expected in the medium- to long-term.

The Commonwealth Development Corporation (CDC) proposed the project following discussions with the Government of Tanzania. CDC is a UK-based, overseas development agency which seeks to promote private sector development. It is supported by funding from the UK-government via the Department for International Development, DFID (formerly the Overseas Development Administration, ODA). To facilitate project implementation, CDC established a Tanzanian company – the Kilombero Valley Timber Company (KVTC) which is now responsible for the implementation of the project. KVTC is wholly owned by CDC.

The potential suitability of the Kilombero Valley for teak, in terms of climate, soils and land availability, was identified by a study mission in 1990. The report of this mission suggested that plantations be located in *'vacant degraded forest lands'* along the margins of the Kilombero floodplains and in the catchment forests on the hills and escarpments flanking the Kilombero Valley. A subsequent mission investigated the technical, financial and economic feasibility of establishing teak plantations on such lands (CDC, 1991). This feasibility mission included a vegetation study based on aerial and satellite image analysis, and concluded that most of the area was free from settlement and that the lowland forests had been:

> '...exploited and degraded by logging, past cultivation and fires.'

The subsequent project proposal included a stated intention to combine *'...environmental conservation with economic development'*. To this end, the proposal recommended that 35,000 ha of land should be leased to the CDC for the establishment of teak plantations, and a further 25,000 ha. should be managed by the CDC according to a 'natural forest management plan'. In addition, negotiations were also held to try to secure rights for CDC to assume management responsibilities for the Matundu Forest Reserve and parts of the Nambinga Forest Reserve, both of which contained areas of evergreen forests considered to be important for biodiversity conservation.

Since support for the project was being sought from the UK ODA, the latter requested and funded a preliminary EIA, in compliance with its own

environmental policies. The EIS (IIED/IRA, 1992) concluded that the project would bring significant commercial and development benefits to Tanzania and noted that the project was broadly welcomed at the national, district and village levels. However, it highlighted a number of potential social and environmental issues (impacts) for which avoidance or mitigation measures were recommended. Whilst there were agreements on some of these issues, divergent positions emerged between the proponents and the EIA team on a number of key points, and these remained unresolved at completion of the pEIA. Therefore, the report cannot be seen as a reflection of consensus between the proponents, practitioners and other stakeholders. The main findings of the pEIA were presented by the (whole) team separately to both CDC in London and to the ODA regional office in Nairobi. The final report was submitted in June 1992. There was no presentation of findings to any official Tanzanian authority.

Key Issues

Key issues of contention at the time the pEIA was undertaken included:

- The assumption of management responsibility for two forest reserves in the project area

Two forest reserves consisting largely of evergreen forests were considered especially important for biodiversity. These same areas were considered by CDC to be of considerable potential for teak plantation development. CDC argued that these areas were partially degraded whereas the EIS, whilst acknowledging that some exploitation had occurred, maintained that these areas still supported important ecological functions and retained important biodiversity value, and concluded that these areas should not be encroached upon by teak plantation development.

- The future management of miombo woodland lying between blocks of plantation teak

The proponents argued that the project should assume management responsibility for these areas (amounting to around 19,000 hectares). The EIA argued that these should remain outside the project and therefore available for continued village use, and for the expansion of village farming land when needed.

- The immediate need for a reconnaissance soil survey

to confirm the suitability of proposed blocks for teak plantations. CDC viewed this as an unnecessary 'condition' and felt that 'selective' survey techniques were more flexible and appropriate.

- The nature of 'compensation' for village lands leased for teak plantation

The EIS argued that 'compensation' payments should be paid to villagers for such lands, and further, that the project should place more emphasis on achieving objectives through an outgrower scheme (a relatively minor component of the original proposal), so that villagers could benefit more from the project. CDC argued that consultation exercises undertaken as part of the pEIA were 'premature' and had raised expectations amongst local people. Furthermore, they argued that 'compensation' was an inappropriate means of addressing the issue (see below). The EIA practitioners argued that CDC had already raised expectations, some accurate and some misleading, of the project objectives.

- The framework for economic analysis

The EIS recommended that the framework for economic assessment of the

project should incorporate an 'expanded cost benefit analysis' in order to incorporate environmental and social costs and benefits. This was considered particularly important in terms of the environmental sensitivity of components of the project design. The proponents rejected this framework.

The project has now established a social fund as an alternative to the 'compensation' measures recommended in the EIS. Under this arrangement, KVTC has contributed a lump sum, and has undertaken to pay annual, index-linked payments for each hectare leased to the project for teak growing. Payments are made at the village level, and the project has enlisted the help of an NGO (Plan International) to work with local communities to identify priority needs, and disburse funds accordingly.

The EIA process

To some extent the CDC considered that the EIA process had been imposed upon them by their paymasters – the ODA (at least, this was the perception of one key member of CDC staff). Terms of reference were prepared mainly by the EIA practitioners at the request of the ODA, and in consultation with both the CDC and ODA. The pEIA was undertaken jointly by two research institutes – one national (IRA), and the other international (IIED). The environmental assessment mission, with expertise in a broad range of resource management disciplines, visited the project area in January 1992. The visit included:

- meetings and briefings with a wide range of governmental departments (at central, regional and district level), NGOs and experts;
- field visits to most parts of the project area;
- aerial surveys;
- reporting (to CDC and ODA in London, Dar es Salaam and the ODA regional Development Division in Nairobi); and
- village level discussions and meetings.

Discussions were held with CDC administrators in Dar es Salaam before and after the field visit. For most of the one week field visit period, the mission team was accompanied by a technical officer from CDC. However, the team had no 'day-to-day' interaction with senior project design and survey staff of CDC. This factor may have contributed significantly to differences in opinion on a number of important issues between proponents and practitioners (see above).

To some extent, the preliminary EIS examined project alternatives, but only theoretically, in terms of 'with and without' project scenarios, since alternative design details were not available and insufficient resources were available to explore alternative design options further. However, the pEIA did propose some alternative sites for teak plantation development, but only within the existing project area.

Interestingly, despite the joint preparation of clear terms of reference, differences in opinion emerged between the CDC (as project proponents) and the EIA practitioners over the interpretation of these ToR. One senior member of CDC staff argued that the EIA had 'gone beyond' the terms of reference on issues such as economic analysis and public consultation[4]. It was on these

[4] This is of interest, since the terms of reference for this EIA were the clearest and most concise ToR reviewed by this study. Whilst the ToR specifically required that the EIA provided a framework for integrating the costs and benefits of impacts into the investment analysis, and to consult with a wide range of stakeholders (including local communities), it would appear that the proponents felt that the practitioners had 'gone too far' in addressing these issues, in stark contrast to most proponent experience of EIA in Tanzania!

grounds that the proposed economic analysis framework – a key component of the EIA, was 'rejected' by CDC.

Technical aspects of the EIS

On the basis of the IEA review criteria, the EIS for Kilombero is considered one of the best so far prepared for Tanzania. The report is concise, includes a clear summary presented in English and Kiswahili. Whilst the EIS appeared to address all the key issues expected for such a project, the report omitted to include a clear, tabular summary of potential impacts and recommended mitigation measures.

The performance assessment review identified some (relatively minor) areas of deficiency in the statement. For example, CDC have noted misclassification of miombo and evergreen forest stands in certain parts of the project area. Further, the rather non-specific presentation of some of the recommendations for mitigation and monitoring has introduced ambiguity on some key issues. For example, the EIS might usefully have defined the width of a recommended 'buffer zone belt' for one area proposed for teak plantation establishment (in the southern miombo area of Matundu Forest Reserve). This would have clarified issues for the proponent and assisted future compliance auditing initiatives.

However, the performance assessment review indicated that significant underlying problems with EIA relate to the EIA 'process' as a whole, including the perception by one key individual that the EIA had been imposed on the proponents. The failure to reach a consensus as a result of these 'process' issues appears to have had a significant effect on subsequent decision-making and EIS compliance.

The effect of the EIA process on decision-making

The impact of this pEIA on project decision-making has proved difficult to define. In its broadest sense, the view was expressed that the process as a whole contributed significantly to improving the way in which CDC addressed environmental and social concerns. Furthermore, the pEIA was perceived as stimulating an important internal debate within CDC and, in so doing, the process led to a change in the 'culture' of decision-making within the organization. This resulted in more attention being given to development considerations. It is possible that the momentum to establish the social fund was a direct consequence of the pEIA process. The EIS was also regarded as a valuable background document for project staff since it contains an overview of a wide range of issues associated with the project.

Some specific recommendations have been accepted and adhered to by CDC, although, in several cases, it is unclear whether this resulted from the recommendations contained within the EIS, or because they represented logical extensions to the project design, or merely reflected constraints imposed by existing legislation or policy. In direct response to the EIS, site selection has excluded all areas of evergreen vegetation from plantation development. Perhaps less directly, no land or management rights have been secured by CDC for forest reserves, although discussions are continuing on the possibility of teak planting in the southern portion of Matundu Forest Reserve. Components of other monitoring and research recommendations are being undertaken. For example, KVTC has employed a full time research officer who is undertaking a wide range of trials and experiments.

It is clear that those issues on which agreement was not reached at the time the EIS was submitted are by-and-large the same issues that remain outstanding

today. These include some of the most important issues raised in the EIS such as:

- the rejection of the framework for economic analysis of the project;
- the project's assumption of management responsibility for woodland lying between blocks of plantation;
- the absence of mechanisms to support or facilitate continuing public involvement in the project;
- the nature of 'compensation' for village lands leased for teak plantation – for which a more enduring and sustainable solution would appear to have been found; and
- a reconnaissance soil survey of the project area prior to project implementation (although a soil survey focusing on soil structure, rather than nutrient status, was undertaken[5]). It is possible that some plantation development on unsuitable soils has taken place and this has led to poor performance and wasted resources.

In view of the EIS's '*overwhelming conclusion that the project would bring significant commercial and development benefits to Tanzania*', it must be viewed as a missed opportunity that differences on outstanding specific issues could not be constructively resolved at the time of the EIS, or shortly thereafter. Clearly, innovative and constructive solutions to key issues were possible and might have been found had the dialogue been able to continue in a constructive way. Unfortunately, no mechanisms were available to enable this to happen.

Lessons for EIA policy

The initiation of the EIA process relatively early in the project development cycle did provide an opportunity for significant changes to the project design to be made, and hence to avoid negative environmental and social impacts. The support of the funding agency (in this case the ODA) also exerted a significant, positive influence, by encouraging the proponents to adhere to the recommendations of the EIS.

The establishment of a constructive working relationship between the EIA practitioners and the project proponents from the start of the environmental assessment process is an important ingredient for effective EIA. This did not appear to happen in this case, limiting the potential for constructive dialogue and 'problem-solving'. Thus, lack of trust is likely to have originated from the perception (perhaps limited to a single member of staff of the proponent design team) of the pEIA as 'externally-imposed'. The influential role that the EIA practitioners played in compiling the ToR may have aggravated tensions still further. Constructive engagement is particularly important where regulatory and audit mechanisms are weak or absent (as in Tanzania).

A closer working relationship between the proponent and practitioner might have enabled more constructive design changes to have been made during the pEIA process. For example, the inclusion of an appropriate member of proponent staff (with responsibilities for project design) within the environmental assessment team (this was planned, but did not materialize for

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[5] Opinions on the relative importance of soil structure, soil nutrient status, and post-planting management, were divided. Certain project staff expressed the view that the poor performance of certain teak stands was the result of low soil nitrogen. Another view held that a lack of weeding immediately afterplanting, caused by seasonal labout shortages, was the prime reason for problems. Another expressed the view that soil structure (eg. the existence of shallow hard pans, gravel layers, etc.) is a more important consideration than soil nutrient status.

logistical reasons) might have provided an opportunity to improve communication, information-sharing and proponent 'ownership' of the EIA process.

Whilst the project-specific benefits of this environmental assessment process are somewhat unclear and mixed, there is some evidence that the pEIA has had a less direct, though important, effect, stimulating changes in the decision-making culture within CDC.

4.3.3 Case study 2 – pesticides manufacturing, Moshi

Background

Agriculture, the main-stay of Tanzania's economy, generates a considerable domestic demand for pesticides. The Moshi Pesticide Plant was designed to produce 3,000 tonnes of fungicide (copper oxychloride), 4,500 tonnes of organochlorine pesticides and 1,500 tonnes of herbicides annually. Also, the plant has a capacity to produce 1,800 tonnes of hydrochloric acid and an equal amount of caustic soda annually. The pesticide plant is located in an industrial area, 2 km SW of the central part of Moshi town (with about 150,000 residents), about 500 m from sparsely populated areas of the town and about 500 metres from the Karanga River.

Two feasibility studies were undertaken, one by the United Nations Industrial Development Organization (UNIDO), the other by Tanzania Industrial Studies and Consulting Organization (TISCO). Both studies concluded that the project was economically feasible. Plant design and the supply of machinery was then undertaken by an Italian company.

The project was originally conceived as a joint venture between three government-owned companies – the National Chemical Industries (NCI), Tanzania Coffee Marketing Board (TCMB) and the Agricultural and Industrial Supplies Company Ltd. (AISCO). The latter has now withdrawn from the venture.

Four out of 12 products to be produced by the plant are considered to be acutely toxic, highly persistent and extremely harmful to people and the environment. The plant was the first of its size and kind in Tanzania, and attracted the attention of the media and the public, particularly the residents of Moshi town. Local people took the project proponents to court over fear of the health risks.

In response to the public outcry, the Ministry of Trade and Industries appointed an interdisciplinary task force to evaluate the adequacy of the safety, occupational health and environmental protection measures incorporated in the project and to recommend additional and appropriate measures where necessary. Among other things, the task force recommended a comprehensive EIA for the project. This (preliminary) EIA was, therefore, a response to the recommendation by the task force. The National Environment Management Council (NEMC) requested that an EIS be prepared by independent consultants, and a Swedish firm was commissioned to undertake the study.

Key issues

The key environmental and socio-economic issues identified by the pEIA included:

- occupational health issues associated with chemical toxicity of some of the products;
- social and health risks associated with the proximity of the pesticides plant to residential areas;
- potential for groundwater pollution (due to the location of the plant on an important aquifer and a prime catchment for the Pangani River); and
- potential surface water pollution associated with the use of the Karanga River for discharging liquid wastes.

The EIA process

The preliminary EIA was undertaken in 1992, long after plant designs had been decided upon, buildings and infrastructure established, machinery installed and the plant made ready for commissioning. Terms of Reference (ToR) for the EIA were prepared by NEMC, without consultation with other stakeholder groups. Although the EIA team had access to the plant designs and received background information on the project from the plant management, there was no direct interaction between the EIA team and the plant management. Hence, the EIA effectively represented a 'stand alone' process.

There were no indications that the EIA team consulted the public – EIS contained neither the list of local people consulted, nor their views and concerns. Nor was the draft EIS made available for public review. This was particularly surprising in view of the crucial role that the public played in triggering the EIA process. Furthermore, the EIS omitted to describe the expertise used to manage and implement the EIA process. However, it is known that the EIA team did not include Tanzanian expertise.

The final report was submitted to NEMC with copies to the National Chemical Industries authorities and the plant management. No review comments were submitted to the proponents and the project proceeded as originally planned.

The pEIA identified that major risks and severe environmental and health impacts could result from emissions or careless handling of carcinogenic and toxic chemicals, and inadequate waste treatment and/or disposal. The EIS recommended restrictions on the production of a number of chemicals, and recommended that carcinogenic pesticides should *not* be produced at Moshi. It also recommended mitigation measures/monitoring programs and that a comprehensive EIA be undertaken.

Technical aspects of the EIA

Although the Task Force had recommended a comprehensive EIA, what was actually undertaken could only be described as an initial environmental evaluation (IEE). Certain key components, such as descriptions of groundwater recharge patterns and surface water drainage, were not investigated in sufficient depth to assist in decision-making.

Two extremely important omissions were apparent. Firstly, the EIA did not undertake the geo-hydrological study as required by the ToR. This was particularly worrying in view of the potential risks of contaminating the aquifer and the Pangani River system. Secondly, no risk assessment was undertaken or recommended, which was a significant omission in view of the risks associated with the handling of toxic chemicals by staff, and the proximity of the pesticide plant to the residential areas

The effect of the EIA process on decision-making

The EIA has had only a marginal effect on plant design and the project will continue largely as planned. The attitude of the plant's management to the EIA process was somewhat skeptical. They considered the EIS to be a repetition of the work of the earlier task force and re-iterated that adequate environmental mitigation measures were incorporated in the original plant designs. It was also argued that the EIA was too expensive and 'biased against development'. The proponents' intentions remain unchanged – to re-commission all the planned units once they get the opportunity, as per the original designs. Nevertheless, the EIA did help to hasten the establishment of some occupational health infrastructure such as the dispensary.

The EIS recommended that a comprehensive EIA should be undertaken; that training programs for health and safety procedures should be established, and that the plant should include a waste incinerator. None of these measures have been implemented. The main reason advanced for non-compliance was a lack of funds.

Plant managers admitted that the EIA was undertaken 'to assure [local] people that the plant was OK'. From the proponents' perspective, the EIA was a great success, as it placated the public, without needing to make any substantive changes to the location, design and operation of the plant. A recent attempt by the government to approve/support the project re-kindled opposition from local people.

Plans to produce several chemicals (copper oxychlorate, various herbicides and the organochlorines, *aldrin* and *dieldrin)*, have been temporarily shelved for financial reasons, not because of concerns raised in the EIS. The intention to produce these chemicals remains firmly in place.

Lessons for EIA policy

The EIA was undertaken too late to improve project design significantly. Since enormous investment in design and construction had already taken place, there was no potential to consider alternative locations for the plant. Had the EIA been done before decisions were made on siting and design, the social conflicts might have been avoided.

Project planning did not give sufficient attention to national and international pesticide policy issues and experience elsewhere. In this case, the plant was trying to produce pesticides which have been banned elsewhere in the world because of their well-established health and environmental impacts.

The fact that integration between the EIA team and plant management was lacking meant that there was little, if any, sense of ownership of, and respect for, the EIA process and virtually no chance of compliance with any recommendations.

The EIA failed to identify a potential role for the integration of an Envronmental Management System into the design, and hence omitted to identify 'win-win' options by which savings could be made whilst also minimising environmental impacts.

The lack of EIA guidelines and legislation contributed to a poor quality and belated EIA process.

4.3.4 Case study 3 – graphite mining, Merelani

Background

The project involved the development of a commercial graphite and tanzanite[6] mining operation and processing plant at Merelani, near Kilimanjaro Airport. Substantial investment was provided by a number of sources, including Graphtan Ltd. and partner companies in Tanzania, credit banks and the multilateral African Development Bank. Prior to development, the project area consisted of dry miombo bushland and dry savanna scrubland. Much of the project area had already been extensively disturbed by unregulated activities of artisanal gem mining operations. These ongoing activities currently employ (directly or indirectly) around 25,000 workers. Characteristic of many such artisanal mining operations worldwide, safety standards in these areas were (and still are) extremely poor. Fatalities and serious injuries are commonplace.

As part of an attempt to introduce better regulations, the Government of Tanzania divided the mineral-rich area into four blocks (A to D), and allocated Blocks B and D to small-scale mine operators for the extraction of the semi-precious gem – tanzanite. Block C, which contained a rich seam of graphite, but which is located between Blocks B and D, was allocated to Graphtan Ltd., a subsidiary of a British holding company. Artisanal mining for tanzanite continues intensively in blocks B and D.

Mining operations for graphite commenced at Block C in 1994 when the processing plant became operational. There is also a unit for the recovery of tanzanite and this is likely to contribute an important component of the income from the project.

The commercial mining process in Block C involves the blasting and removal of graphite ore to the processing plant, rock crushing and graphite extraction. Physical extraction activities generate large quantities of spoil, and result in the emission of considerable quantities of dust and noise. Spoil is currently being dumped on leased land adjacent to the processing plant, but new measures for disposal will have to be found as the amount of spoil accumulates with operation of the plant. Processed tailings are pumped into bunded (unsealed) settling tanks, and a small component of the liquid content (mainly water but also containing industrial solvents, bubbling agents and detergents) is recycled for re-use in processing activities. The remaining water is lost through evaporation and groundwater infiltration.

Severe conflicts have emerged between the artisanal mine operators in adjacent concessions, and the commercial operators of Block C. These conflicts have involved periodic incursions and 'invasions' of the commercial concessions by aggrieved artisanal miners seeking to establish tanzanite mining claims in commercially-leased concessions. Physical clashes between security staff and artisanal miners have occurred on a number of occasions. These have resulted in injuries and, in extreme cases, in the shooting and killing of artisanal mine operators by security staff employed by the commercial mine operator. Graphtan Ltd. argues that these conflicts have emerged because small-scale operators have illegally entered, threatened and intimidated its staff, and firearms have been used only in extreme cases where drastic self-defence measures were required.

Graphtan also argued that these conflicts were exacerbated by the lack of support from the police. The Company officials stated that this placed Graphtan in the uncomfortable situation of having to rely heavily on its own

[6] Tanzanite is a gemstone found mainly in Tanzania

security arrangements in order to secure its legal rights to mine and process the mineral resources of Block C. Since commercial mining activities have been legally licensed by the government of Tanzania, Graphtan Ltd. argued that they are operating completely within national law, and incursions into their project area are illegal. Nonetheless, the conflict has resulted in the loss of human life, and high recurrent costs required for security. Perhaps not surprisingly, there is little constructive dialogue between the commercial and artisanal mine operators.

The EIA process

The environmental assessment process started formally with the feasibility study which included a brief discussion of environmental issues. However, the African Development Bank's (AfDB) own financing requirements obliged the company to prepare a more adequate and comprehensive environmental impact statement. The AfDB prepared terms of reference for the EIA (although these were far from comprehensive) and the company sub-contracted the study to a unit of the engineering faculty of the University of Dar es Salaam. However, this took place after the design of the plant and mining operation had been finalised.

The environmental impact study was undertaken principally as a 'stand-alone' exercise, and involved a brief site visit (two days), followed by report preparation and reporting. The proponents provided the background information required for the consultants to prepare the EIS, but there was no further integration between the EIA process and project design. The EIS was reviewed by a mission from the AfDB which visited the site and discussed issues with the EIA team. Their principal concern was the danger of groundwater contamination caused by infiltration from the unsealed tanks used to hold washings water.

The EIS focused tightly on the design prepared during the feasibility study, and did not explore alternative options for design, plant siting, and mine waste disposal plans. The EIS refers briefly to a visit of the consultants to two local villages but makes no reference to the questions and issues discussed, nor to the amount of design information provided to villagers. It is not clear to what extent those consulted were aware of the objectives of the EIA process, or the scale or design details of the proposed project. No references were made to the views expressed by the local communities involved, nor to the influence of those views in shaping the content of the EIS (or their influence on project design, which is assumed to be none). The report concluded that the 'socio-economic effects for Tanzania and the region will be mostly positive.'

There was no economic analysis of the project, and only minimal analysis of social and health impact issues. Nonetheless, the EIS included a number of recommendations for the mitigation and monitoring of impacts predicted for the project, although cost estimations for these recommendations were not prepared.

The EIS concluded that the project *"...does not pose any serious threat to the natural environment and will not adversely effect the existing social fabric in the area."* Further, the document states that the proponents must *"...continue to develop and sustain its already good working relationship with the local people"*.

There appears to have been no formal review process, either by external agencies or by proponent staff. The EIS was accepted by the African Development Bank and the financing arrangements were subsequently finalized and approved, allowing the project to proceed.

Technical aspects of the EIA

The EIS predicted that the project would create some environmental and socio-economic impacts as a result of the release of dust, the drainage of processing water into groundwater and the creation of some 'harmful working conditions'. Nonetheless, the authors of the report expressed the view that the project would provide socio-economic benefits for Tanzania and the region, through the payment of taxes and royalties, employment and improved communication.

Importantly, the EIS omitted a number of key issues associated with the construction and operation of the Graphtan works. As a consequence, it was seriously flawed – a view shared by staff of the operating company. Key issues overlooked included:

- the storage and disposal of spoil;
- the likelihood of severe social conflicts between the plant operators of Block C (Graphtan Ltd.) and the artisanal mine operators in adjacent Blocks;
- the possibility of groundwater contamination by infiltration of chemical-rich water from unsealed storage tanks (after its use in the separation of graphite from ore);
- the disposal of water accumulating in the extraction pit (which could potentially contain high levels of contaminants);
- restoration of the project area and the decommissioning of the processing plant; and
- evaluation of the full costs (and benefits) of the project in economic terms. The failure to address this issue resulted in the effective externalization of a number of important environmental costs. Examples include an irreversible loss of grazing and other natural resources (in this case exacerbated by problems of spoil and tailings disposal which will now require considerable land-take), the cost of decommissioning the processing plant, and possible groundwater contamination.

The effect of the EIA process on decision-making

From the proponent's perspective, the EIS had the important effect of meeting the African Development Bank's requirements to release financing. In this respect alone, the EIA process at Merelani influenced decision-making. Graphtan also expressed the view that the EIS provided an important public relations tool. In a more general sense, the EIS would appear to have had no impact whatsoever on the siting, design and operation of the project – a point openly conceded by Graphtan. Indeed, key Graphtan staff had either not read the EIA report, or were largely unaware of its findings and recommendations. The poor technical quality of the report was cited as one reason why the report effectively had been ignored by the staff. Some of them were aware that the EIS had omitted to address a number of key environmental issues.

Some of the mitigation and monitoring recommendations in the EIS have been implemented by the project proponents (eg. as the supply of water to a nearby cattle trough). However, several have not been implemented at all, and no funds have been set aside for implementation of the mitigation and monitoring plan set-out in the EIS. Given that the EIA failed to address a number of key environmental issues, it is perhaps not surprising that the EIS omitted to include mitigation and monitoring recommendations.

The proponents also pointed-out that there was no legal obligation to implement the mitigation and monitoring recommendations in the EIS. Voluntary

compliance with these recommendations would have incurred short-term costs additional to operational costs, but Graphtan did not think these were justified. If the EIS had included recommendations on issues such as site restoration and decommissioning, it is likely that these would have been considered as economically unacceptable by the proponents. Graphtan indicated that it would have sought compliance exemptions from the government if the EIA had resulted in obligations to restore the excavation site (such as by backfilling with tailings and spoil) or to decommission the processing plant. It is likely therefore, that site restoration and plant decommissioning will not take place when graphite and tanzanite have been mined-out.

Lessons for EIA policy

Many of the environmental and social problems resulting from the implementation of this project relate to policy weaknesses at the government level. Nonetheless, the EIA was a lost opportunity to predict the nature and scale of these issues, and to mediate between the different stakeholder groups involved. Key lessons to emerge from this case study are as follows:

- the proponents viewed the EIA as having a short-term aim – to facilitate project financing from the African Development Bank, and this constrained the development of a longer term commitment to environmental management at the project site;
- the absence of coherent environmental legislation to ensure EIA compliance severely reduced the potential of the EIA to improve the environmental performance of the mining operation;
- the late stage of introduction of EIA left little scope to explore alternative design options;
- the ambiguity of environmental management recommendations such that the EIS provided ample opportunity for the proponents to implement a 'less-than-rigorous' approach to compliance;
- the failure of the EIA to identify critical social issues, and to integrate these into the design of the project, is likely to have contributed to the scale and intensity of social conflicts that have emerged since the mine started operating. These have resulted in the loss of human life and higher recurrent costs for the mine operator;
- there was a failure to utilize the EIA process as an opportunity to explore solutions to potential social conflicts and develop dialogue between the different stakeholder groups involved, particularly artisanal miners, pastoral communities, government agencies and the project proponent;
- the absence of quality control mechanisms for the selection of EIA consultants; and,
- the absence of a comprehensive cost-benefit analysis as a part of the EIA process has resulted in the externalization of important environmental and social costs, which will eventually have to be met by the government and the people of the region.
- the apparent indifference of the funding agency (in this case, the African Development Bank) , such that this agency accepted a flawed EIS without any apparent review process.

This case study also underscores the point that serious problems can arise when: there is no coherent EIA legislation; there is a lack of compliance monitoring; and the designs of major development projects are finalized before an EIA or social appraisal is undertaken.

4.3.5 Case Study 4 – hydropower redevelopment, Pangani Falls

Background

The original concept of this project was to re-develop the hydroelectric power station built at Hale in 1935 on the lower Pangani River in Korogwe District, Tanga Region, Northern Tanzania. The re-development was considered necessary because the original generating facility was operating at under half of its normal generating capacity of 20 MW, mainly due to reduced water head following reservoir siltation. However, redevelopment of the original generating facility was deemed "too expensive" and so plans were formulated to develop another hydropower generating facility at nearby Pangani Falls.

The new project, designed to enhance capacity to around 66 MW, was implemented by the Tanzania Electric Supply Company (TANESCO). According to Tanzania's energy policy, the development of Pangani Falls hydropower station was the most viable and cost-effective means of enhancing energy generation available in the country.

An initial scoping exercise by two international consulting companies produced a preliminary EIA statement in 1989. This was followed by separate studies on biodiversity, environment and socio-economics between 1989 and 1994. Construction took place concurrently between 1991 and 1995. The project was financed with substantial contributions from Norway, Finland and Sweden. The final EIA document published in 1994 (only one year before the construction was completed) represented a consolidation of these separate studies.

The EIA focused tightly on the immediate impact area – the project site, a village and the adjoining stretch of the river as far upstream as the headrace and downstream for a kilometre or so beyond the tailrace. According to the EIS, the main environmental, social and health issues were:

- aquatic weed infestation – the EIS noted that water hyacinth (*Eichornia crassipes)* had extensively colonized the Pangani River, and was likely to infest the new reservoir;
- soil and water contamination resulting from construction activities and the discharge of slurry and chemicals;
- socio-economic and health impacts, particularly those resulting from the impounding of a new water body and the creation of habitat conditions suitable for vectors of diseases such as malaria and bilharzia; and
- alteration of the river regime between the falls and the tailrace canal and its consequential impact on the riparian ecology and the maintenance of a residual flow in the old channel.

By focusing the EIA on direct impacts at the project site, the EIA failed to predict a number of important environmental and social issues that later proved to undermine the performance of the project as a whole. The most notable omission was that of cumulative water extraction in the catchment upstream of the dam site. Catchment management as whole was also not addressed in this EIA.

The EIS recommended some mitigation measures such as improved management of wastes, release of compensation water flow in the old river channel, transplantation of a threatened plant species – the African Violet (*Saintpaulia sp.),* biochemical eradication of water hyacinth and protection of the riparian forest.

The EIA process

Terms of reference for the main EIA study were prepared by the consortium of bilateral agencies funding the project and the EIA was undertaken by an international consulting engineering company. Since it was initiated after the design of the project had been completed, the EIA was left with limited scope to influence the way in which the project was designed.

The EIA process was fragmented in nature. Whilst the preliminary study was undertaken in 1989, a two year gap ensued before supplementary studies were undertaken. Most of the supplementary studies were not completed until shortly before the completion of construction work in 1995. Thus, the EIS actually comprised of a "belated synthesis" of separate studies.

Another problem was that the EIA did not address cumulative water abstraction and land use issues in the catchment area. Hence, it failed to identify the water shortages that have forced the power station to operate at performance levels below those originally anticipated. Not only did this result in poorer than anticipated performance of the facility (and thus poorer economic performance), but also measures were hastily introduced to address these shortages. For example, water pricing was introduced within the Pangani catchment, and this led to conflicts with the people of the river basin. These might have been avoided had the measures been identified, planned and implemented in a more sensitive and participatory manner.

Efforts to involve local people in the EIA were confined to interviews with local government leaders (mainly village leaders) and local people within the immediate impact area (mainly Bwitini Village). The results of these interviews were not documented and it is unclear whether the views expressed by local people had any substantive influence on the findings presented in the EIS or on the subsequent design of the project. No involvement of people living upstream or downstream of the direct impact area was sought.

Technical aspects of the EIS

- the style of presentation of the EIS made it very difficult for decision-makers and lay readers to gain an adequate understanding of the main issues;
- the executive summary was far too brief to provide adequate coverage of key issues and potential impacts, and created the impression that there were relatively few issues of concern;
- the EIS presented an insufficient level of detail on some key issues, particularly those regarding potential water use conflicts in the basin, land use implications in the catchment area and the level of stakeholder involvement in the EIA process. No environmental management costs were estimated, nor was a mitigation plan presented; and
- the EIS included large amounts of background and baseline data, much of which was irrelevant to impact analysis. The EIS was particularly weak on evaluation of significant impacts, leaving decision-makers with an unclear picture about the critical issues.

The effect of the EIA on decision-making

The EIA had no significant influence on the design and implementation of the project. With minor exceptions, translocation of African violet has largely failed. Biological eradication of water hyacinth was abandoned soon after project commissioning. Mechanical removal of water hyacinth was introduced to replace biological control but has also proved ineffective. The late stage at

which the EIA process was commissioned and the lack of integration of EIA with project design were clearly the reasons for such poor performance. Technical weaknesses in the EIS (described above), and it's fragmented and non-integrated presentation, further contributed to its lack of influence.

At the project site, however, the EIA is thought to have improved some aspects of environmental management and design, such as:

- maintaining communication between two villages on opposite sides of the river by making recommendations (which were implemented) to raise the height of the bridge joining the villages;
- reducing impacts on the riparian ecology of the old river course by ensuring periodic releases of water into the old river course; and,
- ensuring that compensation was paid to two households in the direct impact area.

Lessons for EIA policy

The late commissioning of the EIA relative to project implementation effectively meant that the EIA became a "rubber-stamping" exercise with little potential to effect the fundamentals of project design. This constraint was compounded by the disjointed nature of EIA activities and the poor integration of the EIA with project design and management activities. Furthermore, the EIA process was effectively terminated on submission of the EIS, and there has been little, if any, subsequent monitoring and follow-up activities. The lessons are clear – for an EIA process to be effective, it must be *initiated early*, it should be well *integrated* with project design and management, and it should be planned to *continue beyond the completion of the construction phase.*

This case study clearly illustrates the problems that can arise in the absence of effective and adequate *scoping*. Two issues that later proved crucial to the impact of the EIA process on project design could have been flagged at this early stage. Firstly, the importance of addressing basinwide issues in the EIS. Failure to do this led to a failure to identify likely water shortages – and this resulted in project underperformance. Secondly, the importance of effectively involving water user groups in the basin. The fact that these issues were not addressed early contributed to conflicts associated with the belated (and non-participatory) introduction of water pricing. Greater investment in scoping could well have led to a more cost-effective and better targeted environmental assessment process.

The absence of a *review process* in Tanzania, meant that many of the technical deficiencies of the EIA were not identified or rectified (e.g. the inadequacy of mitigation and monitoring measures, the failure to address basinwide issues).

Provisions for mitigation and monitoring were wholly inadequate. There was little evidence to suggest that proposals for monitoring and mitigation were costed or integrated into project design. Nor were responsibilities for monitoring and mitigation clearly assigned, thus making compliance monitoring extremely difficult.

Finally, the case study illustrates the need for greater rigour in donor practice on EIA.

4.3.6 Case Study 5 – oil pipeline protection, Mikumi National Park

Background

In 1968 the Tanzania-Zambia (TAZAMA) Pipeline Company Ltd. commissioned an underground pipeline to transport petroleum from Dar es Salaam to Ndola in land-locked Zambia. The pipeline has a total length of 1,704 km of which 60 km lie within Mikumi National Park in Tanzania. No EIA was undertaken at the time. Since its construction, the pipeline has been gradually corroding as a result of chemical reactions between the metallic pipe and the soil. Corrosion is reported to be especially severe within the park and has led to oil leakage which threatens the park environment.

In 1993, TAZAMA decided to address this problem and proposed the construction of five Cathodic Protection Stations (four solar stations and one transformer rectifier unit station) along the length of the pipeline within Mikumi National Park. These would generate an electric current along the length of the pipeline, which would then help to slow the corrosion process. Since the pipeline was routed adjacent to a public highway running through the middle of the park, each station was to be located within 20-30 metres of the road. An EIA was commissioned prior to construction of the stations in accordance with Tanzania National Parks (TANAPA) policy.

Key issues

The pEIA identified a number of environmental issues associated with the proposals:

- visual impacts resulting from the construction of the buildings to house the power generation equipment;
- disturbance of wildlife associated with construction and decommissioning activities;
- potential impacts arising from the extraction of construction materials from within the park;
- potential environmental impacts that would arise if new permanent settlements were to be established in the park to provide security for the new CPS structures.

The EIA process

The EIA was undertaken after completion of feasibility and design studies, but before construction of the stations started. It was carried out by two specialists from the Institute of Resource Assessment of the University of Dar es Salaam. Due to time constraints, very little scoping was undertaken.

Stakeholder involvement was confined to Mikumi National Park authorities in Mikumi and TAZAMA Pipeline Ltd. in Dar es Salaam. Other vital stakeholder groups like tourists, tour operators and national environmental agencies were not involved.

The EIA team spent two days in the field with the TAZAMA design engineer assessing the alternative cathodic protection options. However, no changes on the designs were made since firm decisions had already been taken. Although there was interaction between the EIA team and the designers, the two days of field work was probably not enough. The draft EIS was submitted to TAZAMA and TANAPA. The latter sent back a few comments to the EIA team which led to a minor change in the location of one of the power huts. But there was no official approval of the EIS.

TANAPA was only involved to a marginal extent – the EIA team conducted one interview with the chief warden of the National Park.

The main 'message' of the EIA was that, whilst wildlife disturbance within the park could be minimized, there was less scope for mitigating the visual impacts of the cathodic protection stations.

Technical aspects of the EIS

The EIS reported several environmental impacts and recommended mitigation measures. However, the report did not include the ToR, nor the views and concerns of stakeholders.

The EIS did not cost the mitigation measures, nor was there any indication to suggest that TAZAMA was committed to mitigation compliance.

The effect of the EIA process on decision-making

Apart from a minor relocation of one of the power huts, the EIA had no effect on the design of the cathodic stations.

The EIA did help to resolve a long-standing conflict between TAZAMA and TANAPA Authorities about the relevance of establishing the CPS in the national park, and allowed the project to proceed. Indeed, the EIA helped convince TANAPA that the project, by reducing pollution risks, would be beneficial to the park as a whole. In this case, TANAPA needed to make a trade-off between the inherent pollution risks associated with an existing pipeline undergoing gradual corrosion, and the (mainly visual) impacts associated with the construction on new CPS stations.

Lessons for the EIA policy

EIA should be commissioned early in the project cycle in order to improve flexibility in designing projects and in decision-making. In this case, the late stage at which the EIA was commissioned left little if any scope to alter the design or location of the cathodic protection stations.

4.3.7 Case Study 6 – tourist development (Serengeti-Serena), Serengeti National Park

Background

The Serengeti National Park is one of the most important areas for wildlife conservation in the world, and the wildlife attractions of the park are drawing ever larger numbers of tourists to Tanzania. In response to increasing visitor demand, a private hotel company – Serena Hotels and Lodges, proposed the establishment of a 200 bed lodge, on a hill top location, within an Extensive Use Zone[7] in the central part of the Serengeti National Park. The company has a long history of establishing lodges within the national parks of East Africa. The Tanzanian National Parks Authority (TANAPA) requested the preparation of an EIS for the proposed development in line with national park policy. This was prepared by a team from the Institute of Resource Assessment, University of Dar es Salaam.

The EIA study identified a number of potential (some unavoidable) environmental impacts associated with the proposed development, and proposed recommendations for avoidance and mitigation. Key issues and recommendations included:

- prompt re-vegetation to mitigate soil erosion during site clearing and construction;
- a specific warning that care would be needed to avoid discharges of liquid wastes reaching a nearby wetland, and that adequate waste disposal measures should be included in the project design.
- spoil should be disposed outside the park;
- raw materials such as sand, aggregate and roofing thatch should be purchased from villages around the park to minimise impacts within the national park and to provide income generating opportunities for villagers around the park boundary;
- a proposed incinerator should be sited downwind of staff and visitor facilities to avoid health impacts from air pollution; and
- a variety of mitigation measures were recommended for visual and noise impacts (key considerations for the national park) for which, including careful selection of colours, and the sound-proofing of generator housing.

The EIA process

The EIA study, commissioned by TANAPA, was undertaken at short notice. Detailed project designs had already been prepared by the time the EIA work had started and severe time restraints were imposed on the EIA team in order to minimise delays in the implementation of the project. The EIA study was undertaken over only 21 days, and only one day was available for a site visit. These conditions placed significant constraints on the scope and depth of the EIA study. For example, there was insufficient time to visit areas immediately adjacent to the park from which aggregates and stone were extracted for construction and road-building. Nor was time available to visit settlements in these areas to explore local considerations. Nonetheless, the EIA team had the support of both the project proponents and TANAPA. Presentations on the

[7] Extensive use zones are where management for wildlife and the natural environment take precedence over development whilst accommodating the requirements of non-consumptive use.

design of the project and the concerns of TANAPA were made immediately before the field assessment phase of the EIA study. Field assessment consisted of a brief (half day) site visit and discussions with project staff. This was followed by report preparation and submission. No comments were received by the EIA team on the quality or acceptability of the EIS, and project implementation commenced shortly after its submission.

To some extent, this development provides a rare example of an EIA process continuing after the submission of the EIS – the latter provided a framework for negotiations between the proponent and regulator (TANAPA). In a sense, the EIS provided an agreed statement of 'rules' which continue to form the basis of what is a constructive dialogue between the park authorities and the proponent. Hence the 'problem' associated with liquid waste disposal is being addressed with the constructive support of the park authorities, and is unlikely to become an issue of contention as long as efforts at finding a workable solution continue to take place.

Technical aspects of the EIS

If considered as the product of a *preliminary* EIA, the EIS presented a clear summary of the main issues involved – a considerable achievement in view of the lack of notice and the shortage of time imposed on the process. Consideration of a number of additional issues could have improved the quality of the EIS:

- in view of the importance of visual impacts on the park, the establishment of a framework for photographic monitoring would have provided the park authorities (TANAPA) with a useful monitoring tool;
- recommendations for mitigation were insufficiently specific to be of practical use. For example, recommendations regarding the avoidance of pollution of a nearby wetland system should have been supported by specific recommendations to undertake baseline water quality studies of this natural wetland system. Since this data has not been collected, it will be difficult to establish whether effluent discharges from the lodge are impacting on the system to any significant effect. The EIS did not specify who should undertake several of the key mitigation and monitoring activities, even though their implementation would require inputs from the national park and the project proponents. Furthermore, recommendations for mitigation and monitoring were not costed; and
- there was no assessment of the views and concerns of villagers living outside the park. This was an important omission, since materials for construction (such as stone and aggregates) were extracted from village lands immediately adjacent to the park.

The effect of the EIA process on decision-making

The principal difficulty in determining the influence of the EIA on this project lies in distinguishing between the impact of the EIS and the proponent's existing and constructive attitude to environmental management[8]. Furthermore, influence exerted by TANAPA over development proposals adds a regulatory dimension to EIA in parks that is absent in the rest of Tanzania. The EIS *per se* appears to have had a minimal direct effect on decision-making at the site. Since designs had been completed prior to the EIA, there was little scope for making alterations to the lodge design, or considering alternative

[8] Serena lodges are unusual in Tanzania in that they have developed their own 'Corporate Environmental Mission Statement'.

designs or locations for the enterprise. For example, the proposed hill-top location of the development in one of the most frequently used areas for wildlife viewing, meant that the issue of visual intrusion was a key consideration. The most effective means of reducing visual intrusion, without significantly impairing the viewscape offered by the lodge, would have been to relocate the development just below the skyline. Recommendations for design modifications, even to this modest extent, were not considered acceptable by the lodge company on the grounds that the project design had already been completed (ie. that the EIA study was only at liberty to make suggestions on the *detail* of the project design). This was surprising in view of the international significance and sensitivity of the Serengeti National Park.

In terms of the day-to-day operation of the lodge, the EIS had minimal impact, even though the proponent's environmental management practices were, on the whole, extremely good. Although the lodge manager had 'glanced' at the EIS, he was not aware of its detail, and therefore it was not surprising that the operational measures that were being followed were not necessarily those recommended in the EIS. In most cases, the lodge's operational practices (which placed a high premium on clean and environmentally-friendly management practices) were compatible with, but not directly influenced by, the EIS. However, the proponents did comply with a number of key recommendations of the EIS, such as the procurement of raw materials from villages outside the national park.[9]

One of the key recommendations of the EIS – the integration of adequate liquid waste treatment facilities into project design – had clearly not been implemented, and the lodge was facing a considerable problem in dealing with the disposal of such wastes. At the time of the evaluation visit, waste water overflowing from inadequate waste pits had created a new wetland microhabitat.

Lessons for EIA policy

The initiation of the EIA process so late in the development of the project negated any realistic chance of significantly improving project design. This resulted in increased costs for the proponent – it now has to address costly environmental problems, and has led to tension between TANAPA and the proponent over compliance. The message is clear – for EIA to be effective, it should commence as early as possible in the project development process.

As a consequence of the belated commissioning of EIA studies for this development, extremely severe time restrictions were imposed on the EIA. This contributed to the omission of a number of key issues which have caused problems at later stages of the development and management of this project.

The national parks provide a context in which EIA is supported by regulatory controls. In this example, the regulatory authority wielded by TANAPA was instrumental in ensuring that the project was subjected to EIA. It may also have played a major part in encouraging the proponent to adopt a more environmentally sensitive approach to development than might have otherwise been the case. In any event, the EIA now provides a useful framework for constructive discussions on environmental issues associated with the development. This relationship between TANAPA (as regulators) and the proponent is likely to yield benefits to both stakeholders over the medium to long term. This suggests that if regulatory powers did exist outside the parks

[9] This condition is consistent with national park policy and would have been imposed on the proponents irrespective of the findings of an EIA.

(eg. for the country as a whole), they might go some way to forging a more responsible approach to environmental management by the private and public sector alike. Furthermore, on the limited evidence of this case study, EIA might contribute to forging a constructive, rather than confrontational, relationship between government and private sector on environmental issues.

Integrating environmental management recommendations into the general management plan of the national park would improve long-term compliance monitoring by TANAPA.

4.3.8 Case Study 7: tourist development (Grumeti), Serengeti National Park

Background

Recently, there has been much investment activity in the development of tourist facilities in the so called 'northern Circuit' of national parks and protected areas, which includes the Serengeti National Park. One such example is the Grumeti Serena Tented Camp, constructed in 1995/96 by Serena Hotels and Lodges Limited. The location was selected because of its qualities as a vantage point to observe the migration of large herbivores through the Ndabaka Plains and the Grumeti River Basin. The proponent has considerable experience of tourism development in East African National Parks.

The Camp is located approximately 90 km from Park headquarters at Seronera, within the Kirawira Extensive Use Zone of the National Park. The Serengeti National Park is a Biosphere Reserve and a World Heritage Site. The Extensive Use Zone around Kirawira is one of the least developed in the park. In accordance with TANAPA policy, an EIA was commissioned before final approval for construction was given. TANAPA commissioned the Institute of Resource Assessment (IRA) of the University of Dar es Salaam to undertake the EIA. It was funded by the proponent.

Key issues

The EIA identified the following potential problems:

- visual impacts and noise;
- impacts associated with the extraction and transport of construction materials;
- waste disposal and the associated health and environmental implications;
- the social, health and environmental implications of siting the generator and incinerator close to staff and visitor accommodation; and
- risks associated with opening up and exposing a previously remote area of the national park to increased illegal activities, including poaching.

The EIA process

The EIA took place long after feasibility studies and project designs had been completed, but before formal approval of the project by TANAPA had been given. The EIA team was supposed to work in close collaboration with the proponents and TANAPA. However, time constraints meant that dialogue between these stakeholder groups was minimal, and was restricted to the one day site visit. The team felt they were placed under considerable pressure to prepare and submit the EIS in less than 20 days. As in the previous case study, the lack of adequate time severely constrained the scope and depth of the EIA study. Areas outside the park, from where aggregates and construction materials were taken, were not visited. Nor was time available to visit local settlements in these areas to explore and consider local views and needs.

The original design incorporated a number of features that substantially reduced the environmental impact of the camp. The EIS recommended a number of measures that could enhance environmental performance still further. These included:

- the purchase of sand and aggregates from outside park boundaries, to be negotiated through village governments. The EIS further recommended

that the restoration of borrow pits should be negotiated with village representatives;

- the siting of the incinerator so as to avoid health impacts on staff and residents;
- the proper screening of project labourers so as to minimize poaching;
- the testing and monitoring of liquid waste treatment facilities; and the compilation of contingency plans to deal with accidental spills; and
- the reduction of visual and noise impacts through colour selection of construction materials of appropriate colours, and through the use of noise abatement measures.

Technical aspects of the EIA

- the EIS failed adequately to address issues concerned with the site of the camp. This led to avoidable and yet important impacts. For example, the tents are highly visible from the main track through the park as they were sited too close to the crest of the hill to avoid breaking the skyline. This has reduced the wilderness value of the area;
- the EIA team did not consult the villagers and/or local authorities outside the national park to gauge their views and concerns about the purchase of construction materials from their villages;
- the EIA omitted to present an impact mitigation plan/monitoring program. Hence, the allocation of environmental management activities between stakeholders was unclear and ambiguous, making follow-up and compliance rather difficult; and
- despite the above shortcomings, the EIS provided a framework for environmental monitoring by TANAPA, thus ensuring compliance to mitigation by the proponent.

The effect on decision-making

The effect of the EIA on project planning and implementation was marginal, mainly due to the late stage at which the EIA was initiated. Design and siting issues had already been decided prior to the EIA, so there was little scope for the EIA significantly to address alternative options and influence improved environmental performance. Compliance with recommendations was also poor. For example, the proponents did not heed recommendations to purchase construction materials from nearby villages.

Lessons for EIA policy

The late stage at which the EIA was initiated, and the inadequacy of resources (particularly available time) clearly constrained the quality and utility of this EIA process. This resulted in impacts that could and should have been avoided and/or mitigated.

Despite obvious problems associated with the late initiation of the EIA, the process did provide a framework for subsequent negotiation between TANAPA and the proponents which has helped to improve subsequent environmental management associated with the project;

Consistency in ensuring adherence to environmental management recommendations could be greatly improved by ensuring that the recommendations of each EIA undertaken within the park (ideally in the form of an environmental management plan) are integrated formally into the General Management Plan (GMP). This lesson applies equally to all EIAs undertaken within national parks and protected areas in Tanzania.

4.4 Case study analysis

4.4.1 Introduction

The analysis in this section focuses on three aspects of EIA practice highlighted by the case studies. These three aspects are introduced below:

i) Interaction between the EIA team and the project design process;
Close integration between the EIA and project design processes is an essential ingredient of effective EIA. Perhaps surprisingly, rather little attention is given in the EIA 'best practice' literature to emphasizing the importance of developing close working relationships between EIA practitioners and project design teams. Ensuring that EIA teams work closely with project design staff offers an important opportunity to enable and encourage project proponents to take on board environmental and social considerations. This is especially true in Tanzania, where EIA regulatory frameworks are weak and cover only certain sectors (see Chapter 2), and where capacity to implement recommendations for mitigation and environmental management is often severely constrained.

ii) Timing and duration of the EIA process;
EIA processes worldwide often start too late, finish too early, or lack the resources necessary to ensure they are effective. Initiating the EIA early in project development is one of the most important ingredients for effective EIA. Bearing these factors in mind, the case studies explored the stage at which the EIA process was initiated in the project development process, and the resources devoted to them.

iii) Stakeholder and public involvement;
Care needs to be taken in distinguishing between 'stakeholder' participation and 'public' participation. The second is a subset of the first. Howlett and Nagu (1997) define stakeholders as '*all those people and institutions who have an interest in the successful design, implementation and sustainability of the project. This includes those positively and negatively affected by the project. Stakeholder participation involves processes whereby all those with a stake in the outcome of a project, actively participate in decisions on planning and management. They share information and knowledge, and may contribute to the project, so as to enhance the success of the project and hence ultimately their own interests.*'

A component of 'stakeholder' involvement is 'public' involvement. In EIA practice, this is usually taken to mean the involvement of local communities, villagers, farmers, pastoralists *etc.*, as distinct from institutional or government stakeholders. 'People-centred' process are central to effective EIA. Although the EIA industry has accepted this notion relatively recently, there is now widespread awareness of the importance of ensuring effective public involvement in EIA. Public involvement can occur to different levels – from one-way information flows (e.g. from practitioner to village stakeholder) to two-way information- and responsibility-sharing. There are also different types of public stakeholder – and each requires different considerations to be taken into account when deciding how and when to involve them. With this in mind, the case studies explored public involvement issues in Tanzania, for example, the level of participatory involvement, the types of public stakeholder groups involved, and the influence that public involvement had on the decision-making process.

In the sections which follow, the above three aspects of EIA practice are discussed in detail. In each case, key issues emerging from the case studies are presented, and summarized in tables 4.4, 4.5, and 4.6. Each aspect is discussed in the following sections in relation to three EIA performance indicators:

- the effect of the EIA process on decision-making;
- institutional learning and the 'exposure' of proponents and project designers to environment and social considerations; and
- the level of subsequent compliance with the environmental management recommendations contained within the EIS.

4.4.2 Interaction between the EIA team and the project design process

The case studies revealed a number of key issues. These are discussed below and summarized in Table 4.4.

- Integration between EIA and project design has been minimal in Tanzania.

  In six of the seven case studies, interaction was limited to the provision of background documents and project designs by the proponent. In these cases, the EIA generally had little or no significant influence of the EIA process on project design.

  Only in the case study of the Kilombero Valley Hardwood Project did a significant level of integration and dialogue occur, and this led to improvements in project design. In this example, unique in Tanzania to date, design changes reduced environmental and social costs and enhanced benefits. Changes in the way the project was implemented (after submission of the EIS) could also be traced back to this dialogue.

  Conversely, lack of interaction meant that opportunities to avoid impacts were missed. For example, in the case of the development of tourist facilities within the Serengeti National Park, visual impacts could have been reduced and waste disposal problems could have been avoided had more time and resources been available to discuss these issues and determine solutions. However, in this case, the EIA process had positive impacts on project implementation, since it laid the framework for constructive dialogue. This helped to ensure that post-completion environmental management recommendations were implemented to some extent.

- Positive changes in attitude occurred only where the EIA was initiated early in the project cycle.

  If the EIA process is initiated early enough in the design phase of the project, it allows sufficient time for a positive working relationship to develop between practitioner and proponent. An example is, once again, the Kilombero Valley Hardwood Project. Here, dialogue during the EIA study led to indirect and longer term changes. For example, the proponents credited the EIA process with stimulating important changes in thinking on approaches to development planning within the organization as a whole.

  The existence of a policy framework for EIA can encourage dialogue. TANAPA's EIA policy provides a strong incentive for proponents to engage with the national parks authorities, and other stakeholder groups (including public stakeholders) where necessary.

In the case of the Kilombero EIA, the funding agency's environmental policy encouraged the proponent to take the EIA seriously, and comply with its findings.

- EIA processes in Tanzania have been output-oriented.

  Most EIAs have essentially been 'rush jobs' where the completion of EIS is seen as *the* principal goal. This is manifested in the disproportionately high number of preliminary EIAs (see chapter 4). This indicates that project proposals are generally under-assessed in cases where EIA is applied.

  The output orientation of EIA in Tanzania is driven by both proponents and practitioners. Proponents are often required to prepare an EIS in order to meet regulatory requirements (eg. those of TANAPA in the national parks) or more commonly, to secure the release of donor funding. In these circumstances, proponents often commission consultants to prepare a statement that meets the needs of the agency or donor concerned, and at minimal cost. Practitioners are usually constrained by time. From their perspective, interacting with proponents or design teams often requires more time than is available. Furthermore, interaction and dialogue is often not seen as essential if the goal is perceived as simply to prepare an EIS. Examples of projects in Tanzania typifying this problem include lodge developments within Serengeti National Park, cathodic stations in Mikumi National Park, and graphite mining at Merelani.

- Proponents rarely accept the findings of an EIS

  We know of no examples in Tanzania where project proponents formally accepted an obligation to implement the recommendations of the EIS.

- Learning opportunities have been missed.

  Opportunities to expose proponents to environmental and social considerations have been missed. This is largely because most EIAs have been conducted as 'stand alone' processes' with little integration with project design and management. In most cases, the EIA process was so divorced from project design process, that project managers were unaware that an EIA had been undertaken, or were oblivious of the findings and recommendations included in the EIS. Examples are the graphite mine at Merelani, and the Moshi Pesticides Plant. Not surprisingly, these EISs had little or no effect on project operation!

  Where there was a significant level of interaction between the project team and the proponent (eg. the Kilombero Valley Teak Plantation project), the EIS was still used and referred to on a regular basis, nearly 5 years after its completion.

Table 4.4 Interaction between EIA and the project design process: summary of findings

1. Teak Plantation Establishment, Kilombero	Generally good – the closest interaction of all case studies reviewed. Consensus not reached on some key issues. No formal acceptance by the proponent of the EIS.
2. Pesticides Manufacturing, Moshi	Except for the provision of background information, no direct interaction between the EIA team and the proponent. No formal acceptance by the proponent of the EIS.
3. Graphite Mining, Merelani	Minimal interaction between the EIA team and project proponents. Proponents viewed the EIA study as an obligatory 'hurdle' to secure project development funding. The EIA was a 'stand-alone' process. No formal acceptance by the proponent of the EIS.
4. Hydropower Redevelopment, Pangani Falls	Separate EIS study components were undertaken over several years. Each study team reportedly 'worked closely' with the project proponents. Rather little cohesive dialogue. No formal acceptance by the proponent of the EIS.
5. Oil Pipeline Protection, Mikumi National Park	The EIA team 'consulted' with the principal stakeholders involved – TANAPA and the project proponent – the Tanzania-Zambia Pipeline Ltd. (TAZAMA). In practice, interactions between TAZAMA and the EIA team were extremely limited due to time constraints. The proponent verbally agreed and accepted the findings of the EIA study.
6. Tourist Development (Serengeti – Serena) Serengeti National Park	Extremely limited interaction between the EIA team and project proponents. Constraints imposed by extremely limited time and financial resources, and by the late introduction of EIA in the project development process. Support provided by TANAPA and the proponent which enabled some dialogue to occur. The EIA *has* provided a framework for a constructive dialogue between the national park and the proponent, to help ensure compliance with monitoring and mitigation recommendations. There was no formal acceptance by the proponent of the EIS occurred.
7. Tourist Development (Grumeti Serena), Serengeti National Park	As 5 above.

4.4.3 Timing and duration of the EIA process

(see summary in table 4.5).

- EIAs are usually commissioned too late

  In all but one example, EIA studies were initiated after project designs had reached an advanced stage. In several cases, designs had been completed, and in one example, construction was already well advanced. In each example, the case study analysis could link the lack of influence of the EIA process on subsequent decision-making and project design to the late stage at which EIA was introduced.

There are clear examples where the earlier introduction of EIA could have avoided or minimized the subsequent development of 'problem issues'. The EIA for the Moshi Pesticide Plant came too late to act as a mechanism for addressing public concerns over the nature and siting of the plant. This led to expensive and time consuming legal proceedings, panels of inquiry, and belatedly, an environmental impact study. The graphite mining operation at Merelani provides another clear example. In this case, the late stage at which the EIA was initiated meant that the severity of social conflicts (over access to mineral resources) was not foreseen until it was too late to change the design of the project. These conflicts led to loss of life, serious injury and to a high recurrent costs for security.

- Early introduction of EIA can help proponents avoid conflicts and reduce costs

  The EIA for the Kilombero Valley Teak Project shows that EIA can help to avoid negative environmental and social impacts and optimize social benefits. It resulted in enhanced local support for the project which was able to progress without tensions or conflicts.

- Lack of forward planning is the principal cause of late and under-funded EIA processes

  The case studies suggest that there were three principal reasons for undertaking EIA in Tanzania:

  a) to fulfill donor guidelines (eg. teak plantation establishment in Kilombero valley; graphite mining at Merelani, Pangani Falls Hydropower);

  b) as a firefighting response to growing social conflicts (eg. pesticides manufacturing at Moshi);

  c) to meet existing EIA regulations of Tanzanian institutions (eg. TANAPA in the case of oil pipeline protection in Mikumi National Park and tourist lodge developments within the Serengeti National Park).

  In no case was the need for EIA foreseen or included in the original project documents. Thus, each EIA started late in the project development process. In almost all cases, proponents were reluctant to provide adequate resources for the EIA to be undertaken to a sufficient standard. The Pangani Hydropower study provides a classic example of how expensive EIA studies can have little if any effect on decision-making if undertaken too late in the project cycle.

- EIA processes generally finished 'too early'

  In most of the case studies reviewed, the EIA process ended with the submission of the EIS. In no case did EIA practitioner involvement continue during the implementation or post-completion stages of the project. Post-completion monitoring seems to be particularly poor in this respect. The EIAs undertaken within the national parks are the only[10] examples where compliance monitoring continues (based loosely on the recommendations of the EIA).

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[10] Most recently, the EIA process for the Kihansi Hydropower Project contains a provision for five years of post-project monitoring.

Table 4.5: Timing and duration of the EIA process: summary of findings

1. Teak Plantation Establishment, Kilombero	Preliminary EIA study commenced at an advanced stage in project design. However, pEIS submitted well before design was completed and before project implementation. The pEIS process was undertaken intensively during a 1 month period, involving a team of around 8 specialists.
2. Pesticide Manufacturing, Moshi	The preliminary EIA was undertaken after plant designs had been decided upon, buildings and infrastructure established, machinery installed and the plant ready for commissioning.
3. Graphite Mining, Merelani	EIA study undertaken after the design of the plant and mining operation had been finalized.
4. Hydropower Redevelopment, Pangani Falls	EIA studies were initiated late in the project cycle. Designs for redevelopment were largely completed prior to the start of environmental assessment studies. Some studies were not prepared until after construction had begun. Time constraints imposed on the EIA team meant that studies were reportedly 'rushed'.
5. Oil Pipeline Protection, Mikumi National Park	The EIS was prepared after project designs had largely been finalized, but prior to the construction of the Cathodic stations. The EIA was prepared over a 40 day period, drawing on expertise from 2 specialists.
6. Tourist Development (Serengeti – Serena), Serengeti National Park	The EIS was prepared after project designs had been completed and shortly before construction started. The EIA process was severely constrained by time limitations imposed on the EIA team – only 2 days of field time were available to the practitioners.
7. Tourist Development (Grumeti), Serengeti National Park	As 5 above

4.4.4 Public involvement

- Public involvement in EIA has been minimal in Tanzania

  (see summary in Table 4.6)

  With one exception, the case studies indicated minimal public involvement. Where some form of public involvement was addressed, this was always superficial and the techniques used were extractive, rather than characterized by dialogue. There were no examples of the use of participatory (ie. two way dialogue) approaches.

- Public involvement can improve project design and success.

  The Kilombero Valley Hardwood Project provides an example (albeit limited) of how public involvement can actually improve project design and sustainability, and lead to more positive working relationships with local people.

Table 4.6: Stakeholder involvement: summary of findings

1. Teak Plantation Establishment, Kilombero	This preliminary EIA included discussions with all key stakeholders, including government departments at central, regional and district levels, NGOs, village visits and the proponent organization. The results of these discussions led to some changes in project design, including the establishment of a locally-controlled social fund.
2. Pesticides Manufacturing, Moshi	EIA prepared in response to public outcry over siting the plant within a residential area. The EIA process (reportedly) did not involve significant levels of stakeholder involvement. No evidence was presented in the EIS of (local) public involvement in the process.
3. Graphite Mining, Merelani	The EIS makes brief reference to a visit of the consultants to two local villages but does not indicate what questions and issues were discussed. The extent to which those consulted were aware of the objectives of the EIA process, or the scale or design details of the proposed project, is unclear. No references were made in the EIS report to the views expressed by the local communities, nor to the influence of those views in shaping the content of the EIS. With the exception of a reference to consultation with the village/ward government, there appeared to be limited involvement of other stakeholders. Such limited local 'involvement' does not appear to have influenced the design or operation of the mine.
4. Hydropower Redevelopment, Pangani Falls	A small sample of local villagers around the dam site were consulted. Stakeholders, such as water users and fishing communities upstream and downstream of the dam, were not consulted.
5. Oil Pipeline Protection, Mikumi National Park	TANAPA and TAZAMA were consulted as part of the study, although surprisingly, their views and contributions are not outlined in the EIS. The study did not involve the tourist industry (most of the impacts predicted were aesthetic), and no mention is made of other governmental stakeholders.
6. Tourist Development (Serengeti-Serena), Serengeti National Park	With the exception of TANAPA, there was no stakeholder involvement in the EIA. Time constraints prevented the EIA team visiting local settlements in areas outside the park from which stone and aggregates were extracted. The study did not include involvement of the tourist industry (most of the impacts predicted were aesthetic), and no mention is made of other governmental stakeholders.
7. Tourist Development (Grumeti), Serengeti National Park	As above

- **Omitting public involvement can add to project costs**

  The graphite mine at Merelani is a classic example of a situation in which a proponent omitted to deal seriously with claims and opposition expressed by local, artisanal mine operators. The environmental assessment process provided a golden opportunity to address this issue,

and work towards agreements, perhaps based on benefit-sharing agreements. Unfortunately, the EIA was a missed-opportunity. Simmering tensions then led to recurrent and violent conflicts. This also imposed substantial additional costs on the commercial mine in the form of security arrangements.

- Local stakeholder involvement in compliance monitoring has not been encouraged

  There do not appear to be any EIA processes in Tanzania where local institutions or people have been involved and empowered to help monitor and evaluate the impacts of implemented projects (a technique known as *participatory monitoring and evaluation*).

5 Discussion and conclusions

5.1 Changing perceptions of the role of EIA

From its beginnings in the United States, when introduced as a result of the National Environmental Policy Act of 1969 (NEPA), EIA has always been viewed as a predictive and systematic process. Its focus traditionally has been seen (and to some extent still is – see Wood, 1995), as addressing *major* projects. Increasingly, the role of EIA is being re-defined. More attention is now given to the assessment of small and community level projects and, in the upstream direction, to assessing plans, policies and programmes (through strategic environmental assessment – SEA). Many people now view the role of EIA simply as a 'provider of information' for decision-making. Others perceive its function as a mechanism for improving accountability in planning and decision-making, and for providing an opportunity for stakeholder involvement. Carbon (1995) argues that one of EIA's key roles is to remove the 'odium' of defending decisions which are made 'before stakeholders have had a say'.

Increasingly, EIA's effectiveness in fulfilling these 'multiple roles' depends not only on the soundness of the techniques used to gather such information, which has long been a preoccupation of impact assessment research, but also on the interaction between the EIA process, key stakeholder groups and decision-making mechanisms.

The wider policy question that this study[1] seeks to address is whether EIA is being applied in a way that is relevant to decision-making processes in developing countries. Critics argue that EIA is essentially a 'developed world' concept, designed and tailored for formally regulated planning contexts, and not necessarily applicable, nor adaptable, to the very different means of planning and governance that prevail in many developing countries. Many developing countries lack the robust planning frameworks, institutions, and human and financial resources which are generally thought critical for effective EIA (Ebisemiju, 1993). Indeed, recent and influential guides to EIA practice have emphasized technical 'tweaking' and have underplayed the importance of the policy, institutional, legislative and political context in which EIA is supposed to perform in developing countries

5.2 Has EIA been effective in Tanzania?

Our findings show that EIA has had very little impact on decision-making in Tanzania. In most cases, EIAs were extremely late in starting, under-resourced and generally omitted to involve other stakeholders to any meaningful extent. Most focused on outputs and paid little attention to process. There were few examples where dialogue between EIA practitioners and proponents led to design modifications before the submission of the EIS. In most cases, the EIS did not define, cost and integrate environmental management into project design, and few defined compliance responsibilities. Perhaps not surprisingly, compliance with the recommendations of EIA has been the exception rather than the rule. Consideration of alternative project options was often absent, or extremely weak, and there were no examples where EIA had seriously considered cumulative impacts. In one example, cumulative impacts that were not addressed by an EIA process eventually contributed to undermining the

[1] As the first of a series of country case studies

performance of a major hydropower development project. In many cases, it appeared that the EISs were appearing to justify project selection and design. Furthermore, there is a considerable body of opinion, particularly prevalent amongst the private sector and within senior tiers of government, that views EIA in its conventional form as an impediment to much-needed development. This is perhaps a reflection of EIAs being 'imposed' by donors, and/or the late start to many EIAs, which then become a 'problem' when they belatedly call for design changes.

The study found no evidence that donor agency-supported EIA processes, which often harnessed international consultants, and used donor guidelines, led to more effective EIA. This appeared to be because donor interest in the process generally dissipated once the EIS had been prepared and internal agency needs had been fulfilled. The study found no examples where donor agency interest extended to ensuring EIA recommendations were adhered to during implementation, post completion or audit phases of the project. Hence, donor agencies have failed to learn from their own experience with environmental assessment in Tanzania. Further, desk officers and other in-country agency staff could generally say little if anything about the performance of the EIA processes they had commissioned.

5.3 Is EIA effective elsewhere?

Determining the degree of influence of EIA on decision-making is inherently difficult, since many other factors exert influence on decision-making. These include political, financial and economic considerations. Despite these difficulties, determining the impact of EIA on decision-making, at least in indicative terms, remains a crucial issue, and becomes more so as interest grows in the process, and as greater faith is invested in its perceived powers. Most previous studies (eg. Sadler, 1996) have relied upon 'soft indicators', particularly interview and questionnaire surveys with EIA 'insiders'[2], rather than empirical studies. In general, these support the view that the benefits of EIA outweigh the costs, but often refute the view that EIA has any tangible effect on decision-making itself – as manifested in design changes, cancelled projects, selection of alternatives, *etc.* Heuvelhof and Nauta's (1997) study of the effect of EIA in the Netherlands provides a notable exception. They found that 79% of EIA processes directly impacted[3] on decision-making processes. Few studies have focused on practice in developing countries, where the policy and legislative context is often very different from that of developed countries.

Wood (1995) has examined attitudes and opinions of EIA professionals (as an indicator of EIA effectiveness) in relation to seven 'mature' EIA systems[4]. In the cases examined, EIA was perceived as contributing a number of benefits, such as improved coordination between government agencies (eg. UK), and changes in behaviour of EIA 'stakeholders' (eg. Canada, UK and to a lesser extent, Australia). However, only limited evidence of positive impacts on decision-making could be found (see Box 5.1). The Californian EIA process was found to be a notable exception, where EIA appeared to influence decision-making considerably – in large part because of the diligence and commitment of

[2] Taken here to mean those with a vested interest in EIA, such as EIA consultants, certain academics, and EIA process and policy managers.

[3] Note that the term 'impact' is defined considerably more loosely than in this study. Heuvelhof and Nauta define impact as '...if the EIA influences the actions of the actors involved and/or the concepts these actors have'.

[4] United States of America; California; United Kingdom; The Netherlands; Canada; Commonwealth of Australia; and New Zealand.

environmental groups, and the litigation powers available to them. Evidence of influence over decision-making was also cited for New Zealand. For the United States, United Kingdom and the Netherlands, respondents cited a lack of any 'hard' evidence that improvements in decision-making had actually occurred. An earlier study by Bear (1988) also found very little empirical evidence of the effect of EIA on decision-making in the USA. Clarke (1993) comments reflectively on the successes and failures of extensive EIA experience in the USA:

> *'Certainly, many environmental impact statements (EISs) are too long, take too long to prepare, cost too much, and many times do little to protect the environment. Some EISs are prepared to justify decisions already made, many agencies fail to monitor during and after the project, some agencies do not provide adequate public involvement, and few agencies assess the cumulative effects of an action.'*

Box 5.1: EIA effectiveness and future directions

Optimistic assessments of EIA effectiveness have provided the basis for current thinking on future directions of EIA. For example, a recent (and highly influential) international study on the effectiveness of EIA (Sadler, 1996) recommended a three-point framework for 'sharpening' EIA as a sustainability instrument, by:

- staying within source and sink capacities;
- undertaking full cost analysis of natural capital stock to determine impact acceptability; and
- applying in-kind compensation for all residual impacts to meet the 'no net loss rule.'

These recommendations implicitly assume that developing economies can afford to implement or manage such ambitious and optimistic recommendations in the short term, so that they can reap their benefits in the longer term. They also assume that EIA has 'proved itself' to be an effective instrument of change in development planning. Indeed, resources are now being made available to extend EIA principles to policy, plans and programmes, through the development of strategic environmental assessment (SEA).

In the southern context, where mechanisms for governance, development planning and implementation are often very different from those of the countries where EIA has long been an established part of the planning and development process, performance assessment studies are particularly lacking.

Table 5.1: Evidence of EIA influence on decision-making (adapted from Wood, 1995)

Jurisdiction	Empirical evidence for improved decision-making?	Professional 'perceptions'
United States	One study indicates that the impact of EIA on decision-making has been minimal.	Virtually unanimous view amongst key stakeholders that benefits of EIA exceed its substantial time and other costs
California	Many projects modified, and some projects stopped as a result of legal actions under California Environmental Quality Act – CEQA (which provides the legal basis for EIA).	Cost and time requirements high, but outweighed (for most participants) by improved project mitigation measures. Changes of attitude among local politicians do not seem to have occurred. Success of EIA attributed to litigation powers and the diligence of environmental groups.
United Kingdom	Little evidence that EIA has altered outcomes of decisions.	Consensus (but not unanimity) as to utility of EIA in improving project mitigation measures
The Netherlands	No empirical evidence to prove that EIA has altered the outcome of decisions, especially if measured in terms of project cancellations[5].	Virtually unanimous belief that the benefits of EIA outweigh its financial and time costs. EIA thought to have 'changed the behaviour' of EIA stakeholders.
Canada	Quality of some projects generally thought to be better as a result of EIA. Whilst some projects have been abandoned as a result of EIA, main benefit is seen as mitigating the environmental effect of proposals.	Costs and (especially) time requirements often high. Significant mitigation has occurred. Benefits of initial assessment less clear.
Commonwealth of Australia	Empirical evidence difficult to obtain.	Complaints about uncertainties and delays generally outweighed by belief that EIA delivers real benefits.
New Zealand	None available	Virtual unanimity of view that benefits of EIA system outweigh costs but considerable unfamiliarity remains.

5.4 Impacts on decision-making

Impacts on decision-making can only be defined meaningfully in relation to the roles that EIA is supposed to perform. The multiple roles discussed in section 5.1 (above) complicate this process. Furthermore, to avoid ambiguity in the interpretation of results, it is important to be clear about what we mean by *impact*. This study recognizes *indirect* and *direct* impacts.

[5] Note that this study preceded Heuvelhof and Nauta (1997).

Examples of indirect impacts of EIA on planning and project implementation include:

- a change in attitude or organizational culture attributable, at least in part, to a specific EIA process;
- the stimulation of public debate on environmental and social issues arising from the EIA of a development proposal;
- an improvement to institutional learning; and
- the exposure of individuals or technical agencies to environmental or social issues which they might not otherwise have been required to address.

Sadler (1996) cites evidence from surveys of EIA practitioners worldwide (although mainly from developed countries with mature EIA systems) that supports the argument that EIA makes an important contribution to improving awareness of environmental concerns. He cites survey returns that indicated that 89% of respondents believed that EIA had contributed to significant or moderate improvements in environmental awareness. A recent review of NEPA performance in the United States (cited by Cohen, 1997) found that:

> "Agency managers who have learned to use NEPA have discovered that it helps them to do their jobs. It can make it easier to discourage poor proposals, reduce the amount of documentation down the road, and support innovation"

Examples of direct impacts of EIA on planning and project implementation include:

- an alteration to the way in which a development project is planned and implemented;
- a decision *not* to proceed with a project where the EIA has identified potentially significant environmental and social impacts; and
- a decision to adopt alternative approaches or project designs to achieve objectives as a result of alternative design options identified by the EIA.

5.4.1 Indirect impacts

To date, approaches to environmental assessment in Tanzania have not been conducive to institutional learning – around 80% of EIAs have been commissioned and funded by external development assistance agencies; 70% of them have been undertaken by international consulting companies, and nearly one quarter of all EIAs failed to draw upon Tanzanian expertise to any extent whatsoever. Furthermore, in the absence of clearly defined institutional responsibilities for EIA, there is rather little capacity to absorb and retain experience that has been gained. This problem is compounded by frequent staff changes in government agencies, which means that those who have had the opportunity to develop expertise in EIA through training courses (often elsewhere) or through involvement in EIA processes, are often re-allocated to different government positions.

There were clear indications that in the few circumstances where an EIA regulatory framework exists in Tanzania (such as for most protected areas), the EIA had stimulated a more structured approach to addressing environmental and social issues by private sector proponents. Further, there was a belief that EIA had provided a useful framework for defining rules and working relationships between those responsible for environmental management, and private sector proponents. Two recent examples indicate that EIA processes can provide a useful focus for debate on the social and environmental implications of development. This helped raise awareness of issues thus far unfamiliar to most people in Tanzania.

Nonetheless, the study revealed a number of examples where EIA had contributed to more constructive and longer term changes in attitudes to environmental management. For example:

- EIA was cited as having contributed to improving the way a major private sector development agency (albeit a foreign company) addressed environmental and social concerns, not only for the specific project concerned, but also by stimulating an important internal debate. This in turn stimulated a change in the 'culture' of decision-making within the organization, which resulted in more attention being given to integrating social, environmental and development considerations with economic objectives (see case study 1);
- The Tanzanian National Parks Authority (TANAPA) cited EIA as having improved environmental awareness amongst private sector proponents within the national parks, and this had contributed to more positive working relationships between TANAPA and proponents.
- An EIS prepared for a major aquaculture development proposal for the Rufiji Delta helped stimulate a vibrant public debate which involved local farmers and fisherfolk, various government agencies, academic institutions and development assistance agencies. In this case, the public review process for the environmental impact assessment statement provided the focal point for this debate (see box 5.2).

Box 5.2: Prawns and protest? EIA as a focus for debate in the Rufiji Delta

A key role of EIA is to stimulate discussion and provide a focus for debate. For EIA to perform this role effectively, there must be opportunities for public review, comment, and discussion. The EIA process for a proposal to develop commercial aquaculture in the Rufiji Delta provides a good example in Tanzania. In this case, an EIA was commissioned by the project proponent – a commercial fisheries company – in reaction to growing concern over the potential social and environmental issues that could result from the proposed development (this included plans to alienate a large proportion of the Rufiji Delta for commercial shrimp production). The EIS concluded that the project should 'proceed as planned' (Boyd, 1996). The EIS was made available for public review, and attracted comments from local people, academics, development planners and non governmental organizations. Many viewed the EIS as being biased in favour of development (see Box 4.4), questioned the level of public involvement in the EIA process, and identified a number of important technical deficiencies (Fottland and Sørensen, 1996; Hughes, 1996). The review process contributed to an improved level of awareness of the project, and its potential implications for the people and environment of the Rufiji Delta. An important public debate had started. In response to growing concerns, the Government of Tanzania requested a second and more detailed EIA (AFC, 1997). The second EIS was made available for public comment, provided the focus for detailed review by a specially-appointed expert panel, and was the subject of a heated public hearing. Each of these review components identified important technical, environmental and economic discrepancies. Despite the massive local and international outcry over the proposals, the government decided to approve the project (*Daily News*, 2nd December 1997). Nonetheless, further EIA processes will now be expected to meet much higher standards.

5.4.2 Direct impacts

Direct impacts were elucidated through discussions and interviews with project

managers, EIA practitioners and other EIA stakeholders; and through the review of documentary and literature sources. The conclusion is that EIA has thus far had only a marginal direct effect on project design, planning and implementation in Tanzania. There are, however, some limited signs for optimism.

The review shows that, of the 26 examples reviewed as part of the study, only seven proposals subjected to EIA were subsequently implemented (all of these were reviewed in detail by this study). Of these seven projects, EIA directly influenced project design and/or implementation in only one case, and in this case, only to a rather limited extent. Of the remaining 19 projects, two projects remain the focus of ongoing review, largely because of issues raised by EIA. In the remainder of cases (ie. projects for which EIAs were commissioned, but which were subsequently not implemented), EIA appears to have played no part in decisions not to proceed[6]. Hence, of the 26 EIAs reviewed in this study, only three have tangibly influenced decision-making, and two of these may yet proceed in much their original form.

5.5 What factors influenced degree of impact?

Answering this question was one objective of the International Study of the Effectiveness of Environmental Assessment (Sadler, 1996). The effectiveness study tried to explore the issue through a questionnaire survey of members of the International Association of Impact Assessment (IAIA) and other government and development assistance agencies. Amongst those conditions found to support effective EIA were:

- a sound legal and policy basis;
- the existence of thorough procedural frameworks;
- the existence of compliance requirements; and
- the existence of effective public involvement mechanisms.

This is not a comprehensive list of considerations and, to some extent, provides an interesting reflection of conditions perceived as important by the respondents to the questionnaire, which were dominantly individuals with experience from industrialized countries[7].

In Tanzania, it proved extremely difficult to distinguish between the different factors involved. In most cases, more than one factor appeared to influence the performance of the EIA process. For example, most of the EIAs reviewed had been initiated very late in the project cycle. In each of these cases, this appeared to play an important part in the poor performance of the EIA processes, but other factors invariably contributed or exacerbated performance issues.

- Time of initiation

Evidence from around the world clearly demonstrates the importance of initiating the EIA process as early as possible in the project cycle, and continuing environmental assessment activities throughout implementation and into post-completion (WRI, 1995; Sadler, 1996; CEQ, 1997). A recent review of 25 years of experience of NEPA (CEQ, 1997) found that:

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[6] For comparison, Heuvelhof and Nauta (1997) reported a figure of 3% for cancelled projects as a direct result of EIA in the Netherlands.

[7] Most of the membership of IAIA source from North America, Europe and Australia; and most of the institutional respondents to the questionnaire were from the industrialised countries.

"[EIA]... is often triggered too late to be fully effective... By the time an environmental impact analysis is started, alternatives and strategic choices are foreclosed."

Heuvelhof and Nauta (1997) found a clear link between the stage at which the EIA process was triggered, and its impact on decision-making. Their work demonstrates that, where EIA was introduced early, this gave time for the EIA team to develop links with the project development process, and provided room to find solutions which served to improve both environmental and project performance.

In Tanzania, EIA almost invariably started too late to influence significantly project design, by which time most key decisions had already been made. In these circumstances, EIA became perfunctory, and performed either a 'reactive' or a 'firefighting' role (see box 5.3).

Our case study analysis identified only a limited amount of evidence of 'positive' effects of the EIA process. In the only case study where EIA was initiated at an early stage of the project cycle[8] (Kilombero Valley Teak Development Project), this led to the adoption of significant changes to project design and implementation practice. Significantly, this was also the only project that exhibited a commitment to complying with recommendations for mitigation and monitoring. In all other case studies reviewed, EIAs had been undertaken at a stage of project development that left little or no scope for substantive alterations to project design to be given serious consideration. Furthermore, in nearly all cases, the EIA process ceased at or before decision-making, a finding that seems to be consistent with EIA experience elsewhere[9].

In most cases, we found that the need for an EIA was not recognized until project designs had largely been finalized. There were three categories of reasons for this:

- *Poor project planning and management:* Often, proposals prepared with support from donor agencies were presented formally for approval without prior thought being given to the need for an EIA. Donor agencies then responded, sometimes after prompting from their head offices, by requesting the preparation of an EIS, often to satisfy their own internal EIA guidelines. Since project designs were usually at an advanced stage by the time they were presented to donor agencies, there was little scope to introduce new design ideas or alternative approaches existed. The EIA essentially became a rubber stamp process;
- *Lack of awareness of existing EIA requirements*: Proponents for lodge developments within the national parks became aware of the need for EIA only after designs had been completed, and key decisions – such as those concerning siting – had been taken. This was also the case for several donor supported projects (eg. the graphite mine at Merelani).
- *Public concern*: Two EIAs appear to have been undertaken to allay growing public concern over the environmental and social implications of development proposals. In both cases, project development plans had proceeded to an advanced stage, before the EIA was started.

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[8] This refers to projects that were subsequently implemented.

[9] A recent global survey of EIA professionals found that most felt that post-decision phase EA activities fell well short of sound practice (Sadler, 1996)

Box 5.3: Reactive and firefighting EIA processes in Tanzania

- *Reactive EIAs* were undertaken to comply with legal or administrative obligations. Often these were undertaken to secure the release of project development funds or development approval. The case study of the graphite mine at Merelani (case study 3) is a clear example of the former, where the EIA was undertaken after the project design had been completed and a release of funds was required from the African Development Bank – for which an EIS was a required. EIAs for lodge developments within Serengeti National Park (case studies 6 and 7) also fall into the latter category, where EIA studies were invited after project design had largely been finalized (including size, siting, building design) in order to comply with a request from TANAPA. The EIA processes for both developments were compromised by time and financial constraints, and based on field visits of one day each. Not surprisingly, they were found to have only marginally influenced project design and implementation. For all three projects, proponents felt that the EIAs were perfunctory and were undertaken simply as a means of overcoming a bureaucratic obstacle. Not surprisingly, the operational managers were largely (in one case, completely) unaware of the content of the EIS document, and had implemented few, if any, of the recommendations in the EIS reports.
- *Firefighting EIAs* were undertaken under two scenarios. Firstly, to 'smother' emerging opposition or disquiete from local communities or other stakeholder groups. They can sometimes be successful in achieving this objective, but the tactic has also backfired in Tanzania. Under the second scenario, the EIA can fan the flames of conflict, and this has happened on at least one occasion. The case study of the Moshi Pesticide Plant provides an example of the first scenario. Here, construction of the plant had actually been completed, but there was growing disquiet amongst the people of Moshi town since the plant had been constructed close to residential areas. This forced the proponent to explore mechanisms to allay community fears and hostility. An EIS was prepared and, despite the absence of any tangible level of public involvement, or any response by the plant operators to the recommendations of the EIS, public protest and disquiet (which at one stage had succeeded in bringing legal proceedings against the proponents) simply ebbed away. In this case, the EIA appeared to stall and deflate public opposition, even though the EIA process had no tangible effect on the siting, design or operation of the plant.

  The EIS for a shrimp development project in the Rufiji Delta is an example of the second scenario. The first version of the EIS appeared to have been prepared with a view to convincing local people, planners and decision-makers alike of the merits of the proposed project, whilst paying little heed to serious concerns of social, environmental or sustainability concerns. In this case, the EIS succeeded only in fanning the flames of conflict. Attention focused on the sub-standard quality of the EIS. A second EIA process followed which attracted further attention, which eventually led to heated debate and the 'shelving' of the project, at considerable cost to the proponent (see Box 5.2).

- Process orientation

Surprisingly little attention is given to the importance of *process* in the mainstream EIA literature. In developing countries, EIA regulatory frameworks are often weak or absent, and capacity to implement recommendations for mitigation and environmental management is often

severely constrained. Thus, ensuring that EIA teams work closely with project design staff offers an important opportunity to enable and encourage project proponents to take on board environmental and social considerations.

The analysis in Chapter Four shows that very little attention has been given to process orientation in Tanzania. In most cases, the production of the EIS appeared to be viewed as the end in itself. In all case studies reviewed, the EIA process ended with the submission of the EIS. In most cases, EIA processes started too late, and thus reduced opportunities for interactions to occur between EIA practitioners and project design and implementation teams – there were no examples of EIA practitioner involvement continuing during the implementation or post-completion stages of the project. The high proportion of EIAs studies which were actually *preliminary* in nature (63%) is another indicator of this deficiency. Where close working relationship between the EIA team and the project design team were given a chance to develop, the proponents were much more willing to adapt the project design to minimize environmental and social costs and optimize environmental and social benefits.

- Resource availability

Time and budget restrictions are considered widely by EIA practitioners to be significant constraints to EIA 'best practice'. From a proponents perspective, EIA is often perceived as imposing delays on project development and they are understandably keen to impress the need for quick results. Wood (1995) found that delay was one of the most important criticisms leveled at EIA in a range of different countries with mature EIA systems.

Experience has shown that the financial cost of undertaking an EIA is usually a small proportion of total development costs – usually less than 1% of project costs and often less than 0.1% (Mercier, 1995; Cohen, 1997, see Table 5.2). Moreover, this investment can often save considerable costs at a later stage of a project cycle.

Table 5.2 : EIA costs as a proportion of total project costs: experience from World Bank-supported projects (Mercier, 1995)

Project type	Cost of Environmental Assessment (thousand US$)	Project cost (thousand US$)	% of total project costs
Thermal Power Generation Development, Ghana	*250*	*400,000*	*0.06*
Forest Management, Tanzania	*131*	*26,000*	*0.5*
Energy Sector Development, Kenya	*510*	*1,000,000*	*0.05*
Energy Sector Development, Malawi	*180*	*231,300*	*0.08*
Petroleum Industry Development, Guinea Bissau	*20*	*20,000*	*0.1*

In Tanzania, EIA costs are considered a burden, and proponents tend to opt to avoid or minimize incurring such costs. Importantly, however, the shortage of funds available to the proponent may not be the most important reason why so few resources are actually devoted to EIA. The case studies suggest that a more important factor is the late stage at which the need for EIA is actually foreseen. This results in there being little time available in which to undertake an adequate EIA and to disperse the funds that 'should' have been used for environmental assessment (and also leaving little scope for real changes to project design to be negotiated). The 'quick-and-dirty' EIAs that tend to be commissioned in these circumstances also tend to be cheap and ineffective.

Stakeholder and public involvement

There is a growing consensus that well-structured, timely and broad-based stakeholder involvement is a vital ingredient for effective environmental assessment. EIAs that successfully involve stakeholders tend to lead to more influential environmental assessment processes and, consequently, to development that delivers more environmental and social benefits. Conversely, EIAs that fail to be inclusive tend to have less influence over planning and implementation, and consequently result in higher social and environmental costs.

In Tanzania, stakeholder involvement in EIA, particularly of local communities and their representatives, has been minimal. Views expressed during the inception workshop clearly indicated strong support for the principal of stakeholder involvement in EIA. This is extremely encouraging. Yet interviews undertaken as part of this and earlier studies (IRA/IIED, 1995; Guilanpour, 1995) suggested that negative attitudes to stakeholder involvement (particularly public involvement) are still prevalent amongst policy-makers, proponents and EIA practitioners, who often view local communities as 'ignorant' and unable to contribute usefully to planning and decision-making. Socio-cultural issues were also commonly cited as reasons why local people are not, or should not, be involved in EIA. Negative attitudes towards the involvement of local people in planning matters, which conventionally are considered as the preserve of 'experts', present a formidable barrier to making the transition to the more participatory approaches to EIA which are now common in many other countries.

Stakeholders (both local and non-local) were marginalised from the EIA process by one or a number of different ways:

- by *denying access to the EIA process* – either by simply not talking with other stakeholders, by not promoting awareness of proposed projects or the EIA process, or by viewing local stakeholders simply as sources from which to extract information. Combined, this accounted for 90% of all EIA processes undertaken in Tanzania;
- *by denying local people access to the findings of the EIA process*, for example by not making EISs or executive summaries available for consultation in project localities; by not providing language summaries in Swahili or other local languages – less than 8% of the EISs included a Swahili version of the executive summary; by failing to hold public meetings – less than 10% of all EIA processes held public meetings to discuss the findings of the EIA process; or by omitting to use non-written communication methods to disseminate findings where levels of illiteracy are high – all but one EIA relied solely on written communication methods.

- *by arguing that EIAs are 'confidential'* or the *'property of the proponent'* and hence refusing to release the EIS for public consultation; and
- *by omitting to report the views and perceptions of local people* in the EIS and/or omitting to explain the extent to which local or non-local stakeholder views had been incorporated in to the EIS and/or project design. This proved extremely common in the sample of EISs reviewed.

A number of examples illustrated the dangers of not involving adequately all major stakeholder groups. For example, the EIA for the graphite mine at Merelani (case study 3) failed to gauge the level of discontent amongst local communities and artisanal mining groups. Discontent eventually erupted into violent conflict and the marginalisation of local people, and meant that the proponent had to invest heavily in security arrangements to secure the mining site from periodic invasions. The EIA for the Hydropower Redevelopment Project at Pangani omitted to explore the views and seasonal levels of use by water users upstream of the dam site. This led to an over-estimation of the amount of dry season water availability, and hence to project under-performance when set against the original design specification. Subsequent efforts to introduce water pricing in the catchment to reduce dry season water demand then led to conflicts with water users.

More recently, a proposal to develop a massive prawn farm in the Rufiji Delta led to massive local and international opposition. The original EIS, which omitted to adequately gauge local opinion, implied that the environmental and social impacts would be insignificant, and that the project *'should proceed as planned'*. Clearly, this view was not shared by a significant proportion of the people of the delta, and the proponent was forced to prepare a second, and more detailed EIS. Once again, public involvement was somewhat limited until a heated public hearing provided an opportunity for the people of the Rufiji Delta (and other interest groups) to vent their views.

Whilst rare, there are some recent examples of good practice, which provide grounds for encouragement. Box 5.4 provides one example from Northern Tanzania.

Box 5.4: Local involvement in an EIA for road upgrading in Northern Tanzania

An EIA study assessed the potential impacts of upgrading a road in northern Tanzania, the principal purpose of which was to improve tourist access to Lake Manyara National Park, the Ngorongoro Conservation Area, and Serengeti National Park. The road traverses areas considered extremely important for wildlife and tourism, but is also extremely important for agricultural and pastoral livelihoods. The study followed World Bank guidelines (as defined by the Bank's operational directives) for environmental assessment practice. Involving different stakeholders became a strong focus of the EIA, and this required the adoption of a range of different tools and approaches. The environmental assessment included a programme of village-level public meetings in the impact area. The executive summary of the draft EIS was translated into Kiswahili and circulated widely before a series of additional public meetings was convened to focus on potential impacts and mitigation strategies. Pro-active attempts were also made to seek contributions from other stakeholders, using interviews, questionnaires and direct appeals for submissions. These succeeded in involving several stakeholder groups: government officials at national, regional and district levels; heads of government institutions in the study area; tour operators; and NGOs and other public groups.

Existing policy/regulatory framework

In the absence of national level EIA legislation, developments within the national parks, which fall under TANAPA's EIA policy and guidelines (TANAPA, 1993; 1994), provide the only opportunity to explore the potential of a statutory EIA framework in Tanzania. For this reason, three case studies from the national parks were selected for analysis. Prior to the introduction of EIA in national park policy, a number of proposals for tourist developments within the national parks were given permission by the Government of Tanzania, despite substantial opposition from TANAPA and other interest groups. The poor environmental performance of these lodges and consequently, poor relations between TANAPA and the lodge operators, has firmly convinced TANAPA of the potential value of EIA (Box 5.5). EIAs for several projects within the national parks have now been undertaken, including one for the installation of cathodic protection stations along the TAZAMA pipeline running through Mikumi National Park (case study 5), and for two lodge developments within Serengeti National Park (case studies 6 and 7). EIAs have been undertaken for the general management plans of a number of national parks (including Serengeti N.P., Tarangire N.P. and Kilimanjaro N.P.).

Box 5.5: Key Lessons from TANAPA's Experience (based on case studies)

- Where an EIA system is backed by regulatory and compliance monitoring powers, as is the case in the National Parks, EIA can contribute tangible benefits. The existence of regulatory controls backed by the powers of sanction has been cited by TANAPA as an important reason why private sector proponents have adopted constructive approaches to managing environmental concerns within the national parks. To some extent, it is the existence of such powers, rather than their use, that has served this purpose.

- Where the 'rules of the game' are clear to all parties, and stakeholders are aware of their responsibilities regarding EIA, then this can lead not only to better decisions, but can enhance working relationships between regulators (in this case TANAPA) and private sector proponents.

- Where the environmental, social and economic benefits of sound environmental management can be clearly demonstrated, then proponents are more constructive and enthusiastic about the adoption of the EIA process, even if this does result in higher initial investment costs. In the case of the national parks, the need for developments to appear 'environmentally-friendly' to tourists and tour companies provides an added incentive for environmentally sound practice.

- The application of EIA upstream of the project level, for example for national park zoning plans and for general management plans, is still at an early level of development. However, there is great potential for EIA to provide a forum for addressing many potential problems associated with the national parks, not least, access rights to key resources (land, water, fuelwood, bush meat).

Power relationships amongst stakeholders

Throughout the field assessment component of the research, it became very clear that EIA implementation (or lack of it) was often severely compromised by unequal power relations between major private sector companies and the government. Most examples occurred where the potential existed for private sector companies to generate substantial short term profits, and where environmental and economic costs were externalized and not recognized as a responsibility of the project proponent. In such cases, proponents often justified

the use of coercive or strong-arm tactics as being in the national interest for reasons of foreign exchange generation. It is notable that those expounding such paternalistic views made no mention of the profits likely to be made by the companies concerned (usually foreign-owned), or the costs to be borne by government and other stakeholders. Whilst such 'frontier approaches' to development have sometimes clearly resulted in additional costs being imposed on the proponent, these are usually offset by the scale of potential revenues that can rapidly accrue from certain types of development.

Several examples of this category of development were reviewed by this study. Perhaps the most clear-cut were the construction of lodges by one company in the core areas of several national parks in northern Tanzania. None were subjected to environmental assessment and all faced strong and broad-based opposition, including from the Tanzania National Parks Authority (TANAPA). Each of these lodges was approved and caused significant (long-term) impacts on the ecology of the national parks, including concentrating high number of visitors in areas of particular ecological and aesthetic sensitivity. Ultimately, these costs will be borne not only by the ecological communities of the parks, but also by stakeholders in and around the national parks, including the National Parks Authority (eg. through higher costs for road repair, and ecological restoration) and other tour operators. Meanwhile, most of the lodges face significant and costly problems associated with waste disposal and water supply, but these are unlikely to threaten profits significantly.

The graphite mine at Merelani provides another clear example. The revenue-earning potential of the mine invested the proponent with considerable power to wield over the government, since a proportion of these revenues would return to government through levies and taxation. In this case, the proponent made it clear that they would be unwilling to accept conditions placed on, say, decommissioning (in this case, the EIA omitted to address site restoration and decommissioning). On a number of issues, it became clear that commercial considerations prevailed over important social needs or sound environmental management. The proponent's refusal to address these issues has led to significant social conflicts, and is likely to leave the government with a considerable financial burden for decommissioning and environmental restoration.

Commercial considerations did not always provide an insurmountable barrier, especially where power relationships were influenced by donor pressure to ensure that the EIA was taken seriously. The proponents of the Kilombero Valley Hardwood Project (CDC) showed a greater commitment to implementing the findings of the EIA than was evident for any other project reviewed by this study. This was partly a response to donor pressure.

Robust EIA legislation, if carefully framed, could contribute to redressing some of the more unbalanced power relationships, especially those between large private sector proponents, and government.

6 Policy implications

The policy implications outlined below are based around two 'take home' messages arising from the study:

- EIA performance in Tanzania thus far has been extremely poor, to the extent that EIA has had only a marginal impact on decision-making and planning;

  but:

- there are indications that EIA could contribute to greater consideration of environmental and social issues in development planning and decision-making, if the policy recommendations described below are implemented with vigour. Conversely, proceeding with the status quo is likely to contribute little, and environmental assessment will continue to deliver poor results – and continue to waste substantial financial resources.

Both government and development agencies can play an important role in supporting the transition to a more effective EIA system in Tanzania. Policy recommendations for each are outlined below. Some specific recommendations and options for addressing immediate deficiencies in EIA in Tanzania are outlined in Table 6.1.

6.1 Policy recommendations for government

Policy Recommendation 1 – Introduce robust legislation and supporting guidelines to 'set the rules' for EIA in development planning.

Experience in Tanzania's national parks – where EIA policy and guidelines exist – indicate that legislation, if backed by regulatory and compliance monitoring powers, can make an important contribution to effective EIA. Supporting guidelines should take account of the deficiencies identified by this review. For example, they should provide clear and unambiguous guidance on the type and level of stakeholder involvement required, specifying when the EIA process should be initiated; emphasize the importance attached to the consideration of alternatives; emphasize that the level of stakeholder 'ownership' of the EIA process should be clearly indicated; and that compliance responsibilities are clearly defined *and* agreed. Guidelines should also define the minimum level of interaction between different stakeholders relevant to the EIA process, including local stakeholders, the EIA team and the project proponent. Guidelines should specify the importance of compiling clear and concise terms of reference.

Box 6.1: Addressing resource constraints through EIA guidelines

The lack of adequate resources made available for EIA is one of the most serious constraints to EIA performance in Tanzania. Guidelines could help to address this problem by stipulating a minimum threshold level for the *proportion of project design time* or *overall project costs* which should be devoted to environmental assessment. Evidence from this review indicates that proponents tend to ensure that environmental assessment is accorded minimal resources. Currently, it is estimated that less than 3% of project design time is made available for environmental inputs and review and less than 1% of overall project costs.

Source: Stephenson, pers comm.

Policy Recommendation 2 – Quality control mechanisms need particular emphasis.

From a government perspective, investing in the development of a robust quality control mechanism is likely to represent money well spent. Quality control at all stages, from screening and EIA commissioning to EIS review and post-completion audit, needs to be institutionalized throughout the national EIA process. To achieve this will require clear institutional mandates, well-trained and motivated staff, and a high degree of consistency and transparency. Importantly, any quality control mechanisms must ensure adequate opportunities for stakeholder involvement and, where necessary, must pro-actively support such involvement.

Policy Recommendation 3 – Create an enabling environment conducive to high quality environmental assessment.

Four key components of the enabling environment require immediate attention. Firstly, greater awareness of the role of EIA, and expectations of what is expected of proponents must accompany the formal introduction of EIA in Tanzania. Awareness activities must also address the broad spectrum of misconceptions that currently exist concerning the role of EIA. Secondly, environmental management institutions required to manage the EIA process must be accorded clear and unambiguous objectives and be adequately resourced. Thirdly, EIA capacity-building will be urgently required. Target groups of particular importance in the short- and medium-term are staff responsible for managing the national EIA process. Fourthly, domestic capacity to undertake EIA needs to be stimulated. This can be achieved by encouraging government, donor and private sector organisations to commission EIAs from domestic rather than foreign sources.

Policy Recommendation 4 – Promote stakeholder involvement in the EIA process

The restricted evidence available to this study supports the view that higher levels of stakeholder involvement leads to higher levels of influence of an EIA on the decision-making process. This is compatible with findings from elsewhere (eg. Mutemba, 1995; World Bank, 1996). Guidelines and policy should support public access to the EIA process. Hughes *et al* (in press) provide examples of how this can be achieved. For example, scoping reports should include an analysis of the different stakeholder groups that should be involved in the EIA process, and should specify how this involvement should be achieved. These considerations should be codified in the terms of reference for each specific EIA study (see table 6.1).

Quality control mechanisms should be rigorous to ensure that the appropriate stakeholders have been involved in the EIA process to the appropriate level, and that evidence is presented to indicate the way in which stakeholder inputs have been integrated into project design. A public review phase should form an essential component of Tanzania's EIA framework. The use of supplementary external review can provide a cost-effective means of tapping expertise from experts and expert institutions.

Table 6.1: Specific recommendations and options for addressing immediate EIA deficiencies in Tanzania

Specific considerations for Tanzania	*Potential options and solutions*
Shortage of EIA management and review expertise within central government	• target future EIA training on EIA process management and review; • harness sources of expertise from outside government for EIA review (eg. from academic organizations, expert groups, non governmental organizations); • conduct regular in-house training courses in EIA review and EIA process management.
Restricted financial resources for EIA management	• identify cost-effective mechanisms for EIA review; • emphasize the importance of screening and scoping processes in EIA guidelines and procedures; • ensure clear and well-scoped terms of reference are provided for each environmental assessment process; • ensure that proponents are aware of quality requirements – compile and provide clear and explicit 'quality requirement' guidelines for proponents; • ensure that reporting responsibility lies with proponents, from project registration through to compliance reporting; • consider the introduction of minimum threshold levels for time or financial resources devoted to EIA (see policy recommendations).
Absence of national standards against which environmental performance can be judged	• use internationally accepted standards, such as WHO health guidelines for air and water quality; • prioritize the development of national guidelines in association with other relevant government agencies.
Poor coordination of environmental management and policy between government departments	• consider the adoption of an inter-departmental EIA review panel; • establish clear and explicit guidelines to guide governmental departments, and to clarify departmental roles and responsibilities in the EIA process
Low levels of stakeholder participation in project design and environmental assessment processes	• establish clear guidelines and minimum standards for stakeholder participation throughout the EIA process; • ensure review process specifically addresses stakeholder involvement; • ensure compliance to adequate level of stakeholder involvement in the EIA process, especially early in the project cycle.
Widespread corruption and influence peddling	• formalize the inclusion of external and independent comments in the review process; • adopt systematic review criteria and review procedures.
Variable or poor quality of national and international EIA practitioners	• support the establishment of a self-regulating professional association of EIA practitioners; • support and facilitate training of EIA practitioners; • introduce internal EIS review processes.

6.2 Policy recommendations for development assistance agencies

Policy Recommendation 1 – Review the application and performance of donor agency environmental assessment guidelines in Tanzania

Criticism of the performance of EIA in Tanzania has been voiced by representatives from a number of development assistance agencies. These criticisms are often somewhat hypocritical. Development assistance agencies, including United Nations, multilateral and bilateral organizations frequently fail to undertake environmental assessment of projects that they support. Furthermore, when they do so, they often fall short of applying their own guidelines to an adequate standard. Quite simply, development assistance agencies fail to set the examples of good practice that they advocate in wider policy circles.

Policy Recommendation 2 – Assist Tanzania in the development of robust and high quality EIA guidelines.

Development assistance agencies, through their expertise elsewhere, are well-positioned to assist Tanzania's efforts to develop and maintain an effective EIA framework.

Policy Recommendation 3 – Promote and encourage the use of Tanzanian expertise in EIA practice.

Frequently, development assistance agencies have relied too heavily on overseas expertise, leaving too few opportunities and incentives for the development of a domestic skills base for EIA. The exclusion or marginalisation of Tanzanian institutions from EIA practice has also constrained the development of institutional learning and memory.

Policy Recommendation 4 – Plan for long-term support of environmental assessment, including during implementation and post completion phases of the project cycle.

In almost all cases reviewed by this study, development assistance agencies have avoided involvement in monitoring and post-completion audit activities. In so doing, they have failed to learn much about the environmental and social performance of the projects they support. There is a clear role for development assistance agencies to support and learn from such activities.

Policy Recommendation 5 – Ensure that EIAs are provided with adequate resources to be effective.

Most EIAs undertaken in Tanzania have not been provided with sufficient resources to undertake an effective EIA process. Development assistance agencies could address this issue by including minimum threshold levels for the proportion of overall project design or total project costs that must be made available to EIA activities. Suggested levels might be 20-25% of project design costs, or 1.5% of overall project implementation costs.

Policy Recommendation 6 – Support EIA capacity development and information-sharing

There are a number of ways this can be achieved. The most effective is likely to be the integration of 'hands-on' training with 'real life' EIA processes. In this way, EIA capacity development costs can be integrated with project development activities. Support for national and regional-level training initiatives provides another means of assisting capacity development.

References

AGRA Earth & Environmental Limited (1995). *Environmental Update for the Tanesco Ubungo Generating Site Emergency Power Plant.* Report by for the Ministry of Water, Energy and Minerals, United Republic of Tanzania.

Barbier, E.B. (1987). The Concept of Sustainable Economic Development. *Environmental Conservation.* Vol: 14, No. 2; pp 101-110

Bear, D. (1988). Does NEPA make a difference? *EPA Journal* 14(1): 34-5

BICO (1993), *Environmental Impact Assessment of the Mine Development Project, Merelani Block "C", Kiteto District, Arusha Region.* Prepared for Graphtan Ltd. Prepared by BICO, Faculty of Engineering, University of Dar es Salaam, Tanzania.

Boyd, C.E. (1996). Environmental impact statement for *an ecologically-responsible shrimp farming project in the Rufiji Delta, Tanzania.* Prepared for the African Fishing Company Ltd., Dar es Salaam. 112pp.

Boyle, J. (1995). *Training Manual for Environmental Imapct Assessment in Zimbabwe.* Department of Natural Resources and Tourism, Zimbabwe. January, 1995.

Carbon, B (1995). *EIA-An Overview.* Australian Journal of Environmental Management (2) pages 62-64.

CDC (1991). *Kilombero Valley Hardwood Project, Tanzania. Feasibility Study.* Volume 1. Main Report; Volume 2, Financial Schedules; Volume 3, Background Information. Appendices. Commonwealth Development Corpration, London.

CEC (1993). *Report from the Commission of the Implementation of Directive 85/337/EEC and Annex for the United Kingdom.* COM (93) 28, Volume 12. Commission of the European Communities, Brussels.

CEEST (1993). *Environmental Impacts of Small Scale Mining: A Case Study of Merelani, Kahama, Nzega, Geita and Musoma.* Report prepared by Centre for Energy, Environment, Science and Technology (CEEST), Dar es Salaam.

CEQ (1997). *The National Environmental Policy Act: A Study of Its Effectiveness After Twenty Five Years.* Council on Environmental Quality, Executive Office of the President, Washington D.C. January, 1997.

Clarke, R. (1993). The National Environmental Policy Act and the role of the President's Council on Environmental Quality. *The Environmental Professional* 15: 31-49

Cohen, E.B. (1997). Setting the NEPA Record Straight. *NEPA News.* Vol. 2 (4). January-February, 1997. Published by NEPA Watch.

DEA (1992). *The Integrated Environmental Management Procedure.* Integrated Environmental Managament Guideline Series Nos. 1-6. Department of Environmental Affairs, Pretoria, South Africa (13pp.).

Department of Wildlife (1996). *Policy for Wildlife Conservation.* Revised Final Draft. Ministry of Natural Resources and Tourism. United Republic of Tanzania. April, 1996.

Dorais, M. (1993). The Challenge of Effectiveness. Paper to IAIA '93, Shanghai. International Association of Impact Assessment.

Earthcare Consulting Company Ltd (1995). *Final Report on the Environmental Impact of Refugees Influx in Ngara and Kibondo Districts*. Prepared for the National Environment Management Council (NEMC), Dar es Salaam, Tanzania.

Ebisemiju, F.S. (1993). Environmental Impact Assessment: Making It Work in Developing Countries. *Journal of Environmental Management* Vol. 38 (4), pp. 247-273

EPA (1996). *Environmental Assessment in Ghana. A Guide*. Environmental Planning Agency. December, 1996. 89pp.

Fottland, H and Sørensen, C. (1996). *Issues related to the establishment of prawn farms in Tanzania with an example from the Rufiji delta*. Catchment Forestry Report 96.4. Dar es Salaam, October 1996. 35 pages.

Gannett Fleming Inc. (1995). *Feasibility Study of Manyoni-Itigi-Tabora-Ipole-Mpanda-Kigoma Road*. Prepared for MoW, United Republic of Tanzania.

Gauff Ingenieure Consulting Engineers (1995). *Makuyuni-Oldeani, Ngorongoro Access Roads Study, Environment Impact Assessment*. Prepared for the Ministry of Works, Dar es Salaam, Tanzania.

Goodland, R; Mercier, J-R; & Muntemba, S (eds.) (1996).*Environmental Assessment (EA) in Africa: A World Bank Commitment*. Proceedings of the Durban, World Bank Worshop, June 25, 1995. The World Bank, Washington. D.C. May 1996.

Guilanpour, K (1995). *The Effectiveness of Environmental Impact Assessment in Tanzania*. A report submitted in partial fulfilment of the requirements for the Msc and DiC. Centre for Environmental Technology, Imperial College of Science, Technology and Medicine. University of London.

Halcrow (1992). *Madibira Rice Project, 2nd Draft Environmental Impact Statement*. Prepared by Sir William Halcrow & Partners in association with TANconsult Ltd. for National Food Corporation (NAFCO), United Republic of Tanzania.

HBT AGRA (1994). *Environmental Impact Assessment of the Songo Songo Gas Development Project*. Prepared for the Ministry of Water, Energy and Minerals (MWEM) by HBT AGRA Limited, for MWEM, United Republic of Tanzania.

Heuvelhof, E. and Nauta, C. (1997). The effects of environmental impact assessment in the Netherlands. *Project Appraisal* Volume 12 (1). pages 25-30.

Hitchcock, L. (1994). *Report on Exisiting Legislation Pertaining to Environment*. United Republic of Tanzania. May, 1994. 101pp.

Holmberg, J; Bass, S. and Timberlake, L. (1991). *Defending the Future: A Guide to Sustainable Development*. IIED/Earthscan, London.

Howlett, D.J.B. and Nagu, J. (1997). *Agriculture Project Planning in Tanzania*. Institute of Development Management Mzumbe, Tanzania and Development and Project Planning Centre, University of Bradford, United Kingdom.

Hughes, R. (1996). *Environmental Impact Statement for An Ecologically-Responsible Shrimp Farming Project in the Rufiji Delta, Tanzania : Some Thoughts*. Review report for the Institute of Resource Assessment, University of Dar es Salaam. 5 September, 1996.

Hughes, R, Mazzucchelli, S, and Dalal-Clayton, B (in press). *Stakeholder Involvement in Environmental Assessment: A Review of Issues and Approaches*. IIED Environmental Issues Series. IIED, London.

IEA (1990). *Environmental Statement Review Criteria.* Institute of Environmental Assessment, Lincolnshire.

IIED/IRA (1992). *The Environmental Impacts of the Proposed Kilombero Valley Hardwood Project, Tanzania. An Assessment of a Project Proposed by the Commonwealth Development Corporation.* Prepared for the Overseas Development Administration (ODA) by the International Institute for Environment and Development (IIED), London, and the Institute of Resource Assessment (IRA), University of Dar es Salaam.

IRA (1992a). *Environmental Impact Assessment of NORAD Funded Programmes in Tanzania. The Rukwa Integrated Rural Development Programme (RUDEP).* Prepared for the Norwegian Agency for Development Corporation (NORAD). Institute of Resource Assessment (IRA), University of Dar es Salaam, Tanzania.

IRA (1992b). *Environmental Impact of NORAD Funded Programmes In Tanzania. The Road Sector Programme.* Prepared for the Norwegian Agency for Development Cooperation. Institute of Resource Assessment (IRA), University of Dar es Salaam. Tanzania

IRA (1993a). *EIA of Cathodic Protection Stations in Mikumi National Park.* Prepared for the Tanzania-Zambia Pipeline Limited by the Institute of Resource Assessment (IRA), University of Dar es Salaam.

IRA (1994a). *Environmental Impact Assessment of the Ikwiriri-Somanga Road Project.* Report by the Institute of Resource Assessment (IRA), University of Dar es Salaam for Gauff Ingeniere, Dar es Salaam, Tanzania.

IRA (1994b). *Environmental Impact Assessment of the Serengeti Serena Lodge Project.* Prepared for Tanzania National Parks (TANAPA) by the Institute of Resource Assessment, University of Dar es Salaam.

IRA (1994c). *Environmental Impact Assessment of the Grumeti Serena Tented Camp Project.* Prepared for Tanzania National Parks (TANAPA), by the Institute of Resource Assessment, University of Dar es Salaam.

IRA (1994d). *Environmental Impact Assessment of the Tanzam Highway Rehabilitation Project.* Report for Renaldet. Institute of Resource Assessment, University of Dar es Salaam.

IRA/IIED (1995). *Environmental Assessment in Tanzania: A Needs Assessment for Training.* IRA Research Paper No. 36/IIED Environmental Planning Issues No. 9. Institute for Resource Assessment and the International Institute for Environment and Development, August, 1995. 34 pages.

IRA (1996). *Rapid Environmental Impact Assessment for the Ikela Water Scheme.* Prepared for the District Domestic Water Supply Programme (DDWSP), Morogoro Region, by the Institute of Resource Assessment, University of Dar es Salaam.

IUCN/UNEP/WWF (1980). *World Conservation Strategy. Living resource conservation for sustainable development.* IUCN, UNEP and WWF, Gland, Switzerland.

Kakonge, J.O. and Imevbore, A.M. (1995). Constraints on implementing environmental impact assessment in Africa. *UNEP-EIA Training Resource Manual.*

Lee, N. and Colley, R. (1992). *Reviewing the Quality of Environmental Statements.* Occassional Paper 24. University of Manchester, Manchester, England.

Mercier, J.R. (1995). *Environmental Assessment and Review in Sub-Saharan Africa*. Post UNCED Series. Paper No. 7. Africa Technical Department, Environmentally Sustainable Development Division (AFTES), The World bank, Washington D.C. September 1995.

MoW (1995). *Mutukula-Bukoba-Lusahunga Road: Final Report on the Environmental Impact Assessment*. Prepared by Civil & Planning Partnership, in association with Scott Wilson Kirkpatrick & M-Konsult Ltd. Ministry of Works, 1995.

MTNRE (1994). Tanzania National Environmental Action Plan: A First Step. Ministry of Tourism, Natural Resources and Environment, Dar es Salaam.

NEMC 1994. *National Conservation Strategy for Sustainable Development*. National Environmental Management Council, Dar es Salaam.

Ndimbo, E.K., Bwathondi, P.O.J., Mwasonjo, G.U.J., Ntara, M.M., Wagner, G.M., Kabigumila, J., Chachage, C.S.L., Mvungi, A.A.K., Wagner, S., Boyd, C.E., Scura, E.W. and Massaut, L. (1997). *An Environmentally-Responsible Prawn farming Project in the Rufiji Delta, Tanzania*. Vols I and II. April, 1997.

Nikundiwe, A.M., Mzira, G., Ngusara, A. & Benno, B.L. (1992). *Environmental Impact Assessment of the Proposed Construction of an Oil Terminal at Tanga*. Prepared for Scott Bertlin Consulting Engineers and Planners.

Norplan (1994). *Environmental Impact Assessment of the Redevelopment of the Hydro-Electric Power Station at Pangani Falls*. Prepared by IVO-NORPLAN for the Tanzania Electricity Supply Corporation (TANESCO), Dar es Salaam.

Norplan (1995). *Lower Kihansi Hydropower Project: Environmental Impact Assessment. Main Volume*. Report by prepared in collaboration with NORCONSULT International Ltd. for Tanzania Electric Supply Company (TANESCO), Dar es Salaam, Tanzania.

Norconsult (1996). *Environmental Impact Assessment of the Proposed Up-grading of the Makuyuni - Musoma Road*. Prepared for the Ministry of Works, United Republic of Tanzania.

Rites-M-Konsult (1995). *Singida - Nzega Road: Environmental Impact Assessment*. Prepared for the Ministry of Works, United Republic of Tanzania.

Roe D., Dalal-Clayton D.B., and Hughes R. (1994). *A Directory of Environmental Assessment Guidelines*. Published by IIED, London; in collaboration with IUCN and the World Resources Institute. 184 pages.

Ross, K. (1992). *Environmental Impact Study of Proposed Development on Changuu (Prison) Island, Zanzibar; Tanzania*. Report for Lonrho Tanzania Ltd.

RUBADA (1980). *Identification Study of the Ecological Impacts of the Stiegeler's Gorge Power and Flood Control Project*. Prepared by Euroconsult/ Delft Hydraulics Laboratory. Rufiji Basin Development Authority, United Republic of Tanzania.

Sadler, B. (1996). *Environmental Assessment in a Changing World: Evaluating Practice to Improve Performance*. International Study of the Effectiveness of Environmental Assessment. Final Report. June 1996. 248 pages.

SCANDIACONSULT (1995). *Environmental Evaluation of Moshi Pesticides Plant*. Prepared for National Chemical Industries.

Spooner, B., Singh, S. and Mugabe, J. (Compilers) (1994). *Institutional Support for the Protection of East African Biodiversity*. Regional Consultancy to Assess Institional Linkages for Biodiversity Conservation in East Africa. Final Report. Food and Agriculture Organization of the United Nations. September 1994. 111 pages.

TANAPA (1993). *Environmental Impact Assessment Procedure and Screening Guidelines*. Tanzania National Parks, Arusha.

TANAPA (1994). *National Policies for National Parks in Tanzania*. Tanzania National Parks. March, 1994. 66 pages.

TANAPA Planning Unit (1994). *Management Zone Plan: Tarangire National Park. Environmental Impact Assessment*. Prepared for Tanzania National Parks (TANAPA).

TANCONSULT Ltd. (1995). *Feasibility Study of Dakawa Integrated Project (Dakawa II) Annex L (Draft) EIA*. Prepared in collaboration with Mott McDonald International Ltd., for National Food Corporation (NAFCO).

WCED (1987). *Our Common Future*. Report of the World Commission on Environment and Development, Oxford University Press, Oxford.

WCST/IRA/Agenda (1996). Proceedings of the Workshop: *Putting the Environment on the National Agenda* held at the Kilimanjaro Hotel, Dar es Salaam, July 24, 1996. Wildlife Conservation Society of Tanzania, Institute of Resource Assessment and Agenda for Environment and Sustainable Development.

Wood, C. (1995). *Environmental Impact Assessment. A Comparative Review*. Longman Scientific and Technical, New York. 337 pages.

WRI (1995). *Strengthening EIA capacity in Asia: A Synthesis Report of Recent Experience with Environmental Impact Assessment in Three Countries: The Philippines, Indonesia and Sri Lanka*. Centre for International Development and Environment, World Resources Institute. Washington DC.

The **Institute of Resource Assessment (IRA)**, formerly the Bureau of Resource Assessment and Land Use Planning (BRALUP), was established in 1982. The Institute is an autonomous, inter-disciplinary research organisation in the University of Dar es Salaam, under the direct responsibility of the Chief Academic Officer and reports directly to the University Senate. The Institute has been delivering training and contributing expertise to EIA studies in Tanzania for over seven years. It cooperates with, advises, and provides consultancy services to government, public authorities and other organisations on a range of environment and development issues.

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The **Environmental Planning Group (EPG)** focuses on environmental planning and resource management and utilisation issues at national to local levels and is particularly concerned with the linkages, interactions and influences between these levels.

At national and governmental levels, the main emphasis is on policy-making processes and strategic planning for sustainable development, and associated planning tools for environmental assessment (such as environmental impact assessment, strategic environmental assessment, sustainability analysis and scenario development) with a focus on their utility and effectiveness in developing countries.

At more local levels, EPG is concerned with practical and equity issues related to land use decision-making, sustainable resource utilization and resource management with a focus on land resources, wildlife and wetlands. Work covers formal, traditional and community-based approaches.

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9. USAID Environmental Procedures

Description/Objectives

To help you understand USAID environmental procedures and the special categorization process of the USAID's Bureau for Africa. This module covers elements of carrying out an Initial Environmental Examination (as defined by USAID's Regulation 16) or an Environmental Review (similar in content, but without need for as many levels of approval), including where applicable, the preparation and submission of necessary documentation.

This module also introduces you to recent Bureau efforts to increase responsibility of USAID field missions for environmental review. The use of Environmental Monitoring, Evaluation and Mitigation Planning processes also represents a more recent addition to the design of USAID programs and non-project assistance, but is discussed elsewhere in the Module Backgrounder for Session 16.

Readings

Module Backgrounder
Annexes to Module 9

MODULE BACKGROUNDER
Introduction to USAID Environmental Procedures

1. Introduction

This module introduces the process of environmental review of USAID funded activities for both program, program activity and non-project assistance and considers how environmental impacts are addressed in program and program activity design.

USAID's environmental regulations are embodied as 22 CFR 216 and commonly referred to as Regulation 16. The objectives of this session are to: 1) simplify and explain the regulations; 2) help field agents of USAID-supported activities understand how federal environmental law affects the program activity development and implementation process; 3) assist field agents in obtaining environmental clearances with the minimum cost and time expenditure practicable, consistent with the intent of the regulations; 4) apply environmental assessment principles based on USAID procedures; and 5) support the decentralization of responsibility for environmental review and decision-making for grants or subgrants under PVO/NGO large umbrella projects to the USAID Mission level.

This module also introduces you to recent Bureau efforts to increase responsibility of USAID field missions for environmental review. The use of Environmental Monitoring, Evaluation and Mitigation Planning (EMEMP) processes also represents a more recent addition to the design of USAID programs and non-project assistance, but is discussed elsewhere in the Module Backgrounder for Session 16.

USAID, as a "re-engineered, learning institution," has introduced major changes in its new operations systems, for example, by replacing projects with "results packages." Suffice it to say here that this change is key to providing USAID operating units and collaborators the flexibility they need to adapt to changes during implementation. The underlying rationale is to focus on results, while still managing inputs and monitoring outputs properly, and to give those responsible for achieving results the flexibility to change approaches and tactics as situations change or lessons are learned.

Re-invention of USAID has heightened the focus on environmental sustainability as being integral to USAID's development goal. To meet this goal it is essential that environmental considerations be incorporated into results planning, achieving, and monitoring. The Agency's re-engineering can be expected to intensify the need to develop programming consistent with the Agency's Environmental Procedures and with principles of environmental soundness.

USAID Missions in Africa are in critical need of systems, guidelines, technical assistance and training to upgrade their capacity to carry out effective environmental review and program implementation. Over the past few years, the Africa Bureau Environmental Office (AFR/SD/PSGE/ENV), in conjunction with the Regional Environmental Offices (REDSO/ESA in Nairobi, has been developing various elements of an initiative for environmental management capacity building. This initiative is intended to support USAID/AFR Missions, their implementing agents and collaborators.

An important rationale for this course, which is part of the initiative to build environmental management capacity, is that Africa Bureau environmental and legal staff anticipate providing significantly enhanced responsibility and authority to carry out environmental reviews to those USAID Mission programs

whose designers and/or implementors have successfully completed an Environmental Assessment course and/or participated in related capacity-building activities. Enhanced authority would be provided on an initial trial basis under the assumption that participating missions are better prepared to ensure that the program/program activity in question will be designed and implemented in an environmentally sound manner in accordance with all salient agency policies and procedures. While the specific details of this enhanced environmental authority will need to be worked out on a case by case basis, relevant agency experience has shown that such enhanced Mission authority can greatly facilitate field-level program activity design and implementation. These guidelines are consistent with USAID's new precepts of flexibility.

2. Origins of USAID Environment/Natural Resource Policy and Regulations

Concern for environmental planning and management among donors and host governments began in the 1970s with two parallel interests: how to reverse the process of environmental deterioration occurring in many developing countries; and how to prevent, or at least mitigate negative effects of agricultural development and other development activities on the environment.[1] Today USAID employs three key strategies to support host country efforts to address these issues: (i) the funding of development projects and programs that directly address environmental problems and protect natural resources; (ii) support to family planning initiatives in countries and regions where demographic pressures are primary contributors to environmental degradation; and (iii) USAID environmental review of all proposed USAID funded activities prior to their final approval. Where appropriate, plans are developed and implemented to mitigate possible negative environmental effects.

USAID's regulations related to environmental assessment and screening actually evolved out of litigation between the Agency and environmental groups in the mid 1970's over the Agency's use of pesticides in its development programs. The screening procedures adopted by USAID are a legal requirement within *22 CFR Part 216* otherwise known as Regulation 216, or "Reg. 16".

3. Existing USAID Policies and Regulations

USAID Environmental Procedures: 22 CFR Part 216

USAID's Environmental Procedures are Federal Regulations, and therefore represent a legal requirement as well as Agency policy. "Regulation 16" has three stated purposes:

- to ensure that environmental factors and values are integrated into the USAID decision-making process;
- to assign responsibility within the Agency for assessing the environmental effects of USAID's actions by the Agency since 1976; and
- to implement the requirements of the U.S. National Environmental Policy Act (NEPA) as they affect USAID programs.

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1. USAID, *Environmental Assessments of Development Projects: A Preliminary Review of A.I.D.'s Experience,* A.I.D. Evaluation Occasional Paper No. 17, Center for Development Information and Evaluation, Bureau for Program and Policy Coordination, June 1988, Washington, D.C., p. 1

Regulation 16 aims to identify in advance any "reasonably foreseeable impacts" of a given activity upon the environment.

The regulations are consistent with NEPA and Executive Order (EO) 12114 on "Environmental Effects Abroad of Major Federal Actions," but they are considerably less stringent in most respects than NEPA-related environmental legislation applicable to most U.S. domestic projects.[2]

In USAID's Agency-wide policy document, *Strategies for Sustainable Development*[3], the focus of planning efforts is on five areas: (i) protecting the environment; (ii) building democracy; (iii) stabilizing world population growth; (iv) encouraging broad-based economic growth; and (v) providing humanitarian assistance and aid for post-crisis transition. In the chapter on the environment the Agency articulates a new strategic vision with two significant environmental goals: (1) reducing long-term threats to global environmental problems, including the loss of biological diversity; and (2) promoting "sustainable economic growth locally, nationally, and regionally by addressing environmental, economic and development practices that impede development and are unsustainable" (USAID, 1994, p.13). To achieve these goals, USAID now requires all of its country strategies to include assessment of:

(1) "agricultural, industrial and natural resource management practices that play a central role in environmental degradation;" and

(2) "public policies and institutions to protect the environment." (USAID 1994, pp. 16-17)

Section 117 of the Foreign Assistance Act directs the President of the United States to make "special efforts...to maintain and where possible restore the land, vegetation, water, wildlife, and other resources upon which depend economic growth and human well-being, especially of the poor." Compliance requires preparing and taking fully into account an environmental assessment of "...any proposed program or project...significantly affecting the environment of any foreign country" (Section 117). Section 118 and 119, respectively, place particular importance on the conservation and sustainable management of tropical forests and preservation of biological diversity. These sections require USAID to analyze, in any country strategy statements or plans, what is required to achieve these objectives and the extent to which actions the Agency proposes contribute to their achievement.

3.1 USAID Mission responsibilities in meeting Foreign Assistance Act requirements related to tropical forests and biodiversity

USAID Missions are legally obligated to conduct an assessment of tropical forestry and biological diversity in accordance with Section 118 and 119 of the FAA. Amendments to Sections 118 (Tropical Forests) and 119 (Biodiversity) of the Foreign Assistance Act (FAA) require that Country Plans include an analysis of (a) the actions necessary in that country to conserve biological diversity and tropical forests, and (b) the extent to which current or proposed AID actions (if any exist in that country) meet those needs.[4] The

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2. Goodson, Jeffrey W., *USAID Environmental Regulations and Foreign Assistance Act Requirements, A Practical Guide and Strategy Tips for AID Project, Program and Technical Personnel,* REDSO/WCA, September 1987, p.1

3. Agency for International Development, *Strategies for Sustainable Development,* 1994, 56pp.

4. Originally summarized in a cable (State 032584) on "Guidance for Preparation of Background Assessments of Biological Diversity for Use in CDSSs or Other Country Plans" sent to all USAID Missions and regional offices in February 1988.

Bureau suggests this analysis involve a team of tropical foresters and biodiversity specialists, using local technical expertise where feasible, and that it be conducted up to one year in advance of Country Strategic Plan (CPS) preparation.

In addition to Sections 117-119 of the Foreign Assistance Act, attention to natural and environmental resources management was consistent with objectives of the Development Fund for Africa (DFA) and USAID's new approach to sustainable development. The DFA, was developed and received congressional approval in late 1987, and was in force through 1995. Its goals remain directly applicable to USAID Africa Bureau Programming: "to help the poor majority of men and women in sub-Saharan Africa to participate in a process of long-term development through economic growth that is equitable, participatory, environmentally sustainable, and self-reliant" [Section 496(c)(1) of the Foreign Assistance Act as amended].

3.2 Responsibilities for USAID core "sustainable development countries"

The Agency has identified certain core "sustainable development countries" with special environmental guidance and requirements in preparing five year Mission Country Strategic Plans (CSPs). Consult your USAID Mission or USAID/Washington AFR/SD/PSGE to determine if your country is a sustainable development country.

The CSP guidance on Environment supports three environmental objectives:

- *Safeguarding the environmental underpinnings of broad-based economic growth;*
- *Protecting the integrity of critical ecosystems;*
- *Ameliorating and preventing environmental threats to public health.*

In identifying environmental strategic objectives at the country level, core sustainable development countries are also required to assess the full range of environmental and natural resource threats and seek to prioritize them against these three objectives. Contained within the CSP guidance on environment are detailed guidelines for setting priorities. Step 1 is to assess the relative severity of environmental problems according to USAID's three country level objectives. Step 2 is to estimate the potential effectiveness and sustainability of strategies available to address the most severe problems. Step 3 is to identify USAID's best opportunities for sustainable impact.

3.3 Biodiversity Strategy

USAID's Strategy for Biodiversity Conservation (draft) sets out guidelines for USAID's biodiversity investments and biodiversity priorities. The major emphasis is on in situ conservation, i.e. assisting countries to maintain the variety of species, genetic resources and ecosystems in natural settings. These efforts are to be complemented by support for ex situ conservation activities designed to help conserve genetic diversity in managed environments, e.g., outside natural habitats in seed and sperm banks, herbaria and the like.

Biodiversity is considered important in every country, and USAID Missions, in consultation with local stakeholders and development partners, are to ensure that in situ biodiversity conservation needs are analyzed and considered for assistance. Biodiversity is also of global importance. To help conserve a representative sample of global biodiversity in situ, the strategy identifies sub-regions of particularly rich and

diverse resources and ecosystems. USAID seeks to assure that assistance for in situ biodiversity conservation is available to at least one representative country in each identified sub-region.

In Africa, the identified sub-regions are the East African sub-region (including afro-montane ecosystems, Eastern Arc Mountains, Rift Lakes, savanna biomes and coral reefs); southern Africa sub-region (containing such unique areas as Cape Flora and Kafue Flats wetlands); Madagascar (a mega-diversity country, biodiversity hot spot and area of high endemism); and the Congo Basin Ecosystem (containing the world's second largest area of tropical forests). Additional information about the biodiversity strategy and names of key countries in each sub-region should be obtained from your USAID Mission.

An expanded summary of environmental regulations and statutory requirements applicable to USAID assistance is provided in Annex 4 of this module.

4. Regulation 16 Policy

USAID's environmental policy as stipulated in the regulations is to:

- ensure that the environmental consequences of USAID-financed activities are identified and considered by both USAID and the host country (HC) prior to the final decision to proceed, and that appropriate environmental safeguards are adopted;
- assist developing countries in their ability to evaluate the environmental effects of development strategies and projects, and to select, implement and manage effective environmental programs;
- identify environmental impacts of USAID actions; and
- define environmental limiting factors that constrain development, and identify and carry out activities that "assist in restoring the renewable resources base on which sustained development depends." (22 CFR 216.1 (b)).

5. General Applicability of the Regulations

The various procedures outlined in USAID's environmental regulations apply to all new activities authorized or approved by USAID, and to "substantive amendments or extensions to on-going activities." In practice, substantive amendments or extensions to ongoing activities are assessed for environmental impact only when 1) they include new components (e.g., addition of funds to construct a road not originally envisioned); 2) they represent a significant expansion of scope over and above the original project (e.g., an expansion of barrage construction into new geographical areas not envisioned in the original project paper); 3) the original activity was authorized prior to the existence of the regulations; 4) commodities to be imported under a project amendment are in addition to those reviewed during the original environmental review process; or 5) unforeseen adverse impacts may have occurred in the original design.

6. Environmental Review and the USAID Design Process

USAID Missions are required by law to follow rules outlined in Reg. 16. To help ensure sound design and implementation in a way that fully incorporates sustainability into USAID supported activities, USAID is attempting to increase the knowledge and involvement of not only the Mission Environmental Officer (MEO) and Foreign Service National (FSN) staff, but other in-country professionals who are engaged in program and program activity design and implementation, including but not limited to: PVOs/NGOs, host government professionals, contractors and university staff.

The work involved in preparation of IEEs or environmental reviews varies greatly. Simple IEE's or requests for categorical exclusions normally require less than a day to prepare and very little specialized knowledge of the environment. However the IEE's for complex natural resource activities can require the full-time participation of an environmental expert on the design team and they can involve extensive negotiations between the Mission, the regional offices and Washington. USAID Mission's should draw on guidance provided by the New Automative Directives System (ADS) and New Management System (NMS).

It is best to examine environmental issues at the earliest stage in the design process in order to avoid adverse impacts and the costs which may be associated with unforeseen effects which may emerge at a later stage of design or implementation. The modification of an activity design to take foreseeable impacts, both direct and indirect, into account will raise the probability of the activity's success, help avoid adverse impacts and increase its contribution to sustainable development. Environmental review thus can be an aid and not necessarily an obstacle to program and activity design. It can only strengthen program and program activity proposals.

Regulation 16, or an IEE prepared pursuant to it, sets out the requirements for addressing environmental issues in the design process. It aims to identify in advance any "reasonably foreseeable impacts" of a given activity upon the environment. For a detailed description of the environmental review process, please refer to Regulation 16 itself. What follows is a summary (see also Figures 1 and 2 on the next page).

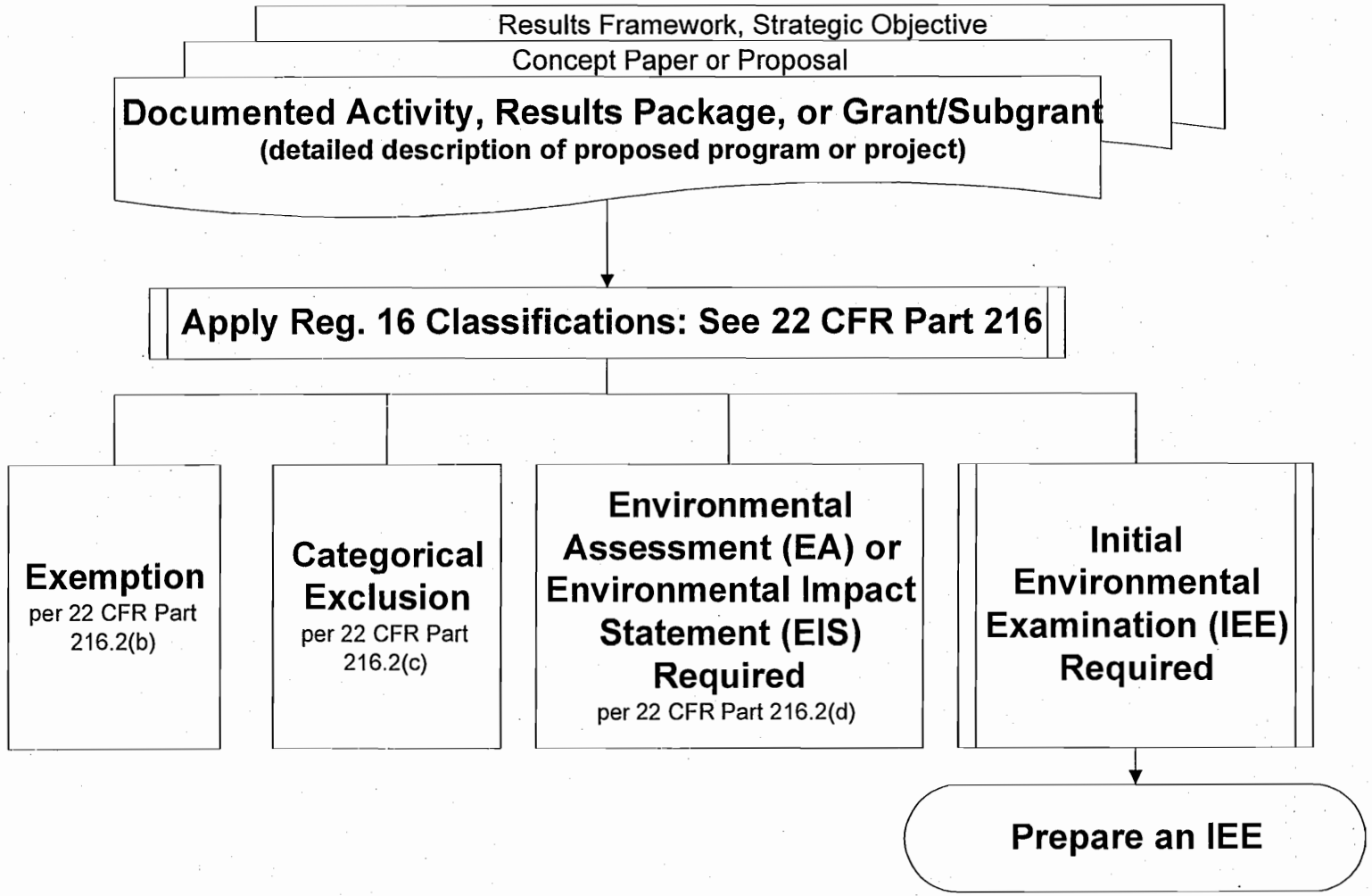
7. A Summary of Environmental Procedures

USAID Missions must prepare an Initial Environmental Examination (IEE) which makes a threshold determination as to whether the proposed program or program activity will have a significant impact on the environment. A negative determination means the program or activity will have no significant impact, and a positive determination indicates it will have one. A deferred determination is one which applies to sub-activities that, in practice, are insufficiently identified and , thus, the IEE postpones analysis until they can be sufficiently identified. "A significant impact" is defined in Regulation 16 as one which does significant harm to the environment. So, an activity which has only beneficial impacts upon the environment would receive a negative determination. Activities which both benefit and harm the environment should receive a positive determination, because despite their benefits the potential damage to the environment will require mitigation.

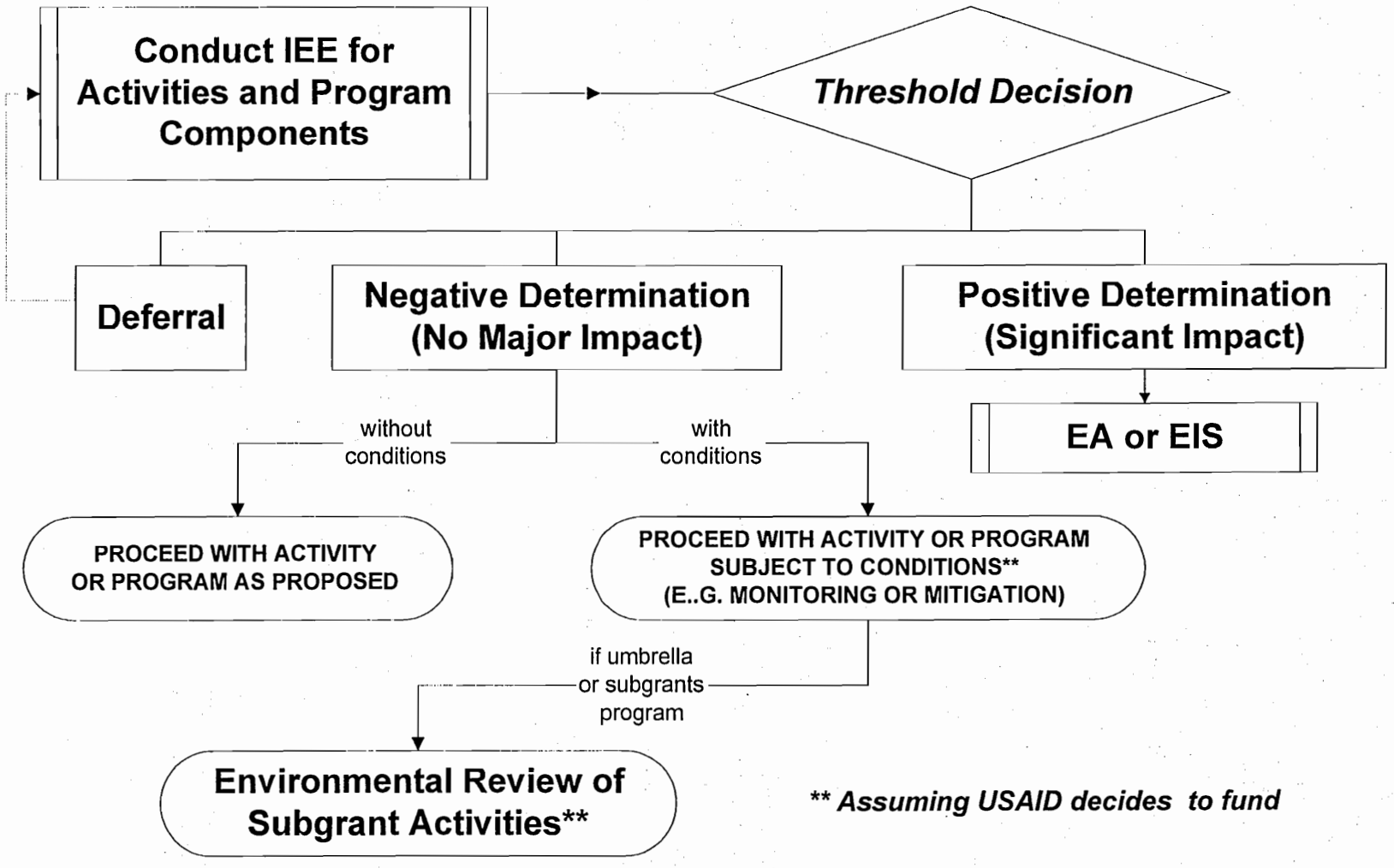
Regulation 16 exempts or excludes a number of activities from the IEE process. Exemptions apply to activities undertaken in response to emergencies, such as famine relief. Exclusions apply to categories of activities which are considered by nature very unlikely to have any significant impacts on the environment.

These activity types are eligible for "categorical exclusion," and for them the environmental review process ends there. Regulation 16 also lists specific activities which are expected to have significant impacts on the environment. For these, a comprehensive analysis, called an Environmental Assessment or EA, is typically required; although an IEE does not need to be performed to determine that there is a significant effect on the environment (i.e., reach a positive determination) or if there is a question about significance. The initial environmental examination process is summarized in the following figures.

The Full Reg. 16 Approach



Prepare IEE and Make Threshold Decision



*** Assuming USAID decides to fund*

IEEs should be prepared along with an initial proposal, so that any modifications can be made to the design with a minimum of delay or difficulty. IEEs are prepared in the field by USAID staff or consultants and approved by the field mission, the Regional Economic Development Services Office (REDSO), and the Regional Environmental Office (REO). Then, they are forwarded to Washington for approval by the Bureau Environmental Officer (BEO) and clearance by the General Counsel's office. Annex 1 in this module provides an *Initial Environmental Examination or Categorical Exclusion* form followed by a summary of sample contents. Annex 2 provides *Information on Use and Preparation of the Umbrella IEE and Use of Environmental Screening and Report Form* and includes a sample of the *Environmental Screening/Report Form for NGO/PVO Activities and Grant Proposals.*

When an IEE threshold is positive (the project is judged to have adverse impacts), the next step in the process is to perform an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). In general, EISs are performed for projects affecting the United States or the global environment, while EAs are performed when the impacts are judged to be more limited in geographic scope. EAs and EISs are usually carried out by teams of outside consultants, strengthened by qualified local expertise and USAID regional environmental staff. More detail on the EA process is provided as Annex 3.

Non-Project Assistance

Special attention must be paid to non-project assistance (NPA) involving institutional or policy change and sectoral adjustment, as it is playing an increasingly important role in the activities funded by USAID and often little is known about the potential environmental impacts of NPA activities. USAID now requires that IEEs be completed for all NPA. To avoid unforeseen impacts from NPA, it is often especially important that an environmental monitoring plan be developed during the NPA design phase. Some of the problems and analytical issues discussed above regarding the design process are the same for NPA, so it is important to follow the same approach to integrating the analysis of potential environmental impacts into the NPA design process. An environmental specialist should be included on the NPA design team, and he or she should provide input on the later monitoring of activities as well.

Classification of Activities in Regulation 16

Exemptions:

- International disaster assistance;
- Other emergency situations [requires Administrator (A/AID) or Assistant Administrator (AA/AID) formal approval]; and
- Circumstances with exceptional foreign policy sensitivities [requires A/AID or AA/AID formal approval].

Note: Exemptions are not applicable to assistance for the procurement or use of pesticides; assistance for procurement or use is interpreted to include transport of pesticides or control equipment, disposal or ancillary support.

Categorical Exclusions (various caveats and nuances limiting the application of categorical exclusions are contained in Reg 16, reproduced in the Appendix):

- Education, training or technical assistance;
- Controlled experimental research of limited scope and carefully monitored;
- Analysis, studies, workshops, meetings;
- Projects in which USAID is a minor donor;
- Documents or information transfer;
- Contribution to international, regional or national organizations not for the purpose of carrying out specifically identifiable activities;
- Institution building grants to research and educational institutions in the US;
- Nutrition, health, population and family planning activities, except for their construction components and other activities directly affecting the environment;
- Commodity Import Programs (CIPs), when USAID has no knowledge of or control over use;
- Support to intermediate credit institutions if USAID does not review or approve loans;
- Maternal or child feeding programs under Title II of PL 480;
- Food for development programs under Title III, when USAID has no specific knowledge or control;
- Grants to PVOs where USAID has no specific knowledge or control;
- Studies or projects that develop the capability of countries to engage in development planning, except those resulting in activities directly affecting the environment;
- Activities that involve the application of USAID approved design criteria.

Note: Categorical exclusions are not applicable to assistance for the procurement or use of pesticides; assistance for procurement or use is interpreted to include transport of pesticides or control equipment, disposal or ancillary support.

Actions Affecting the Environment and normally requiring an Environmental Assessment (EA), if appropriate:

- River basin development; (Note: what is not in a river basin?)
- Irrigation or water management including dams;
- Agricultural land leveling;
- Drainage;
- Large scale agricultural mechanization;
- New land development;
- Resettlement;
- Penetration road building or road improvement;
- Power plants;
- Industrial plants;
- Potable water and sewage, unless small scale; (Note: what is the size limit?)
- Activities jeopardizing endangered and threatened plant and animal species and their critical habitat (wetlands, tropical forests, protected areas, and so forth);
- Pesticides (assistance for procurement or use always requires an IEE, see Sec, 216.3 (a), and often an EA).

Note: See Sourcebook *Appendix 1 - Text of Regulation 22CFR Part 216 ("Reg 16")*, Section 216 (3) (a) (4) and (5), 216.5 and 216.6 for applicable procedures.

"Gray areas":

When it is not obvious that a project falls into one of the above categories, it is necessary to prepare an IEE to make that determination. Mission Environmental Officers can assist in the preparation of the IEE.

Non-project assistance

Given the very different nature of NPA ...the focus of the environmental examination must be on the reasonably foreseeable (i.e. direct and predictable) impact of the policy and institutional reforms and other specific actions required by the program. For example, in a program designed to encourage a government to recognize and codify private ownership of land, the focus of the examination might be on the direct and predictable environmental impacts of private land ownership on land use patterns. In a fertilizer reform program, for example, the focus would be on the anticipated changes in fertilizer application as a result of the reform. To fully examine the potential environmental impacts, the IEE for a sector NPA needs to look at the planned objectives of, not solely the intermediate steps in, the reform process. Where an IEE indicates possible negative impact on the environment, the final design should included measures to mitigate those impacts.

Activities financed with local currency

Activities financed by host country-owned local currency could cause or contribute to adverse effects on the environment but they are not, as a legal matter, subject to Regulation 16 procedures. The Africa Bureau has dealt with local currency issues for many years under the Development Fund for Africa as a "common sense" issue, i.e. although local currency funded activities do not fall within the letter of the law, they must still be addressed within the spirit of the law. One reason for doing so, is the high visibility these activities (host countries or the US public draw no fine distinctions between grants and projects); the Bureau/Agency is deemed at fault if negative impacts result, regardless of funding mechanics). Thus, the Africa Bureau expects Missions to be sensitive to this issue in approving host country-owned , local currency activities whenever possible. When local currencies are programmed for general budget support, it may not be practical to do so; however, when they are approved for specific, project-type activities, it becomes feasible to take environmental impacts into consideration. A further consideration is that most governments now want to include environmentally sound practices within their development activities as matter of national, regional or local policy.

In the case of local currency use for development activities, Reg 16 does not apply. However, the Agency is no less committed to sound environmental review of their consequences. The guidance cable on this subject (88 State 066242) recommends that "responsible safeguards ensuring that environmental concerns be taken into account in the design and implementation of projects and programs supported by jointly programmed local currency and trust funds. In-country procedures to evaluate any long-term environmental impacts of activities funded with generated local currency already exist in many countries. The Mission Environmental Officer will ensure that the responsible staff in the appropriate ministry for environment and/or natural resources will be made aware of U.S.A.I.D. concerns, and that they will be asked to provide occasional progress reports to the Mission. The cash grant program should also include some

support for adequately training environmental staff within the host country to carry out monitoring and mitigation efforts related to these activities, and in developing an adequate response mechanism if adverse impacts are uncovered."

Intermediate credit

The following paragraphs represent current Bureau for Africa practice:

Under USAID environmental and legal practice, for credit components to qualify for a categorical exclusion under Reg. 16, Missions would need to affirm that our purpose is the equivalent of capitalizing an intermediate credit institution (ICI) (e.g., capitalizing a guaranty facility, as contrasted with the making of each guaranty), and that USAID does not retain the right to review and approve each loan (or equivalent) by the ICI. This is the case regardless of whether USAID's funds are used for loan guaranty or for actual loans.

If a categorical exclusion is not appropriate, the mission environmental officer (MEO) should provide a recommendation for a negative determination or a deferral of this component, together with supporting information. Identification of possible types of participating businesses, and the existence of or potential for environmental guidelines, for the loans guarantees is relevant. Resources could be used for technical assistance, training, and promotional support to test models, and provide close monitoring of each intervention to determine modifications necessary to arrive at the most acceptable approach.

Recommendation: Credit programs for agricultural inputs, the promotion of export crops, and other initiatives that might increase pesticide use even indirectly should ideally be funded concurrently with programs to provide farmers with alternatives to dependence on pesticides.

Environmental Impact Statement (EIS):

- Under USAID regulations, in accordance with US Council on Environmental Quality regulations implementing the National Environmental Policy Act (NEPA) an EIS is a detailed study of the reasonably foreseeable environmental impacts, both positive and negative of a proposed USAID action to be prepared when Agency actions significantly affect:

  (1) The global environment or areas outside the jurisdiction of any nation (e.g. the oceans);
  (2) The environment of the United States; or
  (3) Other aspects of the environment at the discretion of the Administrator.

Note: See Sourcebook *Appendix 1 - Text of Regulation 22CFR Part 216 ("Reg 16")*, Section 216.7 for further details on USAID's EIS regulations.

Other Categories of Activities Where Assistance May Be Denied, Or An IEE Or Environmental Assessment Is Required

Tropical Forests: Section 118 and of the Foreign Assistance Act as amended 1986.

Based on provisions of FAA Sections 118, assistance must either be denied or an Environmental Assessment pursuant to Regulation 16 must be carried out for any activities that:

- involve the procurement or use of logging equipment, unless an EA indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner which minimizes forest destruction and that the proposed activity will produce positive economic benefits and sustainable forest management systems;
- have the potential to significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas;

Section 118 also states that assistance shall be denied for the following activities unless an EA indicates that the proposed activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development:

- activities which would result in the conversion of forest lands to the rearing of livestock;
- entail construction, upgrading or maintenance of roads which pass through relatively undegraded forest lands;
- the colonization of forest lands; or
- entail construction of dams or other water control structures which flood relatively undegraded forest lands.

Biological Diversity: Section 119 and of the Foreign Assistance Act as amended 1986.

Under this section assistance must be denied for actions which significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas.

Note: For a detailed review of USAID's responsibilities related to biological diversity and tropical forests see Russo, Sandra, *Considerations of Biological Diversity and Tropical Forestry in the Context of Country Program Strategy Planning in the Bureau for Africa: Review and Guidelines*, Prepared by Environmental and Natural Resources Policy and Training (EPAT) Project for USAID AFR/SD/PSGE, November 1994, 117pp.

Classifying Activities With Multiple Components

In classifying actions that are part of an activity or program with several components, some actions may qualify for a categorical exclusion, others may qualify for a negative determination and yet others may necessitate a positive determination. Thus, within an activity or program, several classifications can apply, depending on the nature and mix of the particular actions. In practice, many activities or component actions thereof receive negative determinations *with conditions*; conditions typically invoked include specific ways of carrying out an activity in an environmentally preferable manner, subsequent environmental reviews of

individual actions, mitigative measures, training or technical assistance related to environment, or monitoring requirements.

8. The Deferral Process

Environmental review may be deferred when programs, activities or sub-activities have not been specifically identified at the time of authorization. When possible, deferral should be minimized, since a number of USAID activities (as high as 20 percent in the past) have had unforeseen significant environmental impacts which might have been avoided or mitigated by completing the IEE during the design process.

In cases of deferral, Reg. 16 calls for the application of covenants or conditions precedent to ensure environmental review will be completed prior to irreversible commitment of resources.

Initial proposals where it is not possible to identify activities in sufficient detail to permit completion of the IEE shall contain:

(i) an explanation of why the IEE cannot be completed;

(ii) an estimate of the amount of time required to complete the IEE; and

(iii) a recommendation that a Threshold Decision be deferred until the IEE is completed.

The USAID Assistant Administrator acts on a deferral request concurrently with action on the initial proposal and designates a time for completion of the IEE. Normally this completion date will be sufficient for preparation of an EA or EIS, if required, before a final funding decision is made. Some exceptions are permitted (see Reg. 16, 216.3 (a) (7).

9. Africa Bureau Categorization Process for PVO/NGO Grants and Subgrants

USAID/AFR has been steadily increasing its funding to private voluntary organizations (PVOs) and non-governmental organizations (NGOs) over the past several years. Generally this support occurs through "umbrella" projects which may result in considerable numbers of subgrants, usually with a variety of NGO/PVO grantees. Increased association with the PVO and NGO community has stimulated an interest in providing environmental management capacity building opportunities and guidelines to ensure that such activities are consistent with USAID's Environmental Procedures. These guidelines are fundamentally similar to those outlined for IEE process, but they are tailored to umbrella project subgrantees where the umbrella grant IEE has already received earlier approval, and therefore do not contain all of the IEE preparation requirements.

9.1 Screening and Environmental Review Procedures for PVO/NGO Grantees and Subgrantees

To ensure that individual interventions are designed in an environmentally sustainable manner, the Mission Environmental Officer (MEO) and/or USAID Project Officer or Manager provides the lead PVO/NGO under the umbrella grant (and, as appropriate NGOs and CBOs subgrantee applicants), with a copy of the Africa Bureau Environmental Guidelines for NGO/PVO Field Use and the Screening Form

(Annex 2), which is presented in draft form for illustrative purposes. Missions are to facilitate the refinement of this form with lead PVOs/NGOs, and the REDSO REO or REA in order to tailor the screening process to the umbrella project's purposes and to incorporate, as appropriate, information that will serve to identify any need for environmental assessment in accordance with host country environmental assessment policy and proposed legislation. Adherence to the procedures in the original umbrella project IEE, it must be emphasized, cannot be considered in lieu of host country requirements or vice versa. The proposals for subgrants will also spell out how potential negative impacts will be mitigated prior to activity implementation and during implementation, if they are detected during monitoring and evaluation.

All activities and subgrants not recommended for a categorical exclusion, will be individually reviewed according to the Screening Form, which utilizes a categorization process consistent with Africa Bureau NGO/PVO Environmental Guidelines, as defined below.

Category 1: Subgrants that would normally qualify for a categorical exclusion under Reg. 16 (e.g., community awareness initiatives, training at any level, provision of technical assistance, controlled experimentation exclusively for the purpose of research and field evaluation which are confined to small areas and carefully monitored, etc.). The rehabilitation of water points for domestic household use, shallow, hand-dug wells and small water storage devices and construction or repair of facilities under 10,000 square feet (approximately 1,000 square meters) can be placed in this category.

Category 2: Subgrants that would normally qualify for a negative determination under Reg. 16, based on the fact that the grantee used an environmentally-sound approach to the activity design and incorporated appropriate mitigation and monitoring procedures. For example, the design followed, and the manager has access to and will follow, a series of guidelines for the design of small-scale environmentally-sound activities in forestry, water supply and sanitation, rural roads, etc.). Rehabilitation or construction of facilities or structures exceeding 10,000 square feet would normally fall under Category 2. Funding levels would also normally not be in excess of $200,000 per discrete activity. In any case, an Environmental Review Report will be prepared for all the Category 2 projects.

Category 3: Subgrants where significant environmental impacts are likely such as those involving land development, forest harvesting, planned resettlement, penetration road building, substantial piped water supply and sewage construction, and projects involving the procurement and/or use of pesticides, or of large-scale or area-wide application of pesticides. Also, some light industrial plant production or processing (sawmill operation, agro-industrial processing of forestry products) could qualify.

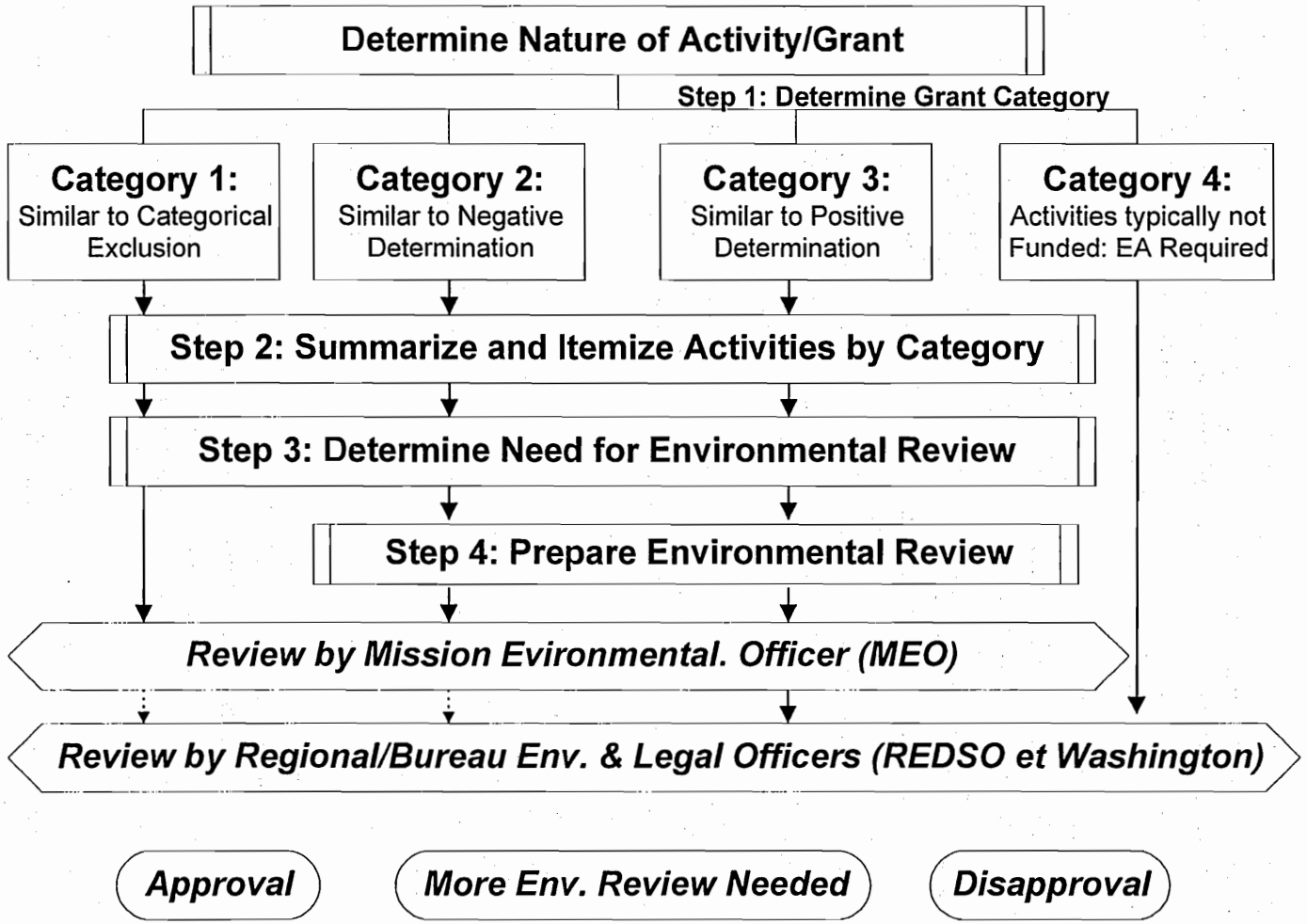
Category 4: Activities not fundable or fundable only when specifically defined findings to avoid or mitigate the impacts are made, based on an Environmental Assessment[5] such as: 1) actions determined likely to significantly degrade protected areas, such as introduction of exotic plants or animals; 2) actions determined likely to jeopardize threatened and endangered species or adversely modify their habitat (esp. wetlands, tropical forests)[6]; 3) conversion of forest lands to the rearing of livestock; 4) planned colonization of forest lands; 5) procurement or use of timber harvesting

5. Per Foreign Assistance Act Sect. 118 & 119 relating to overseas assistance affecting Tropical Forestry and Biodiversity.

6. Per USAID Environmental Procedures 22 CFR 216.5, on Endangered Species.

Apply Environmental Screening Form

for Umbrella NGO/PVO Grant and Activity Proposals where Umbella IEEs Exist



equipment; 6) commercial extraction of timber; 7) construction of dams or other water control structures which flood relatively undegraded forest lands; 8) construction, upgrading or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands.

[In accordance with these FAA provisions, assistance must either be denied or an Environmental Assessment pursuant to Regulation 16 must be carried out.] All items listed in Regulation 16 (Sect. 216.2(d)(1)) are automatically included, unless such items qualify for a negative determination in accordance with the criteria listed under Category 2. All Category 3 and 4 activities under consideration must be passed to the REO and BEO and to the Regional and Bureau Legal Officers.

The lead PVO/NGO will use the Screening Form (Annex 2), as refined in consultation with the MEO and REDSO REO or REA, to review subgrant proposals to determine in which Category the activity falls. The MEO will then review and clear the draft category determination and any environmental review reports prepared as a result of the categorization. It is assumed that the majority of subgrants will fall within Categories 1 and 2, and will, therefore, be approvable locally by the USAID Representative without further external review, given that appropriate sound implementation and environmental monitoring and mitigation procedures will be in place. The MEO and/or Mission Project Officer or Manager shall on a routine basis, pass to the REO and BEO an updated list of grants, with a summary of activities and the disposition of the environmental categorization and review process in order to keep them apprised of the sector and scope of activities involved.

All Category 3 and Category 4 subgrants (if there are any) and possibly some Category 2 subgrants, if the MEO has questions, will be subjected to additional environmental assessment, as deemed appropriate in consultation with the BEO and REO, and passed on to the Regional and Bureau Environmental and Legal Officers for further review and clearance.

Prior to the approval of any subgrant, results of the environmental categorization must be available and considered. For Category 2 projects, environmental review reports, including MEO review and, if needed REO or BEO review, must be performed prior to funding. For any Category 3 or Category 4 projects, approval cannot be considered until environmental documentation as determined by the BEO has been prepared.

9.2 Promotion of Environmental Review and Capacity Building Procedures

The environmental review procedures specify how the subgrants covered by these procedures, and associated mitigation actions, will be identified and reviewed on an individual basis after project authorization in accordance with Regulation 16, Section 216.3(a)(2). Specifically, these procedures are intended to ensure environmental accountability and soundness, on the assumption that Missions will have the following elements in effect to promote environmental review and capacity building within the umbrella grant PVOs/NGOs and CBOs:

a. **Subgrants will be individually reviewed and screened according to a Screening Form** (Annex 3), which will categorize each subgrant or subactivity. The 4-tier categorization process is according to the AFR *Environmental Guidelines for NGO and PVO Field Use in Africa,* or as further defined in the umbrella project IEE;

b. PVOs, NGOs and CBOs will help design and conduct, participate in, and apply, appropriate **environmental assessment and management training,** in conjunction with USAID and host country resource organizations and authorities;

c. The lead PVO, and as appropriate, the indigenous NGOs and CBOs, will be encouraged to **develop and apply host country environmental policies;**

d. A **monitoring and evaluation** process will be put in place and used by the lead PVO, NGOs and CBOs, in collaboration with host country authorities and USAID project management; and

f. The Mission will **keep the BEO and REO apprised of subgrants provided,** including the type/nature, scale, funding levels and status of the individual subgrants approved under the process described in the umbrella grant IEE.

9.3 Environmental Responsibilities

The USAID Mission is to assume responsibility for environmental review and decision-making for all sub-grants as outlined below:

- The lead PVO and NGOs or CBOs, as appropriate, will submit proposals that take into consideration potential environmental impacts and their mitigation, including avoidance, and will design the activities with an environmental monitoring system in place.
- The lead PVO will use the Screening Form to categorize proposals and the MEO will review and pass on to REO and BEO any Category 3 or Category 4 and, as he/she determines, some Category 2 activities.
- The lead PVO, NGOs and CBOs, as appropriate, will ensure implementation of mitigating measures and long-term environmental impact monitoring.
- The USAID MEO and the Project Officer and/or Project Manager will be ultimately responsible for monitoring environmental impacts of the grants.
- Periodic visits of the REO or REA will also be requested for advice and validation of the process in place.
- All parties are to utilize the Screening Form, prepared for each proposal and/or grant. The form is formatted as a checklist and will serve as a tool to summarize on a routine basis the area and scope of activities of each subgrant and the overall project.

9.4 Environmental Monitoring and Mitigation

In drafting proposals, designers must address the way in which their interventions will be monitored and evaluated during the course of the activity. Indicators to be used in monitoring should be spelled out in the grant designs. **The implementing agents involved will be fully responsible for monitoring and evaluating all activities under each program or project, and for sending to the Bureau and/or**

Regional Environmental Officer any evaluations, reviews, and/or mitigation plans, especially for Category 3 activities. By planning for monitoring and mitigation in project and program designs, planners can assure that funding will later exist for such activities. Proposals should also spell out how negative impacts will be mitigated, if and when they are detected during monitoring and evaluation. An example would be PVOs/NGOs involved in agricultural production, who could adopt a policy to encourage integrated pest management and other sustainable agricultural practices.

Annex 1

INITIAL ENVIRONMENTAL EXAMINATION
OR
CATEGORICAL EXCLUSION

PROGRAM/ACTIVITY DATA:

Program/Activity Number:

Country/Region:

Program/Activity Title:

Funding Begin: _____ **Funding End:** _____ **LOP Amount:** $_____
Sub-Activity Amount: $_____
IEE Prepared By: _____ **Current Date:** _____

IEE Amendment (Y/N):____ If "yes", Number & date of original IEE _____ ; __/__/__

ENVIRONMENTAL ACTION RECOMMENDED: (Place X where applicable)
Categorical Exclusion: _____ Negative Determination: _____
Positive Determination: _____ Deferral: _____

ADDITIONAL ELEMENTS: (Place X where applicable)
EMEMP: _____ CONDITIONS _____ PVO/NGO: _____

SUMMARY OF FINDINGS (Please Limit Text to This Page):

APPROVAL OF ENVIRONMENTAL ACTION RECOMMENDED: (Type Name Under Signature Line)

CLEARANCE:
Mission Director: _____ Date: _____

CONCURRENCE:
Bureau Environmental
Officer: _____ Date: _____
Approved: _____
Disapproved: _____

File No: _____ (AID/W)

CLEARANCE:
General Counsel
(Africa Bureau) _____ Date: _____

ADDITIONAL CLEARANCES: (Type Name Under Signature Line)

Mission Environmental Officer: _____ Date: _____

Project Manager: _____ Date: _____

Regional Environmental Officer: _____ Date: _____

INITIAL ENVIRONMENTAL EXAMINATION

PROGRAM/ACTIVITY DATA:
Program/Activity Number:
Country/Region:
Program/Activity Title:

1.0 BACKGROUND AND PROJECT DESCRIPTION

Note: This is a break-down of all components corresponding to the level and complexity of environmental examination which they will require. For example, separate those eligible for exemption, those eligible for categorical exclusion, those to be deferred, etc.

2.0 COUNTRY AND ENVIRONMENTAL INFORMATION (BASELINE INFORMATION)

Note: These are short descriptions that give a good idea of current environmental status of the country and that of the project area. However, the environmental background information should cover only information relevant to the proposed activity, such as:

- Location
- Land Use
- Topography, Geology and Soils
- Climate and Hydrology
- Vegetation and Wildlife (Terrestrial and Aquatic Ecology)
- Fisheries (if relevant)
- Agriculture
- Protected Areas and Biodiversity Issues
- Socio-economic Characteristics (Population, Economic Activity)
- Cultural Heritage
- Relevant National (or Local) Environmental Policy or Legislation

3.0 EVALUATION OF PROJECT/PROGRAM ISSUES WITH RESPECT TO ENVIRONMENTAL IMPACT POTENTIAL

Note: This addresses only environmental issues related to project activities that are not exemptible and are not subject to categorical exclusion. It describes how project activities affect different sectors or components of the environment. A good and thorough environmental analysis is made at this level under each subheading listed under Section 2 or others that may be relevant (Checklists from Session 10 should be used as a guide).

4.0 RECOMMENDED MITIGATION ACTIONS (INCLUDING MONITORING AND EVALUATION)

Note: Environmental determinations are made only in an IEE, environmental reviews normally will not require an environmental determination.

Language regarding determinations provides recommendations on how the activity should be legally handled under USAID environmental regulation. It summarizes the findings and conclusions of the IEE and states the recommended threshold decision. If an activity component has no reasonably foreseeable significant (adverse) environmental impacts the threshold decision recommended is a Negative Determination. If an activity component has reasonably foreseeable significant environmental impacts the threshold decision recommended is a Positive Determination; then the preparation of an EA or an EIS is required.

5.0 SUMMARY OF FINDINGS (copy also onto Face Page)

Includes a summary of the determinations and principal mtigative measures.

Information on Use and Preparation of the Umbrella IEE and Use of Environmental Screening and Report Form

Attachment: **Environmental Screening and Report Form for NGO/PVO Activities and Grant Proposals**

NOTE: The process described here is entirely optional and open to adaptation. This umbrella process was designed by USAID's Bureau for Africa together with PVOs carrying out activities under umbrella grants in which there is a proposal review and sub-granting process.

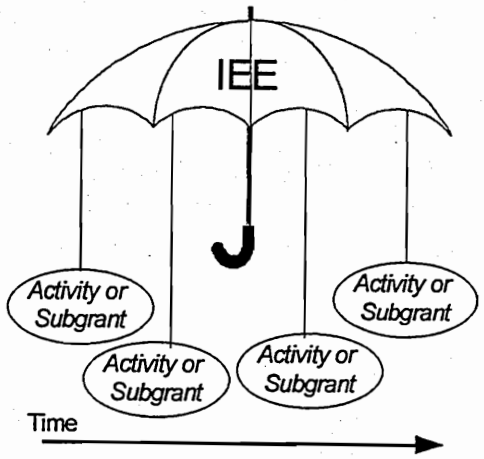
A screening process is applied during the activity-design stage, and mitigation measures thereby identified are built into implementation.

Information on Use and Preparation of the Umbrella IEE and Use of Environmental Screening/Report Form

1. What is an "Umbrella" IEE and When is It Used?[1]

An "umbrella" IEE addresses a **multiple sets of activities generally expected to be small in scale and where their nature is unknown or insufficient specific information is available** (such as engineering designs or siting data), when the IEE is being prepared (See Figure 1).

Figure 1: Multiple Activity with Activities to be More Fully Designed at a Later Date



Prepare Umbrella IEE

- Negative Determination with Conditions (agreement between lead PVO or contractor & USAID)

- As part of conditions, lead PVO (or contractor):
  - demonstrates environmental assessment capacity (for example, through training or in other ways)
  - screens activities and sites as appropriate
  - follows environmental review process as part of planning & design
  - prepares monitoring & mitigation plans
  - PVO (or contractor) summarizes status of environmental compliance process as appropriate

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[1] Within USAID this has sometimes been referred to as a "programmatic" IEE concept, not to be confused with the Programmatic Environmental Assessment (PEA).

An umbrella IEE may be appropriate if: the proposed activity consists of multiple activities, most of which are small-scale **but not yet fully designed**, and which can be subjected to a subsequent review process defined by the PVO or contractor; or the PVO/contractor intends to implement a sub-granting program in which as-yet unidentified sub-recipients submit proposals for activities, and these proposals are to be linked to a subsequent environmental review process similar to that laid out below.

An alternative to the umbrella IEE is doing an **IEE with a deferral of those activities for which insufficient information is available,** which will then require amendment of the IEE before you obligate funds for, or implement, that activity.

Note: It should be understood that PVOs or contractors, if they so choose, can apply the "umbrella" to only a **portion** of the IEE and not all, if there are a large number of multiple sets of activities that are not yet fully defined (for example, community designed activities lend themselves to an "umbrella process"), while other activities are already well-defined (for example, a discrete soil and water conservation project) and thus would be treated in the IEE as an activity outside the "umbrella." Under the IEE, the determination for that part of the program with not yet fully defined activities is a negative determination with conditions (See Figure 2).

The "umbrella" IEE process allows you to deal with sets of yet-to-be-fully designed activities in a more generic fashion and engages you and your implementing partners in a subsidiary environmental screening and review process, once design and siting information has been obtained. This process allows you to screen and prepare environmental reviews of each activity or set of activities (grouped geographically or in some other fashion) as the information becomes available. If you use the "umbrella" IEE with post-IEE environmental reviews, you should not implement the specific activity or group of similar activities until the screening and review process is complete, including USAID approval, if appropriate. Note that with each umbrella IEE, the respective Mission and PVO or contractor, with the concurrence of the BEO, will determine what level of sub-activity review and approval will be carried out by the USAID Mission, if any. The PVO or contractor should discuss approval requirements with the Mission when considering an "umbrella" IEE.

Approval of the "umbrella" IEE means that, in most cases, USAID approval of the subsequent environmental reviews (for specific activities or generic sets) is at the PVO/Contractor or Mission level and does not require Washington concurrence. While the Mission should be kept informed, Washington concurrence will only rarely be called for (e.g., if an activity should trigger a positive threshold decision).

The Environmental Screening Form (ESF) that accompanies an "umbrella" IEE (see sample form at the end of this section) is used after the IEE has been approved. It guides you through the subsidiary screening, review and mitigation process for each set of activities as they are designed. The form itself is normally an integral attachment to the approved IEE. It is meant to be **modified or adapted prior to IEE approval** to reflect the **unique suite of situations** that are most likely to be found under **yet to be defined multiple activities.** Thus, the ESF to be used with a given "umbrella" IEE is typically **specifically tailored for that IEE.**

One particularly useful application of the "umbrella" and the ESF is with small-scale road building and repair. A special ESF has been adapted from USAID/Mozambique, USAID/Madagascar, USAID/Cambodia approved rural road environmental criteria and requires that local partners, the PVOs, and on-site road engineer be trained to use the criteria to conduct Environmental Reviews (ER). USAID/Uganda and most recently USAID/Tanzania are using this specially adapted ER process and ESF for their road activities.

In principle, the **advantages of the "umbrella"-type IEE** are that (a) it provides for an adapted post-IEE screening and review process for each activity in the program as the information becomes available, and (b) once

the IEE process of environmental screening and review is approved in Washington, all or most activities can be approved at the PVO or Mission level on the basis of local screening and review.

F.2 Conditions on the Use of the "Umbrella" IEE or Use of an "Umbrella"Component within an IEE.

An "umbrella" IEE or an "umbrella" component within an IEE, involves a negative determination *with conditions.* This means that **the "umbrella" process may only be approved if the PVO or contractor agrees to a certain set of conditions** (see Figure 1), which include: (a) demonstrated recipient capacity to carry out environmental reviews (may include attendance at environmental compliance training), (b) post-IEE screening of appropriate activities or clusters of activities, (c) following an environmental review process as part of planning and design, (d) conducting monitoring and mitigation as appropriate, and (e) periodically reporting on the status of environmental compliance to the Mission Environmental Officer, as requested.

An "umbrella" IEE or an umbrella component within an IEE can use standardized language, described in detail below, since your ability to analyze activities is limited without information. Figure 1 illustrates the "umbrella" IEE concept and Figure 2, the concept of an "umbrella" component within an IEE with other activities and determinations.

3 Advice on Preparing Sections 1.0 through 4.0 of an "Umbrella" IEE or "Umbrella" Component within an IEE

In preparing the umbrella IEE or umbrella component, you will find the principles and advice offered in Section 4.0, to be pertinent to a large extent. Below are some annotations and advice based on experience with the umbrella IEE approach, involving subgrants by the lead PVO/contractor to sub-recipients. If you are using the umbrella process as one component within a larger IEE, be aware as you read the instructions below that you will have to modify the language as appropriate.

✔ IEE Section 1.0: Background and Project Description

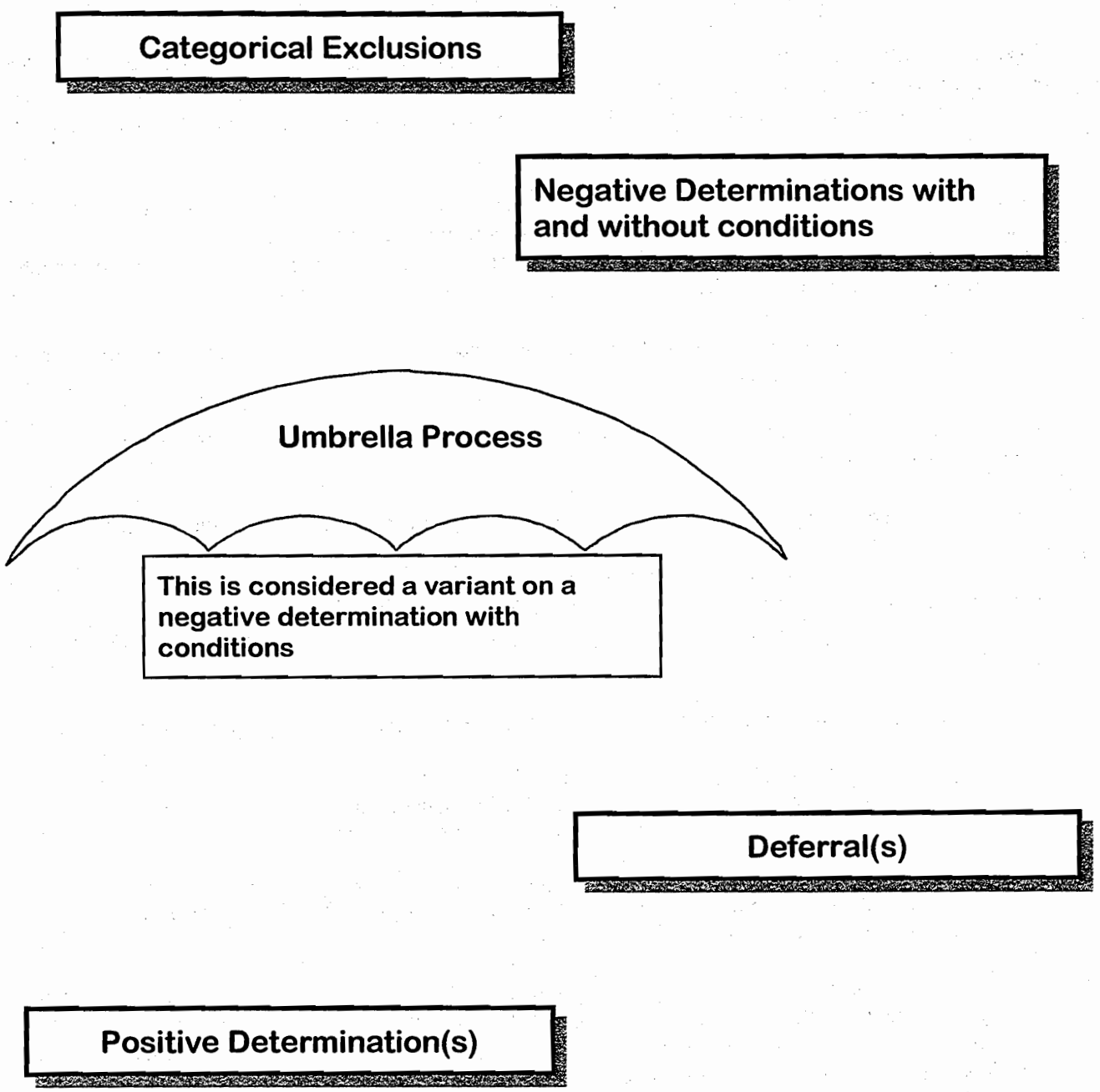
1.1 Background

Briefly describe the background of your suite/set of activities and the reasons why they are not well defined. For example, is it because of the need to maintain design flexibility, is it because the activities to be undertaken will be in response to participant generated needs and proposals, or is it for other reasons?

1.2 Current Activity Description

Briefly describe the goals and purposes and types of results expected. Indicate the sectors in which you will work and the types of interventions that are likely. Describe the level of funding, disbursement and implementation arrangements, including whether the activities are food for work, monetization or entail grants to communities or groups.

Figure 2. IEE With Multiple Determinations in One IEE, including Use of the Umbrella Process with the IEE



1.3 Purpose and Scope of Amended IEE

Generally this is not needed unless you have already prepared an IEE and plan to amend it so that it uses the umbrella process.

✓ IEE Section 2.0: Country and Environmental Information

Organize this section by location or activity, whichever is most appropriate. This section should provide a brief overall portrait of the setting in those geographic areas where you are planning interventions. Depending on the nature of your set of activities, the "area" could be an entire country, several regions, scattered locations, or a specific region.

Briefly describe environment (including physical, biological, health, socio-economic, and cultural aspects) of the proposed activities' locations. Indicate general environmental issues and trends. Because not all locations for future interventions have been identified and because of the variety of environmental situations that might be encountered, this section of the IEE can be neither comprehensive nor detailed.

✓ IEE Section 3.0: Evaluation of Project/Program Issues with Respect to Environmental Impact Potential

Describe impacts for each activity or sets of activities, using the same organizational framework you adopted for IEE Sections 1 and 2.

If an activity has no impact potential, or a component may be a Categorical Exclusion, briefly note this.

First, provide a brief synopsis of potential interventions. You may simply list these and describe with whatever information you have. Then describe, if you have information, the generic kinds of environmental impacts. (For example, you could draw upon the generic information in the *Environmental Guidelines for Small-scale Activities)*.

If your **knowledge of potential environmental impacts is limited, insert the following** or similar wording:

> The physical and topographic conditions, climate, soils, and ecosystems as well as social and economic characteristics that could be encountered are quite variable. Because the specific characteristics and locations of these activities are not definitive, the potential for adverse environmental impacts cannot be excluded until additional information about project design and location becomes available. Each, therefore, requires environmentally sound design and review to determine the specific nature and magnitude of potential impacts. Activities do share the common characteristic of being small in scale.

In addition, you need to think about the potential for cumulative adverse environmental effects as a consequence of multiple activities in a setting or region—those impacts that result when the effects of your actions are added to the existing situation and or other reasonably foreseeable actions, regardless of what organization or agent is undertaking them. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. You probably will not be able to mitigate the effects of activities for which you are not responsible. Nevertheless, where feasible, you should try to coordinate your activities with others, help others to recognize potential impacts of their activities or play a role in fostering an environmentally sound overall development plan.

✓ **IEE Section 4.0 Recommended Mitigation Actions (Including Monitoring and Evaluation)**

Under an umbrella IEE, you and USAID commit to following specific procedures for screening, post-IEE environmental reviews, mitigation, and monitoring (see Figure 1). You and USAID also commit to promoting environmental assessment capacity building for your staff and partners. You could consider and adapt the language below, set off in smaller font and doubly indented, **for this purpose**[2]:

4.1 Recommended Planning Approach

The development activities proposed for support are typically presented and considered as discrete interventions, in isolation from other planned community developments. This linkage argues strongly for the adoption of an integrated approach toward activity planning and implementation. Although such an approach toward program planning and management is more complex and time-consuming "up-front," it will reap significant dividends over the longer term in the form of more cost-effective, sound, and sustainable community investments and improved natural resources management. For maximum efficiency and effectiveness, these review procedures are intended to be applied within the context of development plans, natural resource management plans, or land use plans developed for the areas in which the activities will take place.

4.2 Environmental Screening and Review

These environmental screening and review procedures specify how activities will be examined on an individual basis to comply with the determinations (see Section 5.0) of this IEE in accordance with Reg. 216, Section 216.3(a)(2). These procedures are intended to result in environmental accountability and soundness, by requiring that USAID/[Insert Country name = C from here on] or the PVO/sub-recipients put in place specific mechanisms to promote environmental review capacity and other environmental capacity for the implementing partners. To ensure that interventions are designed in a sound and sustainable manner (see Section 4.1), the Mission Environmental Officer (MEO) and/or USAID Project Manager will work with the appropriate implementing partners to achieve compliance with these procedures.

[Insert Name of the PVO or contractor = O from here on] is the primary implementing partner of the [Program or Activity Title =T from hereon]. [Specify other implementing partners and their roles.]

These procedures are based on use of a Screening Form, presented in Attachment 1. This form is consistent with the "Environmental Screening Form for NGO/PVO Activities and Grant Proposals" contained in the Africa Bureau Environmental Guidelines for Small-Scale Activities in Africa. USAID/ C will facilitate the refinement of this form with O and the [Regional Environmental Officer (REO): Insert if one exists] and the Bureau Environmental Officer (BEO) to meet project needs and to incorporate, where appropriate, information that will identify any need for environmental assessment in accordance with C's environmental assessment policy and procedures.

Adherence to the procedures in this IEE cannot be considered in lieu of C's requirements or vice versa. Efforts will be made, however, in the refinement of the Screening Form to dovetail respective assessment information requirements to the maximum extent allowable.

This IEE does not cover pesticides or other activities involving procurement, use, transport,

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2 The relationship between the PVOs or contractors and USAID may differ from that characterized herein. **The sample language is open to adaptation to the situation at hand.**

storage or disposal of toxic materials, and any situation dealing with such will require an amended IEE, except to the extent covered in Category 2 of the Screening Form attached.

Activities or proposals will be individually screened using the attached Screening Form, which uses a four-tier categorization process:

Category 1: Activities that would normally qualify for a categorical exclusion under Reg. 216 (e.g., community awareness initiatives, training at any level, provision of technical assistance, controlled experimentation exclusively for the purpose of research, and field evaluation that is confined to small areas and carefully monitored, etc.) Certain, specifically defined, small-scale activities entailing rehabilitation of water points and construction or rehabilitation of facilities have also been placed in this category.

Category 2: Activities that would normally qualify for a negative determination under Reg. 216, based on an environmentally sound approach to the activity design and incorporation of appropriate mitigation and monitoring procedures. For example, the design followed, and the manager has access to and will follow, a series of guidelines for the design of small-scale, environmentally sound activities in forestry, natural resource management, infrastructure, etc.

Category 3: Activities that have a clear potential for undesirable environmental impacts and typically under Reg. 216 require an Environmental Assessment, such as those involving land development, planned resettlement, penetration road building, substantial piped water supply and sewage construction, large-scale irrigation projects, and projects involving the procurement and/or use of pesticides, or of large-scale or area-wide application of pesticides. All activities listed in Reg. 216 (Sect. 216.2[d][1]) are automatically included, unless they are small-scale and qualify for a negative determination in accordance with the criteria listed under Category 2.

Category 4: This category groups activities that either USAID cannot fund or for which specific findings must be made in an Environmental Assessment prior to funding. Interventions that are likely to jeopardize a critical habitat for threatened or endangered species or degrade a protected area must be placed in this category. Category 4 covers activities that trigger provisions of Sections 118 or 119 of the Foreign Assistance Act, which generally relate to degradation of national parks or protected areas, introduction of exotic species, or effects on tropical or undegraded forest lands.

_O_ will employ the Screening Form provided as Attachment 1 and to be refined as needed in consultation with the [REO: Insert if one exists] or BEO and the Environmental Review Reports prepared as a result of the categorization process to evaluate activities and/or proposals. Preferably, the direct or actual implementor of an activity will prepare the forms and the environmental reviews, which will be reviewed by _O_ prior to submittal to USAID/_C_. [Insert this sentence if appropriate: Proposals seeking support from the_T_ must also comply with any of its approval criteria and review procedures, which will also include this requirement for environmental screening and review, as well as any other_O_ or USAID/_C_ requirements designed to ensure developmentally sound and sustainable activities for the _T_.]

An Environmental Review Report shall be prepared for all Category 2 activities. The MEO or Mission Director, or Acting Director, on behalf of USAID/_C_, shall be responsible for clearances on the category determination and Environmental Review Reports. It is assumed that the majority of activities will fall within Categories 1 and 2, and will, therefore, be approvable locally by USAID/_C_ without further external review. This delegation of responsibility, without regard to dollar amount of activities, is predicated on the assumption that appropriate

and environmentally sound implementation and environmental monitoring and mitigation procedures will be in place. The MEO, should he/she have questions, will pass Category 2 activities and their reviews to the [REO: Insert if one exists] and BEO for consultation. An Environmental Review Report shall also be prepared as the first step for all Category 3 activities to help the [REO: Insert if one exists] and BEO determine if an Environmental Assessment is required. While an Environmental Review Report may be prepared for Category 4 activities, it is recommended that developers of activities and proposals consult with the USAID MEO and Project Manager before preparing elaborate documentation. All Category 3 and 4 activities (if there are any) shall be subject to additional environmental evaluation, as deemed appropriate, in consultation with the BEO and REO, and shall be passed on to the [REO: Insert if one exists] and Bureau Environmental and Legal Officers for further review and clearance.

Prior to the approval of an activity, results of the environmental categorization must be available and considered. For Category 2 projects, Environmental Review Reports, including MEO review and, if needed, [REO: Insert if one exists] or BEO review, must be performed prior to funding. For any Category 3 or 4 activities, approval cannot be given until the Environmental Review and any additional environmental documentation as determined by the BEO have been prepared and cleared. O may, if it desires, categorize or review categorization of activities, based on use of the screening form, prior to proposers receiving approval and proceeding with final design. This procedure would allow activities in Category 1 (no environmental review required) to be carried out and allow the proposer to undertake appropriate environmental documentation according to the procedures for Category 2, 3, or 4 activities. Hence, such awards will contain clauses stating that funding of Category 2, 3, or 4 activities is contingent on findings, recommendations and clearance of the environmental documentation.

The MEO and/or Project Manager shall on a routine (semi-annual) basis pass to the [REO: Insert if one exists] and BEO an updated summary of activities and the results of the environmental categorization and review process to keep them apprised of the type/nature, scale, funding levels, and implementation status of the individual activities approved under the process described in this IEE and any corresponding mitigation and monitoring requirements. Reference to this process will also be made in the Mission's R4 submittal.

4.3 Promotion of Environmental Review and Capacity-Building Procedures

The procedures described above and incorporated within the Screening Form are intended to ensure environmental accountability and soundness, on the assumption that the Mission has the following additional elements in effect to build environmental capacity with O and its partners:

- The proposer/implementing agent and its appropriate partners will help design, conduct, participate in, and apply environmental assessment and management training, in conjunction with USAID and host country resource organizations and agencies, such as the Regional Environmental Assessment Training Course, and pursue follow-up training to assist these partners in properly fulfilling the screening and review requirements in conjunction with concerned C organizations and agencies;

- The proposer/implementing agent and its appropriate partners will also be encouraged to apply appropriate C environmental assessment policies and procedures; and

- A monitoring and evaluation process will be put in place and used by O and its appropriate partners, in collaboration with any concerned C authorities, and USAID project management.

4.4 Environmental Responsibilities

USAID/_C_ assumes responsibility for environmental review and decision-making for all USAID-assisted_T_ activities as outlined below:

- Through_O_, and with the assistance of partners (as appropriate), proposers will submit proposals that take into consideration potential environmental impacts and their mitigation, including avoidance, and will design the activities with an environmental monitoring system in place.

- _O_, with the assistance of partners (as appropriate), will use the Screening Form to categorize proposals, and the MEO will review and pass on to the [REO: Insert if one exists] and BEO any Category 3 or 4 and, as he/she determines, some Category 2 activities.

- The proposer/implementing agent for an activity, with the assistance of appropriate partners, will ensure implementation of agreed-on mitigating measures and environmental impact monitoring.

- USAID/_C's_ MEO and the Project Manager will be ultimately responsible for monitoring environmental impacts of all project-financed activities, as further specified below (Section 4.5).

- Periodic visits of the [REO: Insert if one exists] or BEO will also be requested for advice, refresher training, and confirmation that environmental processes are in place.

4.5 Monitoring, Evaluation, and Mitigation

An **environmental monitoring, evaluation, and mitigation process** will be established and used by the implementing partners in collaboration with USAID. USAID-supported activities shall incorporate appropriate mitigation and monitoring procedures as listed below.

- The proposer/implementing agent and its partners will use the *Environmental Guidelines for Small-Scale Activities in Africa* (or other appropriate references) to assist them in determining what potential impacts should be of concern for different types of development activities in various settings. Using the information from this and other documents cited therein,_O_ will determine which impacts to mitigate and monitor for the particular development activity.

- The proposer/implementing agent and its partners must identify in each proposal and in the accompanying environmental review reports all proposed environmental mitigation and monitoring requirements.

- Once the environmental review reports are approved, the mitigative measures and monitoring procedures stated in the environmental review report shall be considered a requirement.

- The implementing agent/partner, with assistance of other appropriate partners, shall be responsible for implementation of agreed-on mitigation measures and monitoring of impacts .

- All periodic reports of the implementing partner, under these procedures, to USAID/_C_ shall contain a section on environmental impacts, success or failure of mitigative measures being implemented, results of environmental monitoring, and any major modifications/revisions to the project, mitigative measures or monitoring procedures.

USAID/_C_ is ultimately responsible for ensuring conformity with the procedures spelled out above, including environmental categorization and review procedures. With particular respect to monitoring, evaluation and mitigation, the Mission is responsible for:

- monitoring and evaluation of activities after implementation with respect to environmental effects

that may need to be mitigated, a process that should be integrated into the Mission's pertinent Performance Monitoring and Evaluation Plan;

- review of the implementing partner's reports with respect to results of environmental mitigation and monitoring procedures;

- incorporating into Mission field visits and consultations with implementing partners periodic examination of the environmental impacts of activities and associated mitigation and monitoring (assistance in preparing guidelines or with the monitoring and evaluation can be solicited from the [REO: Insert if one exists] or BEO); and

- reporting on implementation of mitigation and monitoring requirements as part of the summary of activities and their status that is passed to the [REO: Insert if one exists] and BEO.

✓ IEE Section 5.0 Summary of Findings

Incorporate the language below:

This Initial Environmental Examination (IEE) satisfies the conditions of the environmental procedures for umbrella activities and delegation of environmental review responsibility to Missions for PVO/NGO umbrella-type projects (Cable 95 STATE 257896).

Environmental Determinations

Based on environmental review procedures, promotion of environment review, capacity building, and monitoring, evaluation, and mitigation procedures specified in this IEE, to which the Mission commits itself, the following environmental determinations are recommended:

1. A **Categorical Exclusion** is recommended for project-financed technical assistance, training and education, institutional strengthening, regional communications and information exchange activities that have no physical interventions and no direct effects on the environment pursuant to 22 CFR 216.2(c)(1)(i) and 216.2(c)(2)(i), (iii) and (v) [Insert others if applicable]. **The screening form will be used to confirm this determination for each activity.** This categorical exclusion does **not** apply to education, technical assistance, or training if such includes activities directly affecting the environment, such as construction of facilities, per 216.2(c)(2)(i), **nor** to studies, projects, or programs intended to develop the capability of recipient countries to engage in development planning when designed to result in activities directly affecting the environment, per 216.2(c)(2)(xiv).

2. A **Negative Determination with Conditions** is recommended for all other activities entailing community development. This IEE specifies a set of steps to ensure adequate environmental review of USAID-supported activities, including capacity-building elements. This negative determination is also conditioned on the provision of supplemental project technical assistance and training support to augment existing efforts. These capacities will be developed and implemented in close collaboration with the USAID/_C_ and partners.

Conditions

USAID's support for the_T_ will follow a formalized environmental review process for its activities. A key component of this review process is the use of a Screening Form (Attachment 1) to categorize activities, and review and screen them for potential environmental impacts.

The USAID Mission assumes responsibility for environmental review, with clearance by the Mission Environmental Officer (MEO) or USAID Director or Acting Director in accordance with the environmental review procedures outlined herein for Category 1 and Category 2 activities. All

activities classified as Category 3 or 4, based on the procedures for categorization and review (in the unlikely event there are any), and possibly some in Category 2, at the discretion of the MEO, will be subjected to additional environmental review, as deemed appropriate, in consultation with the [REO: Insert if one exists] and Bureau Environmental Officer (BEO), and will be passed to the Bureau Environmental and Legal Officers for further review and clearance.

_O_ may, if it desires, categorize or review categorization of activities, based on use of the screening form, prior to proposers receiving approval and proceeding with final design. This procedure would allow Category 1 activities that are in Category 1 (no environmental review required) to be carried out and for the proposer to undertake an appropriate environmental review in accordance with the procedures for Category 2, 3, or 4 activities. No activities classified in Category 2, 3, or 4 will be funded until the environmental documentation required by this IEE has been prepared, reviewed, and cleared. Hence, such awards will contain clauses stating that funding for such activities is contingent on adherence to the findings and clearance of the environmental documentation.

Partners implementing the_T's_ USAID-supported activities will help design, conduct, participate in and apply appropriate environmental assessment/design and implementation/mitigation procedures for each activity. The Project will support appropriate environmental training and will do follow-up training to assist these partners in properly fulfilling this review requirement, in conjunction with concerned_C_ organizations and agencies.

An environmental monitoring, evaluation and mitigation process shall be established and used by the implementing partners, including grantees, in collaboration with USAID. Updated summaries of activities and their status, based on the procedures described in this IEE, will be submitted periodically to the REO and BEO to keep them apprised of the type, scope and implementation status of the activities and their corresponding mitigation and monitoring requirements. Reference to this process will be made in the Mission's annual R4 submittal.

This IEE does not cover pesticides or other activities involving procurement, use, transport, storage, or disposal of toxic materials, and any situation dealing with such will require an amended IEE, except to the extent covered in Category 2 of the screen form attached.

Adherence to the procedures in this IEE is not in lieu of any environmental assessment procedures required by the_C_, nor can adherence to host country environmental procedures be substituted for compliance with the procedures in this IEE. Efforts will be made, however, in the development or revisions of the Screening Form to dovetail respective assessment information requirements to the maximum extent allowable.

ENVIRONMENTAL SCREENING/REPORT FORM FOR NGO/PVO ACTIVITIES

BACKGROUND

USAID, as a "re-engineered, learning institution," has introduced major changes in its new operations systems, with a strengthened focus on results (not activities), greater accountability and empowerment, teamwork, participation and customer orientation. For example, projects are replaced with "results packages" provide USAID operating units and collaborators the flexibility they need to adapt to changes during implementation. The underlying rationale is to focus on results, while still managing inputs and monitoring outputs properly, and to give those responsible (including the host country partners) for achieving results the flexibility to change approaches and tactics as situations change or lessons are learned.

USAID's Africa Bureau Environmental Office, in conjunction with the Regional Environmental Offices, has been developing an initiative for environmental management capacity building. This initiative is intended to support USAID/AFR Missions, their implementing agents and collaborators. An important rationale for this initiative is that Africa Bureau environmental and legal staff anticipate providing significantly enhanced responsibility to carry out environmental reviews to those USAID Mission programs whose designers and/or implementors have successfully completed an Environmental Assessment course and/or participated in related capacity-building activities. Relevant agency experience has shown that such enhanced Mission authority can greatly facilitate field-level program activity design and implementation. These NGO Environmental Guidelines are consistent with USAID's new precepts of flexibility.

The present Environmental Screening and Reporting Form (ESF) is designed to be consistent with the Initial Environmental Examination process, and to assist USAID Missions and their implementing partners design and implement activities in an environmentally sound manner in accordance with all salient agency policies and procedures. Use of the ESF will greatly reduce the need for review and approval of NGO activities at the regional or Washington levels.

INTRODUCTION TO USE OF THIS FORM

This form is to be utilized to screen USAID-funded activities, including grantees of the PVO umbrella projects, and proposals submitted for consideration for funding under other USAID programs including grants management units, where USAID has approved through an Initial Environmental Examination that this process be put in place. This is a *generic* form , illustrative only, and its final contents are to be refined and jointly determined among the affected partners -- NGO, USAID, host country agencies, etc. To the extent possible, the form should reflect host government environmental policies and procedures, e.g., accounting for existing designated protected areas.

Typically, two broad categories of projects will be funded: (a) those designed to strengthen local institutional capacities to manage the natural resource base and (b) those designed to support the development of appropriate infrastructure needed for sustainable natural resource management. Activities could include training, technical assistance and other institutional support, income-generating activities through the exploitation of natural resources in a self-sustaining and environmentally sound manner or development of physical infrastructure to further natural resource management at the district level. Under other components of USAID-funded programs, training, technical assistance, research, studies, and information-related activities and other types of activities can be funded.

This form is intended to be adaptable to unique circumstances. In using this form, adjustments as needed can be made in consultation with the Regional and Bureau Environmental Offices. It is strongly advised that the Mission Environmental Officer make on-site visits prior to finalization of the ESF, and that the ESF be rational and fully defensible and without ambiguity as to how the conclusion was reached that the activity(ies) will have no significant impact.

ENVIRONMENTAL SCREENING/REPORT FORM
FOR NGO/PVO ACTIVITIES

Grantee: _____

Grant/Sub-grant: _____

Activity Name: _____

Duration (proposed start and completion dates): _____

Geographic Location: _____

Activity Description (paragraph(s) describing purpose/outputs and potential environmental impacts): [add space as needed]

Determine the Nature of the Activity

a. **Environmental Review Report Needed.** Does the activity include funds to support any physical natural resource management activities, or any community and rural development services, infrastructure, public facilities or road rehabilitation? Does it involve development of income-generating or resource management systems, or certain kinds of applied ecological or natural resources research? It will likely require an Environmental Review of the kind described in Step 4 of this form. Determine under which Category the activity falls to establish the need for the Environmental Review.

b. **No Further Environmental Review Required.** Is the activity exclusively to provide technical assistance, training, institutional strengthening, or research, education, studies or other information analysis, awareness-building or dissemination activities *with no foreseeable negative impact on the biophysical environment*? This probably qualifies as a Category 1 activity -- no further environmental review or action may be necessary. Complete form to establish this circumstance.

c. **Emergency Circumstances Apply.** Does the activity involve an emergency circumstance (e.g. drought)? Under specific conditions, the activity may be *exempt* from further environmental review. Must be determined by Bureau Environmental Officer with input from Regional and Mission Environmental Officers. Sound environmental implementation principles are to be applied to any urgent programs. Note that exemptions *cannot* be applied in the case of assistance for use or procurement of *pesticides*.

d. **Multiple Categories.** Many activities will have components or sub-activities in more than one category. Simply mark all that apply. The form will guide you to the appropriate next steps.

Step 1. Determine Category of Activity:

- **Africa Bureau *Category 1* -- no further environmental review needed:**

  ▸ ***Does the activity involve (mark yes where applicable):***

_____ Provision of education, technical assistance, or training. Does *not* qualify for "Category 1" if such programs include activities directly affecting the environment.

_____ Community awareness initiatives.

_____ Controlled experimentation exclusively for the purpose of research and field evaluation confined to small areas (normally under 4 ha., i.e., 10 acres) and carefully monitored (when no protected or other sensitive environmental areas could be affected).

_____ Technical studies and analyses and other information generation activities not involving intrusive sampling of endangered species or critical habitats.

_____ Document or information transfers.

_____ Nutrition, health care or family planning. Such programs do *not* qualify for "Category 1" if (a) some included activities could directly affect the environment (construction, water supply systems, etc.) or (b) biohazardous (esp. HIV/AIDS) waste is handled or blood is tested.

_____ Rehabilitation of water points for domestic household use, shallow, hand-dug wells or small water storage devices (when no protected or other sensitive environmental areas could be affected). *Pursuant toUSAID guidance on water quality, testing required for arsenic, nitrates, nitrites and coliform.*

_____ Construction or repair of facilities if total surface area to be disturbed is under 10,000 sq. ft. (approx. 1,000 sq. m.) (*and* when *no* protected or other sensitive environmental areas could be affected).

_____ Support for intermediate credit arrangements (when *no* significant biophysical environmental impact can reasonably be expected).

_____ Programs of maternal and child feeding conducted under Title II of Public Law 480.

_____ Food for development programs under Title III of P.L. 480, when <u>no</u> on-the-ground biophysical interventions are likely.

_____ Studies or programs intended to develop the capability of recipients to engage in development planning. Do *not* mark "yes" if these involve activities directly affecting the environment.

- **Africa Bureau *Category 2* -- Negative environmental impacts possible, environmental review required (specific conditions, including monitoring, may be applied):**

Note: The Environmental Review (Step 4 below) must address why there will be no potential adverse impacts on protected areas, endangered or threatened species or their critical habitat; or relatively undegraded forest, i.e., justify your conclusion that the proposed Category 2 activities do not belong in Category 3 or 4. Even for activities designed to protect or restore natural resources, the potential for environmental harm exists (e.g., re-introduction of species, controlled burning, fencing, wildlife water points, spontaneous human population shifts in response to activities undertaken, etc.). *If you do not find an exact match listed here for the activity you are undertaking, and it is not in Category 1, 3 or 4, then use the last item in Category 2 to describe the activity and treat it as Category 2 for purposes of environmental review.*

▸ ***Does the activity involve (mark yes, where applicable)*:**

_____ Small-scale agriculture, NRM, sanitation, etc. (*list and scale to be defined mutually among the appropriate partners* -- NGO, donor, host country agencies, REDSO, etc.).

_____ Controlled experimentation exclusively for the purpose of research and field evaluation *(areas of 4 ha. or more,* i.e., 10 acres) and carefully monitored, when neither protected or other sensitive environmental areas could be adversely affected nor threatened and endangered species and their habitat jeopardized.

_____ Small-scale construction or rehabilitation of facilities or structures in which the surface area to be disturbed exceeds 10,000 sq. ft and funding level is not in excess of $200,000 and where no protected or other sensitive environmental areas could be affected.

_____ Minor construction or rehabilitation of rural roads less than ca. 10 km (with no change in alignment or right of way), with ecologically sensitive areas at least 100 m away from the road and not affected by construction or changes in drainage; likewise, no protected areas or relatively undegraded forest should be within 5 km of the road.

_____ Nutrition, health care or family planning, *if* (a) some included activities could directly affect the environment (construction, water supply systems, etc.) or (b) biohazardous (esp. HIV/AIDS) *waste is handled or blood is tested.*

_____ Construction or rehabilitation of small-scale water points or water storage devices for domestic or non-domestic use, not covered in Category 1, when neither protected or other sensitive. environmental areas could be adversely affected nor endangered and threatened species jeopardized. *Pursuant toUSAID guidance on water quality, testing required for arsenic, nitrates, nitrites and*

coliform.

_____ Quantity imports of commodities such as fertilizers.

_____ Food for Development programs under Title II or III, involving known biophysical interventions with potential to cause environmental harm (e.g., roads, bore holes).

_____ Support for intermediate credit institutions when indirect environmental harm conceivably could result .

_____ Institutional support grants to NGOs/PVOs when the activities of the organizations are known and raise the likelihood of some environmental impact.

_____ Technical studies and analyses and other information generation activities that could involve intrusive sampling, including aerial surveys, of endangered species or critical habitats.

_____ Small-scale use of USEPA-registered least-toxic *general-use pesticides*, limited to NGO-supervised use by farmers, demonstration, training and education, or emergency assistance. Environmental review must be carried out consistent with USAID Pesticide Procedures as required in Reg. 16 [22 CFR 216.3(b)(1)].

_____ Other activities not in Category 1 and not in Category 3 or 4. Specify:

_____

_____

▸ ***Were the following used by the PVO/NGO in designing the above Category 2 activities (yes, no, N/A)?***

_____ *USAID/AFR's Environmental Guidelines for NGO and PVO Use in Africa*

_____ Any applicable Programmatic Environmental Assessments: _____

Other: _____

- **Africa Bureau *Category 3* -- Significant environmental impacts likely. Environmental review required, and Environmental Assessment likely to be required:**

▸ ***Does the activity involve (mark yes where applicable):***

_____ River basin or new lands development

_____ Planned resettlement of human populations

_____ Penetration road building, or rehabilitation of roads (primary, secondary, some tertiary) over 10 km length, and any roads which may pass through or near relatively undegraded forest lands or other sensitive ecological areas

_____ Substantial piped water supply and sewerage construction

_____ Major bore hole or water point construction

_____ Large-scale irrigation

_____ Water management structures such as dams and impoundments

_____ Drainage of wetlands or other permanently flooded areas

_____ Large-scale agricultural mechanization

_____ Agricultural land leveling

_____ Procurement or use of restricted use pesticides, or wide-area application in non-emergency conditions under non-supervised conditions

_____ Light industrial plant production or processing (sawmill operation, agro-industrial processing of forestry products)

_____ Potential to significantly degrade protected areas, such as introduction of exotic plants or animals

_____ Potential to jeopardize threatened & endangered species or adversely modify their habitat (esp. wetlands, tropical forests)

The above Category 3 activities are consistent with USAID criteria for activities that normally require a USAID-specific document with a defined format and procedure, called the Environmental Assessment (EA). It is recognized

that some of these categories are ambiguous. Mark "yes" if they apply, and show in the Environmental Review (Step 4) the extent and magnitude of activities and their impacts, so that USAID and its partners can determine if an EA is necessary or not.

- **Africa Bureau *Category 4* -- Activities not fundable or fundable only when specifically defined findings to avoid or mitigate the impacts are made, based on an Environmental Assessment[1]:**

  ▸ ***Does the activity involve (mark yes where applicable):***

_____ Actions determined likely to significantly degrade protected areas, such as introduction of exotic plants or animals
_____ Actions determined likely to jeopardize threatened & endangered species or adversely modify their habitat (esp. wetlands, tropical forests)[2]
_____ Conversion of forest lands to rearing of livestock
_____ Planned colonization of forest lands
_____ Procurement or use of timber harvesting equipment
_____ Commercial extraction of timber
_____ Construction of dams or other water control structures which flood relatively undegraded forest lands
_____ Construction, upgrading or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands.

Step 2. **Summarize and Itemize Activities.** List activities by all categories to which *Yes* was answered.

Categories of activities as determined below (add entries as required):

Activity/Sub-Activity	Funding:	Category

[1] Per Foreign Assistance Act Sect. 118 & 119 relating to overseas assistance affecting Tropical Forestry and Biodiversity

[2] Per USAID Environmental Procedures, § 22 CFR 216.5, on Endangered Species

Step 3. Determine Need to Prepare Environmental Review.

If all activities are in Category 1, sign and date the form. For any activities in Category 2 and 3, prepare an Environmental Review Report assessing all of these activities' impacts. For Category 3 activities, further documentation would be required, once USAID has confirmed the applicability of Category 3, based on the Review. If Category 4 is possible, consult USAID before proceeding with the Environmental Review to determine if activities can be funded and/or whether required EA findings could be made.

For all Category 2 and 3 activities, proceed to Step 4 to prepare Environmental Review.

Step 4. Prepare Environmental Review

Suggested Format for Environmental Review

The Environmental Review should be about 5-8 pages long (more if required) and consist of following sections:

1. **Background, Rationale and Outputs/Results Expected** -- summarize and cross-reference proposal if this review is contained therein.

2. **Activity Description** -- Succinctly describe location, siting, surroundings (include a map, even a sketch map). Provide both quantitative and qualitative information about actions needed during construction, how intervention will operate and any ancillary development activities that are required to build or operate the primary activity (e.g., road to a facility, need to quarry or excavate borrow material, need to lay utility pipes to connect with energy, water source or disposal point or any other activity needed to accomplish the primary one but in a different location). If various alternatives have been considered and rejected because the proposed activity is considered more environmentally sound, explain these.

3. **Environmental Situation** -- Affected environment, including essential baseline information available for all affected locations and sites, both primary and ancillary activities.

4. **Evaluation of Activities and Issues with Respect to Environmental Impact Potential** -- Include impacts that could occur before construction starts, during construction and during operation, as well as any problems that might arise with restoring or reusing the site, if the facility or activity were completed or ceased to exist. Explain direct, indirect, induced and cumulative effects on various components of the environment (e.g., air, water, geology, soils, vegetation, wildlife, aquatic resources, historic, archaeological or other cultural resources, people and their communities, land use, traffic, waste disposal, water supply, energy, etc.). Indicate positive impacts and how the natural resources base will be sustainably improved.

5. **Environmental Mitigation Actions** (including **monitoring and evaluation**) -- For example, indicate means taken to avoid, reduce or compensate for impacts, such as restoration of borrow or quarry areas, replanting of vegetation, compensation for any relocation of homes and residents. Indicate how mitigative measures will be monitored to ensure that they accomplish their intended result or what monitoring might be needed for impacts that one is uncertain about.

6. **Other Information** (as appropriate) -- where possible, include photos of the site and surroundings; list the names of any reference materials or individuals consulted.

Note: Specific plans for monitoring of key environmental indicators and mitigation of impacts during activity implementation are especially important; these must be addressed in the review. Information on monitoring results and mitigation of impacts are to be included in all progress reports. Important information and a criterion for evaluation of environmental soundness is showing how the activity is part of or guided by an integrated, community-based resource and land use plan or planning and management framework that considers the appropriate use of multiple resources.

List of Approvals

Drafted by: _____ Date: _____

Reviewed by: _____ Date: _____

PVO/NGO Director (if different from above) _____ Date: _____

Clearances:

USAID Project Manager or Designee: _____ Date: _____

MEO: _____ Date: _____

OR

USAID Mission Director: _____ Date: _____

Indicate here recommendation that an Environmental Assessment (EA) be prepared, if any activities are classified in Category 3 or 4, OR explain why an EA is thought not to be required.

All activities designated Category 3 or 4 **must be referred** to the REDSO/ESA REO/REA and BEO and, in some cases, the RLA. The MEO should also refer any questionable Category 2 activities.

REDSO REO/REA, RLA and BEO Referrals (if appropriate, list names and dates):

esfmst7b
Modified from esfmast7 in 9/98

Annex 3

THE ENVIRONMENTAL ASSESSMENT (EA)

Note: This summary is illustrative only. Participants would not normally be expected to prepare an environmental assessment. The responsibility for EA's lies with USAID environmental personnel and the USAID Mission.

The Environment Assessment is "a detailed study of the reasonably foreseeable significant effect, both beneficial and adverse, of a proposed action on the environment of a foreign country or countries." It is intended to "provide Agency and Host Country decision makers with a full discussion of the significant environmental effects of a proposed action. It includes alternatives which would avoid and minimize adverse effects or enhance the quality of the environment so that the expected benefits of development objectives can be weighed against any adverse impacts upon the human environment or any irretrievable commitment of resources." (22CFR 216.6 (a)).

It is applicable for classes of actions having significant effect on the environment. See (22 CFR 216.2 (d)(1)), (22CFR 216.2 (d)(2) and (22 CFR 216.5).

See the illustrative flow chart on the following page.

STEPS FOR DESIGNING AN EA:

i) Scoping: Scoping is an open door session (involving all affected parties, including local communities) for the purpose of identifying the major project environmental issues to be assessed. This will include negative as well as positive impacts of project activities.

ii) Submitting the scoping statement: When prepared the scoping statement has to be submitted to the USAID Bureau Environmental Officer for approval.

iii) Setting up the team: Relevant specialists are selected to address the issues identified for an appropriate assessment. The EA team may be composed of, or be a mix of, specialists from the Host Country, USAID Washington, REDSOs, IQCs or other contractors.

iv) Field work on the EA: The team works with relevant Mission and/or host country specialists and institutions in examining and documenting negative and/or positive environmental effects of project activities. Conclusions are based on field visits and analytical field survey work as well as examination of existing baseline information and previous studies.

v) EA report: The report documents findings, analytical results and conclusions in readable standard format.

STEPS FOR PREPARING an EA or an EIS

IEE
if positive determination

|

POSITIVE THRESHOLD or PESTICIDE PROCEDURE

|

SCOPING EXERCISE
Identification of Significant issues
Determine the Scope of issues to be addressed
(team selection can be proposed)

|

REVIEW PROCESS
Circulation of scoping statement
Request for written comments
(within 30 days)

|

SCOPING STATEMENT
APPROVAL BY BUREAU ENVIRONMENTAL OFFICER

|

TEAM SELECTION
(Here or earlier)

|

EA PREPARATION
Summary, Purpose, Alternatives (including proposed action),
Affected Environment, Environmental Consequences,
List of Preparers, Appendix

|

CIRCULATION, CONSULTATION AND REVIEW
ENVIRONMENTAL ASSESSMENT
USAID staff Review by host government
Available to host country general public
selected individuals

|

EA DOCUMENT
APPROVAL BY BUREAU
ENVIRONMENTAL OFFICER
Possible Review by Agency Environmental Coordinator*
Possible Review by General Counsel*

* At Bureau Environmental Officer Discretion

Summary of Environmental Regulations Affecting USAID Activities

Environmental Regulations and Statutory Requirements Applicable to USAID Assistance

In addition to the general guidelines and strategies applicable to USAID as a whole, the Agency operates under a number of regulations to implement its environmental program activities. Some of the more important regulations are briefly described below.

USAID Environmental Procedures: 22 CFR Part 216 (Regulation 216, or "Reg. 16")

USAID's Environmental Procedures are Federal Regulations, and therefore represent a legal requirement as well as Agency policy. These environmental procedures shall be used by USAID to ensure that environmental factors and values are integrated into the USAID decision-making process. These procedures also assign responsibility within the Agency for assessing the environmental effects of A.I.D.'s actions. They are intended to implement the requirements and the purposes of the National Environmental Policy Act of 1970 as they affect USAID development assistance programs.

It is A.I.D. policy to:

(1) Ensure that the environmental consequences of USAID-financed activities are identified and considered by USAID and the host country prior to a final decision to proceed and that appropriate environmental safeguards are adopted;

(2) Assist developing countries to strengthen their capabilities to appreciate and effectively evaluate the potential environmental effects of proposed development strategies and projects, and to select, implement and manage effective environmental programs;

(3) Identify impacts resulting from A.I.D.'s actions upon the environment, including those aspects of the biosphere which are the common and cultural heritage of all mankind; and

(4) Define environmental limiting factors that constrain development and identify and carry out activities that assist in restoring the renewable resource base on which sustained development depends.

Foreign Assistance Act Amendments (P.L. 87-185 as amended):
Environmental and Natural Resources (Section 117 of the Foreign Assistance Act)

Section 117 emphasizes the need for the United States to exercise leadership in reassessing policies related to the environment and natural resources and in "cooperating extensively with developing countries in order to achieve environmentally sound development." To achieve this goal, the section indicates that: "Special efforts shall be made to maintain and where possible to restore

the land, vegetation, water, wildlife, and other resources upon which depend economic growth and human well-being, especially of the poor."

The section also requires USAID to "take fully into account" the impact of its activities on the environment and natural resources of developing countries. Where appropriate, Section 117 (c)(1) encourages USAID to use local technical resources in preparing environmental assessments or impacts statements that may be necessary.

Tropical Forests (Section 118 of the Foreign Assistance Act)

In Section 118, the U.S. Congress recognizes the importance of tropical forests in developing countries. Congress is particularly concerned that the continuing destruction and loss of tropical forests will impair the economic development of these countries. If properly managed, tropical forests can provide a sustained flow of resources which are essential to economic growth. Tropical forests can also maintain genetic resources which are important to both developed and developing countries.

According to this Section, tropical forest destruction may result in:

- shortages or wood resources (e.g., fuelwood, non-timber forest products);
- loss of biologically productive wetlands;
- extinction of plant and animal species;
- reduced capacity for food production;
- loss of genetic resources; and
- desertification and destabilization of the earth's climate.

Under Section 118 (c) the following language pertains to circumstances when USAID assistance would be denied:

"(14) Deny assistance under this chapter for—

"(A) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner which minimizes forest destruction and that the proposed activity will produce positive economic benefits and sustainable forest management systems; and

"(B) actions which significantly degrade national parks or similar protected areas which contain tropical forests or introduce exotic plants or animals into such areas.

"(15) Deny assistance under this chapter for the following activities unless an environmental assessment indicates that the proposed activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development:

"(A) Activities which would result in the conversion of forest lands to the rearing of livestock.

"(B) The construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands.

"(C) The colonization of forest lands.

"(D) The construction of dams or other water control structures which flood relatively undegraded forest lands.

Endangered Species (Section 119 of the Foreign Assistance Act)

In Section 119, the U.S. Congress finds that the survival of many animal and plant species is endangered by over-hunting, by the presence of toxic chemicals in water, air and soil, and by the destruction of habitats. Congress further finds that the extinction of animal and plant species is an irreparable loss with potentially serious environmental and economic consequences for developing and developed countries alike. Accordingly, the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems, and through the protection of wildlife habitats should be an important objective of the United States development assistance.

In order to preserve biological diversity, the President is authorized to furnish assistance under this Section to assist countries in protecting and maintaining wildlife habitats and in developing sound wildlife management and plant conservation programs. Special efforts should be made to establish and maintain wildlife sanctuaries, reserves, and parks; to enact and enforce anti-poaching measures; and to identify, study, and catalog animal and plant species, especially in tropical environments.

Biological diversity is defined as the variety and variability among living organisms and the ecological complexes in which they occur. It can be measured at four levels: biomes (e.g., tropical moist forests, coastal wetlands, etc.), ecosystems (a portion of a biome in which living organisms seem to be self-sustaining), species, and genetic varieties within species.

Country Analysis Requirements Under Sections 118 and 119 of the Foreign Assistance Act

All USAID Missions are required under these Sections to provide information on tropical forests and biological diversity as appropriate in their country development strategy. The information should contain an analysis of the:

(i) actions necessary in that country to achieve conservation and sustainable management of tropical forests; and

(ii) extent to which the actions proposed for support by the Agency meet the needs identified.

Non-Project Assistance (NPA) and Environmental Impacts (Section 496(h)(2)(b) of the Foreign Assistance Act Amendment)

The 1992 Foreign Assistance Act Amendment (Section 496, H.R. 5368) requires that institutional and policy reforms include provisions to protect long-term environmental interests from

possible negative consequences of policy reforms. The requirement calls for analyses of policy reforms that are likely to have a long-term impact on the environment. The amendment's provisions are a particular challenge to implement by USAID, because of the Agency's limited responsibility, vis-a-vis the host country government, for the mitigation of potential environmental impacts associated with policy initiatives. The approach being promoted by USAID Africa Bureau involves encouraging improved environmental monitoring processes by the host country institutions, which can lead to better-informed mitigation actions. Programmatic environmental monitoring, evaluation and mitigation planning (EMEMP) may be a particularly useful mechanism for helping USAID and host governments avoid possible negative environmental consequences from proposed non-project assistance policies or activities.

Protection of Vulnerable Groups in light of Policy Reforms (1990 Amendment of FAA)

Assisted policy reforms shall also include provisions to protect vulnerable groups (especially poor, isolated, and female farmers, the urban poor, and children including displaced children) and **long-term environmental interests from possible negative consequences of the reforms**. This is to be treated as design factor, especially with respect to Non-Project Assistance. *Source:* Amendment to the Foreign Assistance Act, 1990 Chapter 10-Development Fund for Africa. Section 496(h)(2)(B). Dated 27 October 1990.

Commercial Extractive Forestry: Section 533(c)(3) of the Foreign Operations, Export Financing and Related Programs Act, 1991

In addition to imposing requirements on USAID through amendments to the Foreign Assistance Act, the Congress can also do so through legislation that provides appropriations to the agency. Section 533(c)(3) provides such an example. It prohibits the expenditure of funds for any activity, program, or project that "would result in any significant loss of tropical forests" or involve "commercial timber extraction of primary tropical forest areas" unless an environmental assessment:

(i) identifies potential impacts on biological diversity;
(ii) demonstrates that all timber extraction will be conducted according to an environmentally sound management system which maintains the ecological functions of the natural forest and minimizes impacts of biological diversity; and
(iii) demonstrates that the activity will contribute to reducing deforestation.

Note: For a detailed review of USAID's responsibilities related to biological diversity and tropical forests see Russo, Sandra, *Considerations of Biological Diversity and Tropical Forestry in the Context of Country Program Strategy Planning in the Bureau for Africa: Review and Guidelines*, Prepared by Environmental and Natural Resources Policy and Training (EPAT) Project for USAID AFR/SD/PSGE, November 1994, 117pp.

10. Tools and Methods for Environmental Review and Assessment

Description/Objectives

Checklists, maps, and basic information gathering techniques are important tools for identifying potential environmental impacts at an early stage of activity project or program design. Unlike more complex methods, they generally do not require particular expertise to use. This module will present basic information gathering techniques and tools, focussing on checklists and maps, to provide you with tools that you can use for the course field trip as well as your own activities.

Readings

Module Backgrounder: "Basic Tools and Methods for Environmental Review and Assessment: Checklists and Information Gathering"

Attachments

Selected checklist(s) for use in the field

You should review the material in this session Backgrounder, which describes checklists and information gathering, as well as the more extensive material for the later session on detailed environmental assessment, which covers matrices, overlays, and other tools and techniques. In most cases, it is likely that the emphasis should be placed on the use of checklists and maps, *especially the utility of collecting and using available maps to identify and chart the location and movement of human and natural resources.*

You should also review the checklists included in the Sourcebook for this session, and determine whether these should be supplemented or replaced with other useful tools, such as locally developed checklists if they exist.

MODULE BACKGROUNDER
Basic Tools and Methods of Environmental Assessment: Checklists and Information Gathering

In this module, we will introduce you to specific types of information needed to assess environmental impacts as well as some practical basic tools and methods that you can use.

(Much of the following material was drawn from CCIC, 1994: *Environmental Screening of NGO Development Projects*)

1. What type of Information Should You Acquire?

To screen a project for potential environmental impacts, certain information about the community and physical environment at the project site will be needed. Some of this information will already have been collected to develop the project objectives. But additional data will likely be necessary to identify alternative methods of accomplishing the project objectives and to evaluate their respective impacts on the environment. The data will vary depending on the project but, in general, the following environmental data will be needed at the reconnaissance level:

- General climatic information (e.g., annual rainfall patterns, flood and drought cycles, wind patterns);
- Land-use patterns (e.g., residential, recreational, protected area);
- Resource use by the people (e.g., forestry, aquaculture, agriculture, fishing, natural grasslands for grazing);
- Type of habitats present (e.g., mangrove, forest, desert, grassland);
- Physical characteristics (e.g., soil type, topography, erosion potential, presence of streams, ground water characteristics); and
- Biological characteristics (e.g., animal and plant species present and their significance, i.e., food source for the people, endangered species).
- Status (location, characteristics, condition, use, etc. of any protected areas (national or other parks, reserves, or other as defined by national or other law) that could be affected by the action, including protected areas in any possible zone of impact (direct or indirect, upstream, downstream, construction activities, transport of construction materials, etc.)
- Location and information about designated, classified, or gazetted forests (if not defined as a protected area per se under national or other law) as well as identification of any relatively undegraded forest, even if not classified or gazetted.

Some of the above data already exist. Sources of information include:

- Direct observation during a site visit;
- Local counterparts;
- Local villagers, farmers, and residents;
- Regional meteorological stations;

- Local government agencies, such as the Ministry of Agriculture or Forestry, or local agricultural extension workers;
- Airport;
- Local university or training centers;
- Local NGOs, consultants, and experts;
- National Conservation Strategy for Sustainable Development (IUCN);
- National Environmental Action Plan;
- National Report on Environment and Development prepared for the UNCED Rio 1992 conference;
- Tropical Forestry Action Plan;
- USAID Environmental Sector Assessment (sometimes referred to as Environmental Threats Assessment) or Biodiversity Assessment (in place or likely in process);
- GIS data bases (consult Ministry of Environment or Natural Resources or equivalent);
- FAO (which has supported international soils and water resource inventories in many areas).

Similarly, information on the local culture, socio-economic conditions, and gender relations of the area that will be useful for screening purposes include:

- Crops and livestock raised, and associated agricultural practices (e.g., tillage and harvesting methods, pesticide and fertilizer use);
- Agriculture, rain-fed or irrigated;
- Local water sources and usage;
- Community resources (e.g., raw building materials, land ownership and distribution, work patterns, role of women);
- Local sanitation facilities and hygiene practices;
- Population size and demographics (e.g., principal diseases, birth controls, sex/age distribution);
- Local religion, culture, and traditions; and,
- Literacy levels and educational training facilities; and community organization, leadership, communication, and types of occupations.

Some sources of this information include direct observation, local counterparts, local farmers and villagers, and local NGOs.

An emphasis should also be placed on collecting and using available maps to identify and chart the location and movement of human and natural resources. Map resources include:

Topographical and physical maps at the scale 1/10000 to 1/20000 providing information on:

- inhabited areas;
- major wind directions;
- waterways and water bodies;
- different types of vegetation cover;
- sensitive and fragile areas;
- protected forests; and,
- classified forests.

Maps, plans and sketches of activities providing information on:

- land use around the selected site;
- areas disturbed during construction, and type of disturbance;
- existing or planned solid waste collecting systems, especially for urban projects; and,
- existing or planned liquid waste collecting systems.

Compare the maps of information about the setting with maps or plans that you have of the proposed action to see how or if various kinds of resources or areas overlap with the geographic area affected by the proposed action. You will need to be careful about comparing maps of different scales, so you will often not have a precise indication of areas of overlap, but you will be able to see areas of potential conflict that need to be investigated further. Use of map information of environmental features has been refined with the use of transparent overlays (overlay method) and now with the use of computer generated maps that present multiple features from a variety of sources (see Figure 1.1 at end of Module).

2. Simple Checklists for Assessing Environmental Impacts

It is not always easy, even given the right data, to appreciate the various subtle and indirect ways in which certain project activities can affect the environment. Checklists are useful tools for guiding decision-making especially during the prefeasibility and planning phases when it is most critical to anticipate negative impacts and to include mitigating measures in projects. Checklists are designed:

- to help ***identify significant negative impacts*** by providing the right questions to ask regarding the various project activities and the respective environmental components that may be affected;
- to provide a ***systematic approach*** to the environmental screening of development projects;
- to indicate ***how and why certain project activities have environmental impacts*** which will allow planners to transfer those principles to screen projects not specifically addressed by the checklists;
- to assist in ***identifying appropriate mitigation measures*** to be incorporated into the project design; and,
- to ***increase environmental awareness and understanding*** of the relationship between environmentally sound practices and sustainable development.

Checklists offer the advantage of simplicity for gathering and classifying information that is necessary for assessing environmental impacts. The technique is a structured way to help you begin to organize information, identify potential environmental impacts, think about possible mitigation options, and make tentative conclusions on the extent of environmental impact. It is important to note that, no matter what the structure of the checklist, a variety of sources can be used to develop the checklist; local individuals, experts, and other concerned parties. At the end of this Module, we present a simple checklist that is comprised of the following categories:

- ***Project activity***. In this column, you identify the nature of the proposed project and the scope of its activities and tasks.

- ***Potential environmental impacts.*** In this column, list the potential impacts of the proposed project such as threats to a particular species, reduced visibility, materials soiling, etc.
- ***Recommended mitigation strategies.*** This column is for some potential remedies to the identified impacts. Mitigation options can refer to either the pre- or post-construction phase.
- ***Degree of Environmental Impact.*** In this column, synthesize the assessment of impacts and potential remedies and indicate the environmental impact of the proposed project, ranging from severe to acceptable.

Chapter 3 of *Environmental Guidelines for Small-Scale Activities in Africa (1996),* "Implementation Guidelines by Sector," examines key sectors using a consistent outline: identifying the problem; describing potential environmental impacts; and possible causes of negative impacts of activities. Key questions and suggested actions are provided to facilitate review of project design, implementation, mitigation and monitoring/evaluation issues.

3. Interaction Matrices (after Takawira, 1995)

Interaction Matrices involve two checklists, one for environmental features and the other for project activities, arrayed on each axis of a two-dimensional matrix (Figure 1.2). An interaction matrix allows the identification of cause-effect relationships between specific activities and impacts, but does not easily distinguish between direct and indirect impacts. The entries in the cells of the matrix can be either qualitative or quantitative estimates of impact. Each cell can also be divided diagonally to display an estimate of both impact severity and significance.

Matrices are useful for impact identification and for displaying the results of both impact analysis and impact assessment.

4. Network Analyses (after Takawira, 1995)

Network Analysis relies upon an understanding of the ecological relationships among the environmental features in a project area. Environmental features are generally interconnected in some functional manner and the connections, displayed in a network or "web," depict which features are related to others. A project will directly impact one or more features and the network is used to indicate what other features may be subsequently affected indirectly. An "impact network" can then be constructed (Figure 1.3) to display the project actions and which features may be affected directly and through secondary, tertiary and higher-order impacts. Network analysis is useful for impact identification.

What is Happening
Where
When

Sample Checklist for Project Analysis

Project Activity	Potential Environmental Impacts	Recommended Mitigation Action	Environmental Determination
Planning & Design			
Construction			
Operation			
Decommissioning			

5. Information Resources for Environmental Review or IEE Preparation

Environmental information must be available to the Environmental Review or IEE preparer. Information resources should include:

* Topographical and physical maps (preferably at the scale 1/10000 to 1/20000) showing:

- 0.5 meter contours,
- inhabited areas,
- major wind directions,
- waterways and water bodies,
- different types of vegetation cover,
- sensitive and fragile areas.

* Maps, plans or sketches of activities:

- Indications of land use around the selected site,
- Map of areas disturbed during construction and type of disturbance (including tree removal and any grading, land leveling, removal of soil o rock, etc.),
- Description or sketch of existing or planned solid waste collecting system, especially for urban projects,
- Description or sketch of existing or planned liquid waste collecting system.

Overlays (Impact Identification and Prediction):

This technique has always been extremely useful in identifying areas that have high environmental sensitivity. The technique entails the separate mapping of various critical environmental features - wetlands, steep slopes, soils, floodplains, bedrock outcrops, wildlife habitats, vegetative communities, and cultural resources - at the same scale as the project's site plan. The environmental features are mapped on transparent plastic in different colors. The several environmental maps can then be overlaid on the project map to highlight the areas of highest environmental sensitivity (EPA, 1993).

Geographical Information Systems (GISs) are essentially computerized graphical overlays and interacting data files. Environmental features are mapped, and the mapping digitized and stored in the GIS data base. The mapped features can be combined to produce computer-generated displays of one or more environmental features in a specified geographical area. If the GIS mapping is conducted systematically, information acquired on specific projects can be combined, and the GIS data base becomes more detailed over time (EPA, 1993).

Compare the maps of information about the setting with maps or plans that you have of the proposed action to see how or if various kinds of resources or areas overlap with the geographic area affected by the proposed action. You will need to be careful about comparing maps of different scales, so you will often not have a precise indication of areas of overlap, but you will be able to see areas of potential conflict that need to be investigated further. Use of map information of environmental features has been refined with the use of transparent overlays (overlay method) and now with the use of computer generated maps that present multiple features from a variety of sources.

A CLASSIFICATION OF EIA TASKS AND ASSOCIATED METHODS

Tasks	Methods (examples only)
1. Description of proposed development	
a) Identify aspects of project for which information is to be sought distinguishing, where necessary, between different stages in the proposed development (e.g. construction and operating phases) and between different levels of screening.	Checklists, consultations with developer.
b) Determine resources to be used in construction and initial operating phase, wastes to be created, physical form of the development.	Data sheets, engineering drawings, etc., prepared by developer; mass balance analysis; accident and uncertainty analysis (this continues through a number of assessment stages).
c) Forecast future resource use, waste generation, etc., over the expected life of the development.	The same methods apply as in b), but methods of production and technological forecasting are also relevant.
2. Description of existing and projected environmental conditions	
a) Identify aspects of existing and projected environmental conditions for which information is to be sought.	Checklists, consultations with environmental agencies; alternatively, may be linked with 1a) through the use of matrices or through more elaborate representations of relationships such as networks.
b) Collate existing environmental data and identify gaps in information.	Consultation with environmental agencies and voluntary organisations; use of data bank and retrieval systems.
c) Obtain additional environmental data to meet remaining deficiencies.	Review of existing monitoring systems; special surveys using a variety of techniques (aerial photography, field sampling, etc.).
d) Predict future environmental conditions (without the proposed development).	Variety of available methods, ranging from simple forms of extrapolation to complex modelling studies; consultation with environmental agencies.
e) Summary and presentation of environmental data.	Mapping, overlay methods, summary sheets.
3. Assessment of probable impact of development	
a) Assess magnitude of impact (in present and future conditions) on:	
i) air, water and land;	diffusion and resource utilization models, physical intrusion assessment;
ii) receptors within the environment.	ecological modelling, damage functions
b) Assess importance of impact by:	
i) investigating response of affected parties;	social surveys, agency consultation and public participation;
ii) aggregating individual environmental impacts,	scaling and weighting systems, overlay methods, use of panel of experts.
4. Compliance with other environmental plans, policies and controls	
Assess likely compliance of development with existing and proposed controls.	Agency consultation, checking of extant plans.
5. Review of alternatives to the proposed development	
a) Identify alternatives to be considered.	Checklist (of types of alternatives to be reviewed), consultation and survey methods.
b) Describe project alternatives and assess their impacts.	Same methods as in 1, 2, 3 above, combined with screening methods.
6. Preparation of non-technical summary of the assessment	
Determine salient features of assessment and most effective means of presentation.	Communication methods

Reproduced from: Wathern, 1988

Environmental attributes potentially affected by tropical river basin development

Actions	Environmental and socio-cultural characteristics and conditions
Modification of regimes	Physical and chemical characteristics
Conversion of river section to reservoir	1. Earth
Exotic fish introduction	Seismic characteristics
Flood control	Mineral resources
River flow regulation downstream	Construction material
Modification of riverine habitats downstream	Soils
Modification of terrestrial habitats by reservoir	Land form
Exotic flora introduction	Unique physical features
Exotic livestock introduction	Archaeological sites
Alteration of groundwater hydrology	2. Water
Alteration of drainage	Surface-water quantity
Canalization	Surface-water quality
Irrigation	Underground-water quantity
Burning	Underground-water quality
	Recharge of aquifers
Land transformation and construction	Water temperature
Resettlement village platforms and land clearing for farms	Salinity
Highways and bridges for dam construction	3. Atmosphere
Roads, trails, and bridges	Quality (gases, particulates)
Electric transmission lines and corridors	Climate (micro, macro)
Barriers including fencing	Temperature
Channel revetments	4. Processes
Canals for irrigation	Foods
Dam for reservoir	Erosion
Reservoir	Deposition (sedimentation, precipitation)
Dam for irrigation	Solution
Irrigation pool	Sorption (ion exchange, complexing)
Piers, seawalls, marinas and landings	Compaction and settling
Blasting and drilling	Stability (slides, slumps)
Cutting and filling	Stress-strain (earthquake)
Tunnels and underground structures	Air movements
Resource extraction	Biological conditions
Electrification	1. Flora
Surface excavation	Trees
Clay-fill pit for dams	Shrubs
Limestone/sandstone quarry for dams	Grass
Well drilling and fluid removal	Crops
Forest harvesting	Microflora, land
Commercial fishing	Phytoplankton
Subsistence fishing	Aquatic plants
	Rare species
Processing	Endangered species
Farming-areal, traditional	Barriers
Farming-resettlement, traditional	Corridors

Reproduced from:
Bisset, 1987

Checklist of impact categories for land development projects (summarized from Schaenam 1976).

1 *Local economy*
Public fiscal balance
Employment
Wealth

2 *Natural environment*
Air quality
Water quality
Noise
Wildlife and vegetation
Natural disasters

3 *Aesthetics and cultural values*
Attractiveness
View opportunities
Landmarks

4 *Public and private services*
Drinking water
Hospital care
Crime control
Feeling of security
Fire protection
Recreation – public facilities
Recreation – informal settings
Education
Transportation – mass transit
Transportation – pedestrian
Transportation – private vehicles
Shopping
Energy services
Housing

5 *Other social impacts*
People displacement
Special hazards
Sociability/friendliness
Privacy
Overall contentment with neighbourhood

Reproduced from:
Wathern, 1988

Leopold **PROJECT IMPACT MATRIX**

PROJECT COMPONENTS	ENVIRONMENTAL COMPONENTS →	PHYSICAL ENVIRONMENT													BIOLOGICAL ENVIRONMENT											SOCIAL ENVIRONI					
		AGRICULTURAL LANDS	SOIL EROSION	SLOPE STABILITY	ENERGY / MINERAL RESOURCES	SURFACE WATER QUANTITY	SURFACE WATER QUALITY	GROUND WATER QUANTITY	GROUND WATER QUALITY	AIR QUALITY	NOISE	AQUATIC ECOSYSTEMS	WETLAND ECOSYSTEMS	TERRESTRIAL ECOSYSTEMS	ENDANGERED SPECIES	MIGRATORY SPECIES	BENEFICIAL PLANTS	BENEFICIAL ANIMALS	PEST PLANTS	PEST ANIMALS	DISEASE VECTORS	PUBLIC HEALTH	RESOURCES / LAND USE	DISTRIBUTION SYSTEMS	EMPLOYMENT	AT-RISK POPULATIONS	MIGRANT POPULATIONS	COMMUNITY STABILITY	CULTURAL/RELIGIOUS VALUES	TOURISM / R	NUT
PLANNING & DESIGN																															
CONSTRUCTION																															
OPERATION																															

Reproduced from: Wathern, 1988

Instructions

1. Identify all actions (located across the top of the matrix) that are part of the proposed project
2. Under each of the proposed actions, place a slash at the intersection with each item on the side of the matrix if an impact is possible
3. Having completed the matrix, in the upper left-hand corner of each box with a slash, place a number from 1 to 10 which indicates the MAGNITUDE of the possible impact; 10 represents the greatest magnitude of impact and 1, the least, (no zeros). Before each number place + (if the impact would be beneficial). In the lower right-hand corner of the box place a number from 1 to 10 which indicates the IMPORTANCE of the possible impact (e.g. regional vs. local); 10 represents the greatest importance and 1, the least (no zeros)
4. The text which accompanies the matrix should be a discussion of the significant impacts, those columns and rows with large numbers of boxes marked and individual boxes with the larger numbers

Sample matrix

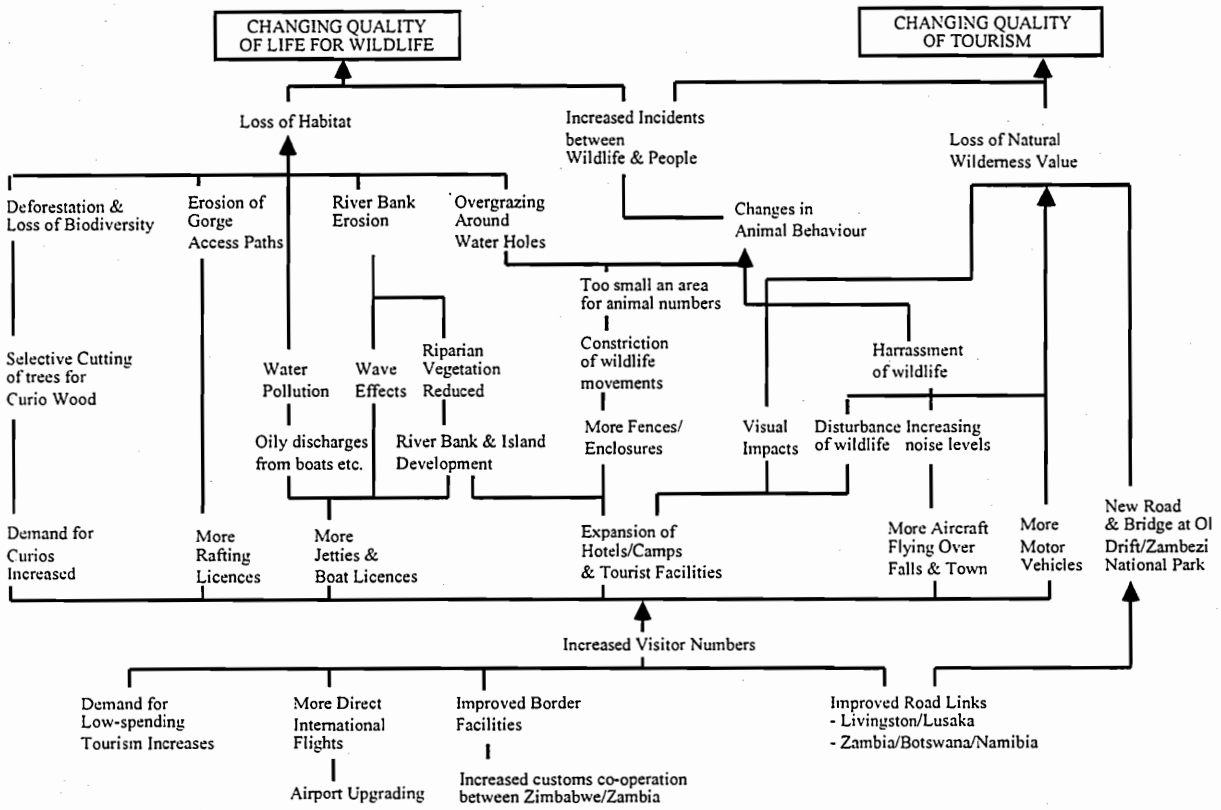
	a	b	c	d	e
a		2/1			8/5
b		7/2	5/8	3/1	9/7

			A. Modification of regime													B. Land transformation and construction																					C. Resource extraction						
		Proposed actions	a. Exotic flora or fauna introduction	b. Biological controls	c. Modification of habitat	d. Alteration of ground cover	e. Alteration of ground water hydrology	f. Alteration of drainage	g. River control and flow modification	h. Canalization	i. Irrigation	j. Weather modification	k. Burning	l. Surface or paving	m. Noise and vibration	a. Urbanization	b. Industrial sites and buildings	c. Airports	d. Highways and bridges	e. Roads and trails	f. Railroads	g. Cables and lifts	h. Transmission lines, pipelines and corridors	i. Barriers including fencing	j. Channel dredging and straightening	k. Channel revetments	l. Canals	m. Dams and impoundments	n. Piers, seawalls, marinas and sea terminals	o. Offshore structures	p. Recreational structures	q. Blasting and drilling	r. Cut and fill	s. Tunnels and underground structures	a. Blasting and drilling	b. Surface excavation	c. Subsurface excavation and retorting	d. Well drilling and fluid removal	e. Dredging	f. Clear cutting and other lumbering	g. Commercial fishing and hunting
CHEMICAL CHARACTERISTICS	1 Earth	a. Mineral resources																																									
		b. Construction material																																									
		c. Soils																																									
		d. Land form																																									
		e. Force fields and background radiation																																									
		f. Unique physical features																																									
	2 Water	a. Surface																																									
		b. Ocean																																									
		c. Underground																																									
		d. Quality																																									
		e. Temperature																																									
		f. Recharge																																									
		g. Snow, ice and permafrost																																									

A section of the Leopold matrix (Courtesy US Geological Survey).

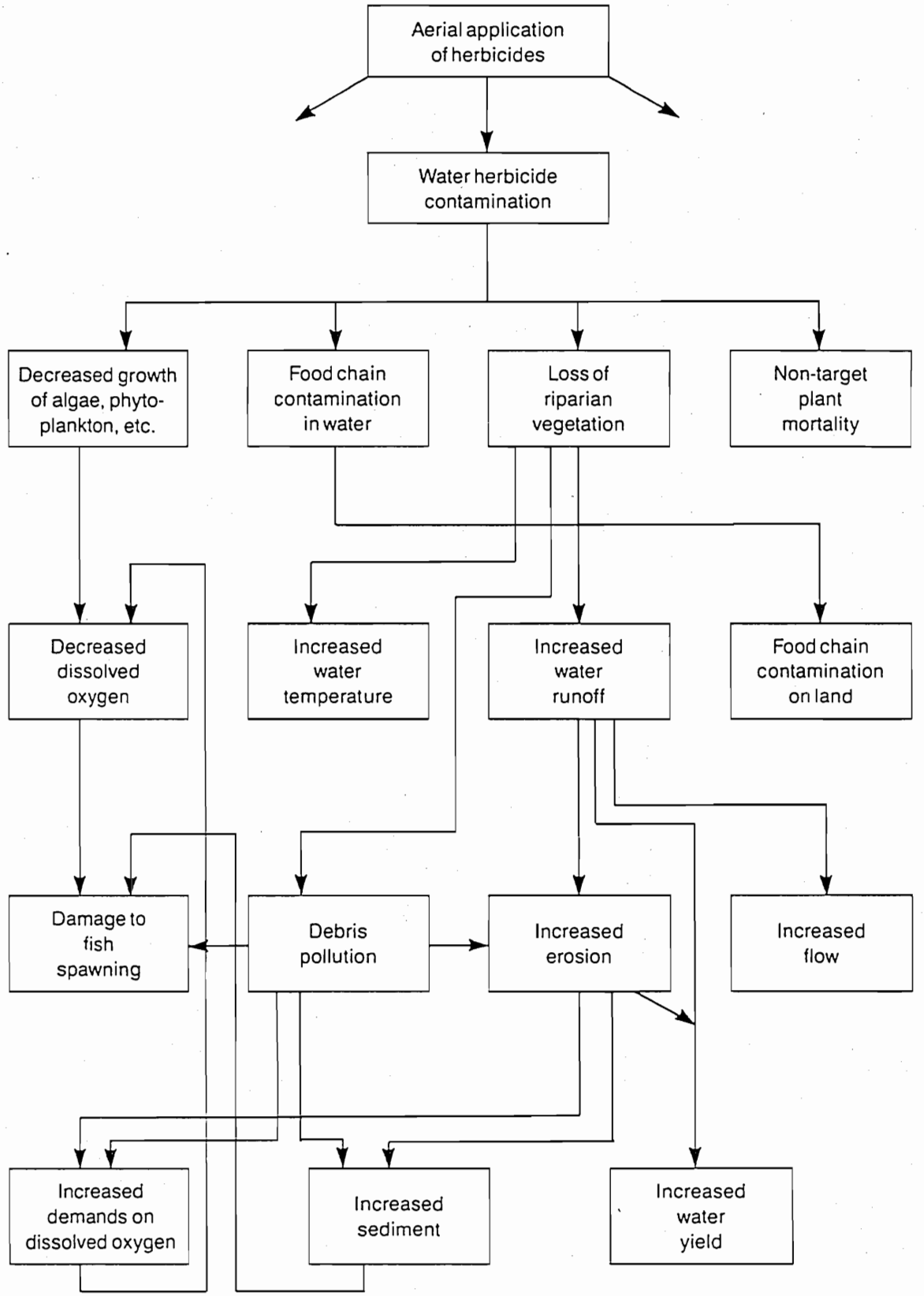
An example of a network

(showing linkages leading to changes in quality of life, wildlife and tourism) Construction



(Bisset)

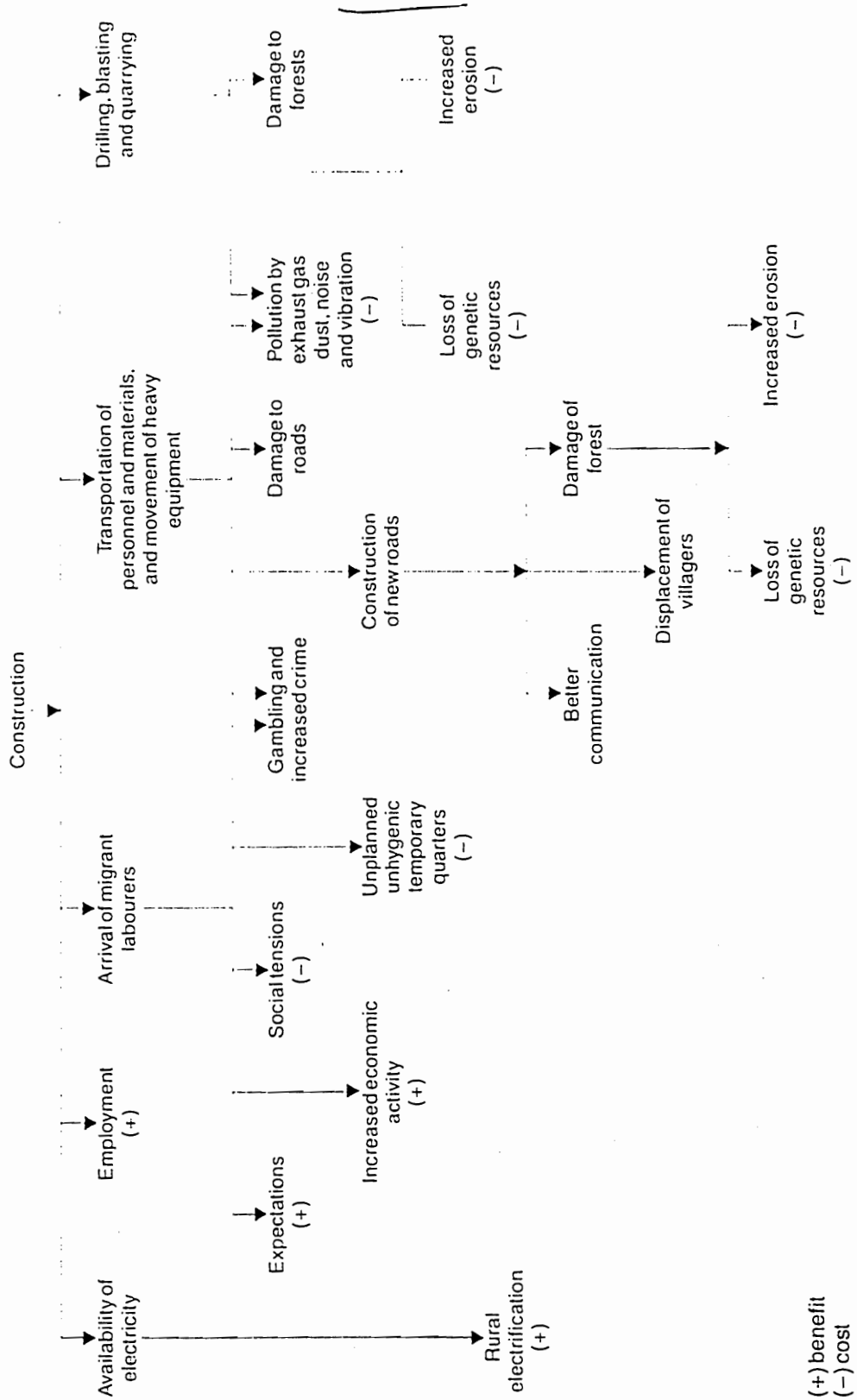
Section of the IMPACT network Wildlife



Source: Thor *et al.* (1978)

Reproduced from:
Bisset, 1987

Potential impact of the construction period



Source: Institute of Ecology, Padjadjaran University (1979)

Reproduced from:
Bisset, 1987

GUIDELINE DOCUMENT 5

CHECKLIST OF ENVIRONMENTAL CHARACTERISTICS

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G.P.-S.

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1 INTRODUCTION

This checklist identifies environmental characteristics which may potentially be affected by development actions, or which could place significant constraints on a proposed development. The effect a development could have on an environmental attribute may be either positive or negative.

While the checklist has endeavoured to include the major characteristics and linkages which should be considered by the environmental analyst or planner, it is not exhaustive and the user should be aware that other characteristics, significant to a particular situation, may occur. Assistance of experts may be required to assess certain potential impacts and to identify unlisted characteristics which may be affected in specific cases. It is important to stress that cumulative effects should always be borne in mind (see section 12).

2 PHYSICAL CHARACTERISTICS OF THE SITE AND ITS SURROUNDINGS

Could the proposed development have a significant impact on, or be constrained by, any of the following?

2.1 Land

- the nature of surface (e g old weathered surfaces)
- the nature of substrata (eg rock, soil deposit)
- unstable bedrock or faultlines
- seismic activity
- slope of the land
- waterlogging of depressions
- the binding or bonding of soils
- stability of site
- surface subsidence
- compressive strength of soils
- rates of erosion or siltation by wind or water
- the potential of soils to be used for formal/informal agricultural purposes
- the potential of soils to be used for commercial purposes
- access to mineral deposits
- the availability of or access to construction materials such as rock and gravel
- the availability of topsoil or fill material
- the management of excess soil or spoil material
- unique geological or physical features
- mobile sand dunes
- prominent landscape features
- existing physical degradation of the local environment

2.2 Freshwater systems

- streams or river channels
- river flow
- natural drainage patterns
- engineered drainage patterns
- drainage limitations
- the water-table
- run-off as a result of the hardening of surfaces, or loss of the sponge effect of vegetation
- ability to absorb run-off
- changes to floodplains
- the quality or quantity of surface water, groundwater or public water supplies
- conservational or recreational value of rivers, streams, lakes, wetlands, dams or islands
- threats to hydrological functioning through existing or altered:
  - — pollution
  - — turbidity
  - — salinity
  - — chemical processes or nutrient balances
  - — changes in sediment flows and siltation rates
  - — canalisation
  - — impoundment construction
  - — water extraction

2.3 Marine and estuarine systems

- prominent coastal features such as coastal cliffs
- existing or altered processes such as:
  - — wave and tidal action
  - — deposition/removal of sand

- — sedimentation rates and patterns
- — turbidity
- — salinity
- — chemical processes or nutrient balances
- inherently unstable ecosystems such as mobile sand dunes
- sand sources such as mobile sand dunes
- rocky and sandy shorelines
- the seabed and subtidal areas
- coastal islands
- functioning of estuary systems
- river mouths

2.4 Climate

- wind strength, direction and frequency
- frequency of flash-floods
- rainfall patterns
- fluctuations in temperature or humidity
- intensity of inversions
- dispersal or influx of pollutants
- global warming and sea-level rise

3 ECOLOGICAL CHARACTERISTICS OF THE SITE AND ITS SURROUNDINGS

Could the proposed development have a significant impact on, or be constrained by, any of the following?

3.1 Vegetation

- survival of rare or endangered plant species
- diversity of plant communities
- sand-trapping vegetation such as that found on foredunes
- vegetation communities of conservation or scientific importance
- conservation of vegetation communities of particular recreational value
- the introduction or spread of invasive alien seeds and plants
- natural replenishment of existing species
- frequency of veld fires
- frequency of use of off-road vehicles
- amount of trampling of special areas of vegetation
- firewood collection
- overgrazing
- overexploitation
- genetically engineered organisms

3.2 Animals

- survival of rare or endangered animals
- diversity of animal communities
- animal communities of particular scientific, conservational or educational value
- natural migration of species
- survival of animal communities of particular recreational value
- non-resident or migrant species
- alien species (including invasive and domestic species)
- survival of animal communities due to:
  - — frequency of veld fires
  - — threat from poaching
  - — frequency of use of off-road vehicles
  - — intrusion of roads and fencing
  - — overexploitation
- genetically engineered organisms

3.3 Natural and semi-natural communities

- local, regional or national importance of the natural communities (e g economic, scientific, conservational, educational)
- compatibility of the development and the natural communities
- appropriateness of conservation methods to be employed
- ecological functioning of natural communities due to:
  - — physical destruction of the habitat
  - — reduction in the effective size of the community
  - — quality and flow of groundwater
  - — quality of standing or flowing water
  - — oxygen content of the water
  - — salinity
  - — turbidity
  - — flow rate
  - — temperature
  - — level of chemical and other forms of pollution
  - — eutrophication

— toxins such as effluents or poisons
— siltation patterns
— air quality
— levels of dust pollution and deposition
— availability of food
— the construction of access routes, roads and pathways
— recreational pressure
— secondary or cumulative impacts affecting other natural communities
— presence or introduction of invasive alien species
— rehabilitation potential
— predator:prey relationships
— barriers to animal movement or migration
— altered fire regime

4 CURRENT AND POTENTIAL LAND USE AND LANDSCAPE CHARACTER

Could the proposed development have a significant impact on, or be constrained by, any of the following?

4.1 General considerations applicable to all development proposals

- compatibility of land uses within the area
- aesthetic quality of the landscape
- sense of place within the area
- character of the area
- compatibility with the scale of developments in the area
- compatibility with building materials used in the area
- preservation of scenic views and valued features
- revitalisation of run-down areas
- landscaping plans and/or site restoration proposals
- need for buffer zones to allow for natural processes such as coastal erosion, windblown sand and changes in river channels
- political considerations such as land claims and historical rights
- legal considerations such as servitudes and rights of way

4.2 Urban open space, protected and recreational areas

- urban open space systems or recreational areas
- natural features such as streams and ridges
- natural heritage sites
- change in use or intensity of use
- pressures on recreational facilities and open space systems
- enhancement or linkage of facilities and open space systems
- rehabilitation of disturbed or degraded sites
- improved public amenity
- potential for harbouring vagrants and criminals

4.3 Residential areas

- need to displace people or affect existing housing
- lifestyle, neighbourhood character or stability
- quality of life within the residential area
- effect on views, overlooking and privacy
- effect of overshadowing causing loss of sunlight hours
- compatibility with the surrounding residential developments
- community cohesion
- the needs of the elderly, handicapped or other special interest groups
- community safety aspects such as lighting, open areas and policing
- adequacy of infrastructure to service the area (see also section 7)
- access and movement patterns
- change in the volume of through traffic
- property values and local tax base

4.4 Commercial areas

- character of urban centre
- volume of traffic and adequacy of vehicular access
- inappropriate siting
- provision of parking
- adequacy of pedestrian walkways

- conflicts between vehicular and pedestrian traffic
- safety of the area and surveillance
- the rate of decay or change in character of the area

4.5 Industrial areas

- volume of traffic and adequacy of vehicular access
- provision of parking
- levels of pollution — gas emissions, effluent or solid waste
- polluted street run-off
- aesthetic quality of the area

4.6 Agricultural and sylvicultural areas

- use of high-potential farmland
- use of areas available for commercial forests
- a need for buffer zones or greenbelts to contain urban sprawl
- availability of water
- pollution levels of air and local water supplies by fertilisers, pesticides or feedlots
- disease control activities such as crop-spraying
- levels of toxins, dust and bad smells in the air
- rate of soil erosion and sedimentation
- bush encroachment
- damaged land due to overgrazing or bad farming methods
- spread of invasive alien plants
- provision of housing and educational facilities

5 CULTURAL RESOURCES

Could the proposed development have a significant impact on, or be constrained by, any of the following?

- structures and sites of architectural, cultural or historic heritage
- sites of archaeological or palaeontological importance
- special attraction of local sites, traditions or events
- sites or areas of religious or spiritual significance
- sites or areas of special social or cultural interest
- the integrity of cultural resources

6 SOCIO-ECONOMIC CHARACTERISTICS OF THE AFFECTED PUBLIC

Could the proposed development have a significant impact on, or be constrained by, any of the following?

6.1 Demographic aspects

- growth rate of the local population
- location, distribution or density of the population
- existing age or gender composition of the population
- existing biographical composition of the population
- existing migration movements
- inflow of tourists

6.2 Economic and employment status of the affected social groups

- economic base of the area
- distribution of income
- local industry
- rate and scale of employment growth
- labour needs and the spare labour capacity of the area
- movement of labour away from existing employment in the area
- competition through non-local labour moving into the area
- non-local labour remaining in the area after completion of the development
- pressure placed on particular skills, age range or gender needs
- job opportunities for school-leavers
- short- and long-term unemployment trends

6.3 Welfare profile

- incidence of crime, drug abuse, or

violence
- extent of homelessness and overcrowding
- adequacy of services
- adequacy of support systems such as crèches and shelters for destitute children
- quality of life (see also section 7 on infrastructure and section 8 on community services and facilities)

6.4 Health profile

- availability of clinics/health services
- incidence of disease
- incidence of mental illness
- threats to health from pollution (see also section 9 on pollution)

6.5 Cultural profile

- existing lifestyles, household composition and family network
- religious and cultural attitudes, outlooks and expectations of the local population
- cultural or lifestyle diversity
- cultural or lifestyle stability

7 INFRASTRUCTURE SERVICES

Could the proposed development have a significant impact on, or be constrained by, any of the following?

7.1 Energy supply

- the demand for power and its effect on peak and base loads
- planned provision of power for the area
- power generation and associated infrastructure
- the need for new transmission lines
- the adequacy of emergency power facilities
- the danger to the local community and the environment or processing units in the case of a major power failure
- availability of alternative fuel source

7.2 Water

- water rights
- wasteful or excessive water requirements
- planned provision for water supply to the area
- adequacy and reliability of water supply
- adequacy of groundwater reserves
- adequacy of emergency supply system
- need for additional abstraction schemes or construction of new supply reservoirs
- need for additional purification systems
- need for inappropriately sized or located impoundments
- need for new pipelines
- danger to local people and industry in the event of a major water supply failure

7.3 Waste management

- efficiency and capacity of existing waste management facilities
- extent of contribution to centralised waste-processing facilities
- ability to provide necessary facilities
- need for new pipelines
- risk associated with waste transport
- adequacy of emergency waste disposal facilities
- risk to the community and the local environment should the facility break down
- hazard of groundwater pollution
- danger of rodents and scavengers at waste sites
- potential for windblown or waterborne refuse pollution
- visual and smell effects of waste sites and treatment works
- hazard of birds to air traffic near sewage ponds and landfill sites
- utilisation of treated waste water and recycled materials
- on-site waste management potential

7.4 Transport networks

- existing transport systems
- present patterns of circulation or movement of people and/or goods
- generation of more private and public traffic
- adequacy of existing road network
- adequacy of existing parking facilities
- adequacy of existing traffic management schemes
- need for and desirability of additional road schemes over and above those which have been planned
- temporary access roads used for the development
- viability of the rail service
- rail capacity
- need for additional rail links
- adequacy of harbour facilities
- need for expanded harbour and related facilities
- adequacy of air transport facilities
- ability of commerce and social facilities to locate along route

7.5 Education

- demand for specific types of technical skills training
- demand for specific types of industrial training
- adequacy of existing technical institutions
- adequacy of nursery, junior and secondary education facilities
- need for additional education facilities
- demand which exceeds the planned provision of educational facilities
- preschool facilities

7.6 Housing

- property values and levels of rates
- potential conflict over land use
- availability of housing stock
- need to release additional land for housing developments
- acceptability of such land release
- adequacy of infrastructure for further housing developments
- ability of private or local authority to provide housing
- compatibility of planned development with existing housing
- location for suitable housing sites
- sites suitable for construction camps
- standard of provision of facilities required by authority
- design and layout of site facilities
- use to which construction camp may be put after termination of the construction period

7.7 Telecommunication

- existing telecommunication network
- installation of additional telecommunication transmission lines or facilities

7.8 Financial implications to region

- job creation and economic opportunity
- enhancement of regional self-sufficiency
- financial programmes of responsible authority
- comparative wage rates between those of existing employment in the local area and those offered by the new development
- movement away from existing employment due to higher wage rates offered in the new development
- insurance rates
- cost implications of the supply of energy, water, waste management, transportation, education, housing and telecommunication

8 SOCIAL AND COMMUNITY SERVICES AND FACILITIES

Could the proposed development have a significant impact on, or be constrained by, any of the following?

8.1 Health service facilities

- adequacy of temporary facilities during construction phase of developments

- adequacy of on-site health facilities
- adequacy of facilities for primary health care (e g screening facilities for tuberculosis or AIDS, family planning advice)
- adequacy of the existing health services to cope with increased population
- projected provision of health service facilities
- need for additional facilities

8.2 Emergency services

- adequacy of existing emergency services (e g fire and ambulance services)
- projected provision of services to meet increased demand
- need for additional emergency services
- adequacy of the emergency and safety services provided by the developer
- ability of the local resources to deal with emergencies

8.3 Recreational facilities

- adequacy of existing facilities
- projected provision of facilities to meet increased demand
- need for additional facilities
- recreational and service facilities in the workplace

9 THE NATURE AND LEVEL OF PRESENT AND FUTURE ENVIRONMENTAL POLLUTION

Could the proposed development have a significant impact on, or be constrained by, any of the following?

9.1 Air pollution

- existing levels of atmospheric pollution
- the nature of air pollution, such as ozone-depleting gases, acidic compounds and toxic substances
- extent of the local build-up of pollutants due to inversions
- compounding of effects with existing pollutants or other chemicals in the atmosphere (e g photochemical smog production)
- smog formation and reduction in visibility
- quantity and type of particulate matter produced with reference to size, composition and chemical stability
- production of offensive odours
- pollution of adjacent sensitive areas
- effects on human health, crops, wildlife, livestock and other potentially affected organisms
- effects on stonework, buildings or works of art

9.2 Water pollution

- level of water pollution
- high localised levels of pollution
- pollution of surface waters from polluted underground waters
- the concentration of pollutants due to variations of water flow
- localised pollution build-up through changes in salinity gradients and/or current movements
- effective dispersal mechanisms
- salinization of fresh waters
- synergistic or compounding effects with existing pollutants
- production of offensive odours
- effect of treated or untreated effluent on the flora and fauna of river, lake, canal, estuary or coastal waters
- effects on dependent natural communities through changes in aquatic fauna and flora
- effect on irrigation schemes
- effect on recreational activities

9.3 Noise, vibration and lighting

- increase in ambient noise, vibration or illumination levels
- length of time that there will be noise, vibration or lighting impacts
- exacerbation of "creeping" ambient noise levels
- peace and quiet of residential areas

either during day- or night-time
- change in the quality of life due to artificial lighting
- functioning of schools, hospitals and old people's homes or informal recreation areas
- the need for individual protection against noise
- levels of annoyance and discomfort due to vibration caused by such activities as blasting and pile-driving
- structural damage caused to buildings by vibration
- effects on wildlife of nature reserves, sites of special scientific interest, or high-quality habitat of local significance
- reduction of wilderness quality in declared wilderness areas

9.4 Visual pollution (see also section 4 on land use and landscape character)

- existing level of visual pollution
- reduction in aesthetic quality of the environment through:
  - — sign-boards and advertising
  - — overhead transmission cables and telephone wires
  - — unsightly or inappropriate walls, buildings, roads or other installations

9.5 Solid or liquid waste and by-product disposal

- existing or proposed water disposal plans
- choice of alternative means of disposal
- alternative treatment technologies
- choice of disposal sites
- biological and chemical characteristics of the leachates generated within the disposal site
- the quantity of leachates produced
- measures to reduce or treat leachates
- potential pollution of nearby surface waters
- potential groundwater pollution
- waste minimisation potential of process
- containment and treatment of wastes at site of generation
- final disposal option
- gas emissions from landfill
- allowance for physical and chemical variation in waste generated
- visual intrusion caused by waste disposal site or disposal plant
- potential health hazard to nearby residents
- suitability of traffic to transport the waste materials
- volume of traffic to transport the waste materials
- proposed after-use of the site and its management

10 RISK AND HAZARD

Could the proposed development have a significant impact on, or be constrained by, the following?

- the level and identity of hazard to the public
- probability of occurrence
- extent of effect — local, regional or panoramic
- standards required for process equipment in chemical and processing industries:
  - — safety and design reviews
  - — safety audits
  - — hazard and operatability reviews
  - — failure mode and effect analysis
- workers' safety/degree of risk
- the level of risk and hazard for other living organisms

11 HEALTH AND SAFETY

Could the proposed development have a significant impact on, or be constrained by, any of the following?

- effects in the workplace through:
  - — dust, fume and particulate matter
  - — noise
  - — odours
  - — gases
  - — vapours
  - — use of dangerous chemicals
  - — lighting

- — heat
- — cold
- — noise
- — vibration
- — radiation
- — protective clothing and equipment
- — access to recreational facilities
- — risk of workplace accidents
- — risk of major disasters involving multiple loss of life or injury
- — availability of services such as crèches, factory-based health services, canteens, change-rooms, toilets

- effects in the surrounding areas through:
  - — dust
  - — fumes
  - — particulate matter
  - — noise
  - — vibration
  - — radiation
  - — odours
  - — gaseous emissions
  - — vapours
  - — use of dangerous chemicals
  - — lighting
  - — risk of major disasters involving explosions or major leaks of toxic liquids or gases
  - — solid waste disposal techniques
  - — liquid waste effluent and disposal

12 CUMULATIVE AND SYNERGISTIC EFFECTS

Could the proposed development have a significant impact on, or be constrained by, any of the following?

- the ability of the natural and social environments to assimilate cumulative stresses placed on them
- the likelihood of negative synergistic effects
- existing or future development rights because of a precedent being set

13 ENHANCEMENT OF POSITIVE CHARACTERISTICS

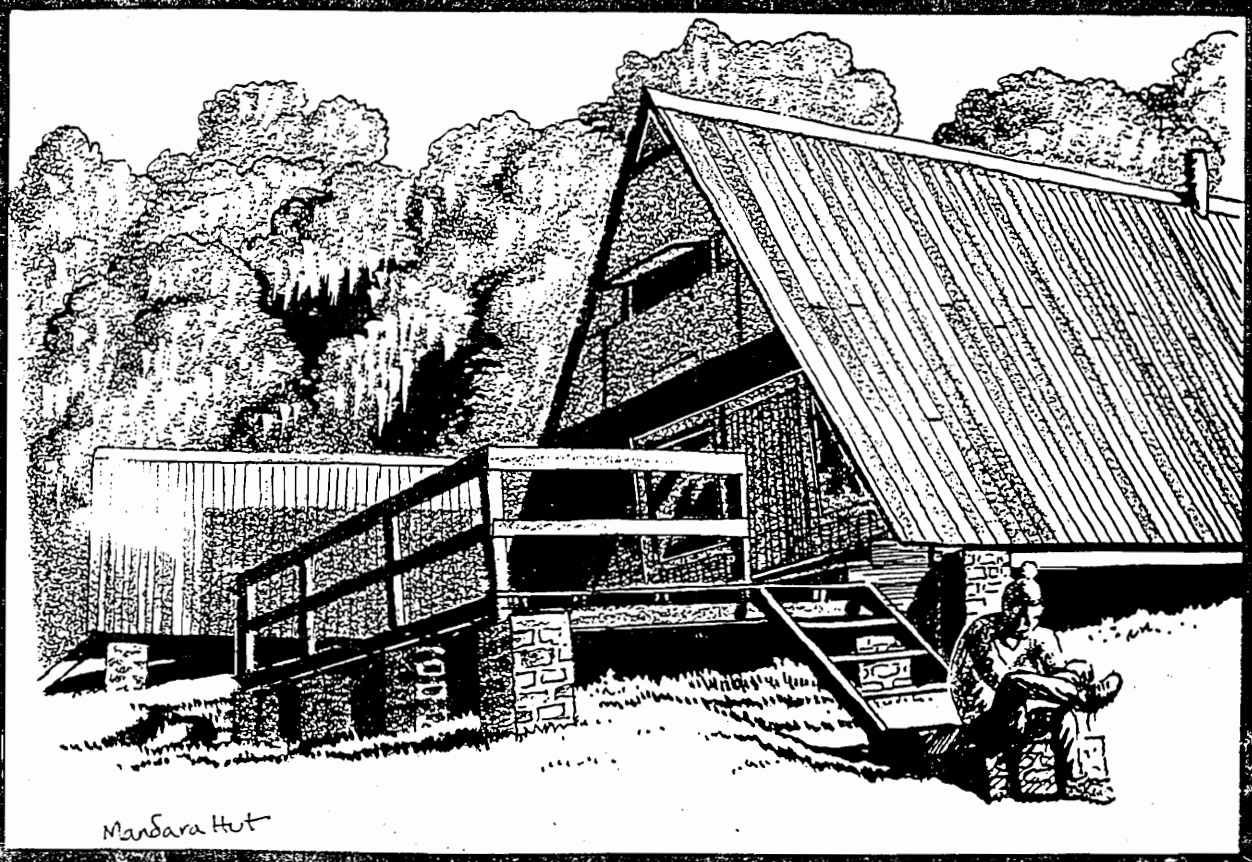
Could the proposed development be modified to enhance the positive aspects of the following?

- any of the characteristics listed in points 2 to 12 above

DALP

DEVELOPMENT/ACTION/LEASE PROCEDURES

TANZANIA NATIONAL PARKS



SECTION IV

ENVIRONMENTAL IMPACT CONSIDERATION CHECKLIST

ENVIRONMENTAL IMPACT CONSIDERATION CHECKLIST

IMPORTANT! The IP is not responsible for the preparation of the EIA for the **PROJECT PROPOSAL;** however, the IP is responsible for providing the funding to TANAPA for the preparation of the EIA. The following impact checklist is included in the **DALP** to assist IP's and their consultants in preparing a **DP OR PROJECT PROPOSAL** to ensure that proper consideration is given to the environment during the **DP OR PROJECT PROPOSAL** generation.

The Checklist identifies environmental characteristics which may potentially be affected by development actions, or which could place significant constraints on a proposed development. The effect a development or action could have on an environmental attribute may be either positive or negative. While the Checklist has endeavored to include the major characteristics and linkages which should be considered by the environmental analyst or planner, it is not exhaustive, and the user should be aware that other characteristics, significant to a particular situation, may occur. Assistance of experts may be required to assess certain potential impacts, and to identify unlisted characteristics which may be affected in specific cases. It is important to stress that cumulative effects should always be borne in mind.

CONTENTS

1. Physical characteristics of the site and its surroundings
- 1.1 Land
- 1.2 Fresh water systems
- 1.3 Marine and estuarine systems
- 1.4 Climate

2. Ecological characteristics of the site and its surroundings
- 2.1 Vegetation
- 2.2 Animals
- 2.3 Natural and semi-natural communities

3. Current and potential land-use and landscape character
- 3.1 General considerations applicable to all development proposals
- 3.2 Recreational areas
- 3.3 Residential areas in and bordering on the parks and protected areas
- 3.4 Commercial areas in and bordering on the parks and protected areas
- 3.5 Industrial areas bordering on the parks and protected areas
- 3.6 Agricultural and silvicultural areas bordering on the parks and protected areas

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5. Socio-economic characteristics of the affected publics
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- 5.4 Health profile
- 5.5 Cultural profile

6. Infrastructure services
- 6.1 Energy supply
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- 6.3 Waste management
- 6.4 Transport networks
- 6.5 Education
- 6.6 Housing and tourist facilities
- 6.7 Telecommunication
- 6.8 Financial implications to the region

7. Social and community services and facilities
- 7.1 Health service facilities
- 7.2 Emergency services
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8. Level of present and future environmental pollution
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- 8.2 Water pollution
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- 8.4 Visual pollution
- 8.5 Solid or liquid waste and by-product disposal

9. Risk and hazard

10. Health and safety

11. Policy considerations

12. Awareness and publicity

13. Cumulative and synergistic effects

14. Enhancement of positive characteristics

1. PHYSICAL CHARACTERISTICS OF THE SITE AND ITS SURROUNDINGS

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

1.1 Land

- the nature of surface (eg, old weathered surfaces)
- the nature of substrata (eg, rock, soil deposit)
- unstable bedrock or fault-lines
- seismic activity
- slope of the land
- waterlogging of depressions
- the binding or bonding of soils
- stability of site
- surface subsidence
- compressive strength of soils
- rates of erosion or siltation by wind or water
- access to mineral deposits
- the availability of or access to construction materials such as rock and gravel
- the availability of topsoil or fill material
- the management of excess soil or spoil material
- unique geological or physical features
- mobile sand dunes
- topography
- prominent landscape features
- existing physical degradation of the local environment

1.2 Fresh water systems

- stream or river channels
- river flow
- natural drainage patterns
- engineered drainage patterns
- drainage limitations
- the water-table
- run-off as a result of the hardening of surfaces, or loss of the sponge effect of vegetation
- ability to absorb run-off
- changes to floodplains
- the quality or quantity of surface water, ground water or public water supplies

- conservation or recreation value of rivers, streams, lakes, wetlands, dams or islands
- threat to hydrological functioning through existing or altered:
  - pollution
  - turbidity
  - salinity
  - chemical processes or nutrient balances
  - changes in sediment flows and siltation rates
  - canalization
  - impoundment construction
  - water extraction
  - wetlands

1.3 Marine and estuarine systems

- prominent coastal features such as coastal cliffs
- existing or altered processes such as:
  - wave and tidal action
  - deposition/removal of sand
  - sedimentation rates and patterns
  - turbidity
  - salinity
  - chemical processes or nutrient balances
- inherently unstable ecosystems such as mobile sand dunes
- sand sources such as mobile sand dunes
- rocky and sandy shorelines
- the seabed and sub-tidal areas
- coastal islands
- functioning of estuary systems
- river mouths

1.4 Climate

- wind strength, direction and frequency
- frequency of flash floods
- rainfall patterns
- fluctuations in temperature or humidity
- intensity of inversions
- dispersal or influx of pollutants
- global warming and sea-level rise

2. ECOLOGICAL CHARACTERISTICS OF THE SITE AND ITS SURROUNDINGS

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

2.1 Vegetation

- survival of rare or endangered plant species
- diversity of plant communities
- sand trapping vegetation such as that found on fore-dunes
- vegetation communities of conservation or scientific importance
- conservation of vegetation communities of particular recreation value
- the introduction or spread of invasive alien seeds and plants
- natural replenishment of existing species
- frequency of veld fires
- frequency of use of off-road vehicles
- amount of trampling of special areas of vegetation
- firewood collection
- overgrazing
- over-exploitation
- habitat manipulations
- critical habitats
- alien genotypes or genetically-engineered organisms

2.2 Animals

- survival of rare or endangered animals
- diversity of animal communities
- animal communities of particular scientific, conservation or educational value
- natural migration of species
- survival of animal communities of particular recreational value
- non-resident or migrant species
- alien species (including invasive and domestic species)
- survival of animal communities due to:
  - frequency of veld fires
  - threat from poaching
  - frequency of use of off-road vehicles
  - intrusion of roads and fencing
  - over-exploitation
- alien genotypes or genetically-engineered organisms
- breeding activities of animals
- behavior of animals (eg, predator-prey relationships, nesting)

- critical habitats of animals
- bird-life

2.3 Natural and semi-natural communities

- local, regional or national importance of the natural communities (eg, economic, scientific, conservation, educational)
- compatibility of the development and the natural communities
- appropriateness of conservation methods to be employed
- ecological functioning of natural communities due to:
  - physical destruction of the habitat
  - reduction in the effective size of the community
  - quality and flow of ground-water
  - quality of standing or flowing water
  - oxygen content of the water
  - salinity
  - turbidity
  - flow rate
  - temperature
  - level of chemical and other forms of pollution
  - eutrophication
  - toxins such as effluent or poisons
  - siltation patterns
  - air quality
  - levels of dust pollution and deposition
  - availability of food
  - the construction of access routes, roads and pathways
  - recreational pressure
  - secondary or cumulative impacts affecting other natural communities
  - presence or introduction of invasive alien species
  - rehabilitation potential
  - predator-prey relationships
  - barriers to animal movement or migration
  - altered fire regime

3. CURRENT AND POTENTIAL LAND-USE AND LANDSCAPE CHARACTER

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

3.1 General considerations applicable to all development proposals

- compatibility of land uses within and outside the park
- aesthetic quality of the landscape
- sense of place within the park and surrounding area
- character of the area
- compatibility with the scale of developments in the area
- compatibility with building materials used in the area
- preservation of scenic views and valued features
- revitalization of run-down areas
- landscaping plans and/or site restoration proposals
- need for buffer zones to allow for natural processes such as coastal erosion, windblown sand and changes in river channels
- political considerations such as land claims and historical rights
- legal considerations such as servitude and rights of way
- camouflage of structures in landscaping plans
- visibility
- ambient light
- exclusivity of tourism experience
- size of the park
- location of development in relation to the zoning of the park
- construction laborers
- water availability (surface and underground)
- daily migration of animals

3.2 Recreational areas

- recreational areas
- natural features such as streams and ridges
- natural heritage sites
- change in use or intensity of use
- pressures on recreational facilities and open space systems
- enhancement or linkage of facilities and open space systems
- rehabilitation of disturbed or degraded sites
- improved public amenity
- potential for harboring vagrants and criminals
- park extensions

3.3 Residential areas in and bordering on parks and protected areas

- need to displace people or affect existing housing
- lifestyle, neighborhood character or stability
- quality of life within the residential area
- effect on views, over-looking and privacy
- compatibility with the surrounding residential developments
- community cohesion
- the needs of the elderly, handicapped or other special interest groups
- community safety aspects such as lighting, open areas and policing
- adequacy of infrastructure to service the area (see also section 6)
- access and movement patterns
- change in the volume of through traffic

3.4 Commercial areas in and bordering on parks and protected areas

- volume of traffic and adequacy of vehicular access
- inappropriate placement
- provision of parking
- adequacy of pedestrian walkways
- conflicts between vehicular and pedestrian traffic
- conflicts between vehicular access and animals
- safety of the area and surveillance
- the rate of decay or change in character of the area

3.5 Industrial areas bordering on parks and protected areas

- volume of traffic and adequacy of vehicular access
- provision of parking
- levels of pollution - gas emissions, effluent or solid waste
- polluted street run-off
- aesthetic quality of the area

3.6 Agricultural and silvicultural areas bordering on parks and protected areas

- use of high potential farmland
- use of areas available for commercial forests
- a need for buffer zones or greenbelts to contain urban sprawl
- availability of water
- pollution levels of air and local water supplies by fertilizers, pesticides or feedlots
- disease control activities such as crop spraying
- levels of toxins, dust and bad smells in the air
- rate of soil erosion and sedimentation
- bush encroachment
- damaged land due to overgrazing or bad farming methods
- spread of invasive alien plants
- provision of housing and educational facilities

4. CULTURAL RESOURCES

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

- structures and sites of architectural, cultural or historic heritage
- sites of archaeological or paleontological importance
- special attraction of local sites, traditions or events
- sites or areas of religious or spiritual significance
- sites or areas of special social or cultural interest
- the integrity of cultural resources
- traditional hunting practices and other resource use activities
- impact on other tourism developments
- ratio of foreign:local tourists
- encroachment
- alteration in the dignity of local people as a result of tourist activities
- tourist impact on traditional crafts, artifacts and heirlooms

5. SOCIO-ECONOMIC CHARACTERISTICS OF THE AFFECTED PUBLICS

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

5.1 Demographic aspects

- growth rate of the local population
- location, distribution or density of the population
- existing age or gender composition of the population
- existing biographical composition of the population
- existing migration movements
- inflow of tourists

5.2 Economic and employment status of the affected social groups

- economic base of the area
- distribution of income
- local industry
- rate and scale of employment growth
- labor needs and the spare labor capacity of the area
- movement of labor away from existing employment in the area
- competition through non-local labor moving into the area
- non-local labor remaining in the area after completion of the development
- pressure placed on particular skills, age range or gender needs

- job opportunities for school leavers
- short- and long-term unemployment trends
- degree of pressure from tourists
- support from/involvement of communities neighboring the park
- costs and benefits to the community
- distribution of costs and benefits
- need of additional park staff and training requirements

5.3 Welfare profile bordering on the parks and protected areas

- incidence of crime, drug abuse, or violence
- extent of homelessness and overcrowding
- adequacy of services
- adequacy of support systems such as crèches and shelters for destitute children
- quality of life (see also Section 6 on Infrastructure and Section 7 on Community Services and Facilities)

5.4 Health profile

- availability of clinics/health services
- incidence of disease
- incidence of mental illness
- threats to health from pollution (see also Section 8 on Pollution)

5.5 Cultural profile

- existing lifestyles, household composition and family network
- religious and cultural attitudes, outlooks and expectations of the local population
- cultural or lifestyle diversity
- cultural or lifestyle stability

6. INFRASTRUCTURE SERVICES

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

6.1 Energy supply

- the demand for power and its effect on peak and base loads
- planned provision of power for the area
- power generation and associated infrastructure
- the need for new transmission lines
- the adequacy of emergency power facilities

- the danger to the local community and the environment in the case of a major power failure
- availability of alternative fuel source

6.2 Water

- water rights
- wasteful or excessive water requirements
- planned provision for water supply to the area
- adequacy and reliability of water supply
- adequacy of ground water reserves
- adequacy of emergency supply system
- need for additional abstraction schemes or construction of new supply reservoir
- need for additional purification systems
- need for inappropriately sized or located impoundments
- need for new pipelines
- danger to local people and industry in the event of a major water supply failure
- impact on wildlife

6.3 Waste management

- sewage disposal
- efficiency and capacity of existing waste management facilities
- ability to provide necessary facilities
- need for new pipelines
- risk associated with waste transport
- adequacy of emergency waste disposal facilities
- risk to the community and the local environment should the facility break down
- hazard of groundwater pollution
- danger of rodents and scavengers at waste sites
- potential for windblown or waterborne refuse pollution
- visual and smell effects of waste sites and treatment works
- hazard of birds to air traffic near sewage ponds and landfill sites
- utilization of treated waste water and recycled materials
- on-site waste management potential
- disposal of oils and lubricants

6.4 Transport networks

- existing transport systems
- present patterns of circulation or movement of people and/or goods

- generation of more private and public traffic
- adequacy of existing road network
- adequacy of existing parking facilities
- adequacy of existing traffic management schemes
- need for, and desirability of, additional road schemes over and above those which have been planned
- temporary access roads used for the development
- adequacy of air transport facilities
- ability of commerce and social facilities to locate along route
- impact of transport on wildlife (eg, accidents)
- fuel availability and supply
- visual impact of transport network

6.5 Education

- demand for specific types of technical skills training
- adequacy of existing technical institutions
- adequacy of nursery, junior and secondary education facilities
- need for additional education facilities
- demand which exceeds the planned provision of educational facilities
- pre-school facilities

6.6 Housing and tourist facilities

- property values and levels of rates outside of parks and protected areas
- potential conflict over land use
- availability of housing stock
- need to release additional land for housing developments
- acceptability of such land release
- adequacy of infrastructure for further housing developments
- ability of private or local authority to provide housing
- compatibility of planned development with existing housing
- location for suitable housing sites
- sites suitable for construction camps
- standard of provision of facilities required by authority
- design and layout of site facilities
- use to which construction camp may be put after termination of the construction period
- source of building materials
- invasive aliens being brought into park with building materials
- maintenance
- construction strategy and duration
- investment costs and pay-back

6.7 Telecommunication

- existing telecommunication network
- installation of additional telecommunication facilities

6.8 Financial implications to region

- job creation and economic opportunity
- enhancement of regional self-sufficiency
- financial programs of responsible authority
- comparative wage rates between those of existing employment in the local area and those offered by the new development
- movement away from existing employment due to higher wage rates offered in the new development
- insurance rates
- cost implications of the supply of energy, water, waste management, transportation, education, housing and telecommunication
- costs and benefits to TANAPA and regional authorities
- provision of a pension scheme for employees
- foreclosing of financial opportunities
- incorporation of "social costs" (eg, pollution) as private costs
- adherence to "user pays" and "polluter pays" principles
- resource economic assessment of alternative options
- structures to ensure that there is recognition for the socio-economic contribution to Tanzania (eg, quantifying the full ecotourism implication of the options for areas outside of parks and protected areas)

7. SOCIAL AND COMMUNITY SERVICES AND FACILITIES

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

7.1 Health service facilities

- adequacy of temporary facilities during construction phase of developments
- adequacy of on-site health facilities
- adequacy of facilities for primary health care (eg, screening facilities for tuberculosis or AIDS; family planning advice)
- adequacy of the existing health services to cope with increased population
- projected provision of health service facilities
- need for additional facilities

7.2 Emergency services

- adequacy of existing emergency services (eg, fire and ambulance services)
- projected provision of services to meet increased demand
- need for additional emergency services
- adequacy of the emergency and safety services provided by the developer
- ability of the local resources to deal with emergencies

7.3 Recreational facilities

- adequacy of existing facilities
- projected provision of facilities to meet increased demand
- need for additional facilities
- recreational and service facilities in the workplace

8. THE NATURE AND LEVEL OF PRESENT AND FUTURE ENVIRONMENTAL POLLUTION

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

8.1 Air Pollution

- existing levels of atmospheric pollution
- the nature of air pollution, such as radiatively active greenhouse or ozone-depleting gases, acidic compounds and toxic substances
- extent of the local build up of pollutants due to inversions
- compounding of effects with existing pollutants or other chemicals in the atmosphere (eg, photochemical smog production)
- smog formation and reduction in visibility
- quantity and type of particulate matter produced, with reference to size composition and chemical stability
- production of offensive odors
- pollution of adjacent sensitive areas
- effects on human health, crops, wildlife, livestock and other potentially affected organisms
- effects on stonework, buildings or works of art
- dust levels

8.2 Water Pollution

- level of water pollution
- high localized levels of pollution
- pollution of surface waters from polluted underground waters
- the concentration of pollutants due to variations of water flow

- localized pollution build up through changes in salinity gradients and/or current movements
- effective dispersal mechanisms
- salinization of fresh waters
- synergistic or compounding effects with existing pollutants
- production of offensive odors
- effect of treated or untreated effluent on the flora and fauna of river, lake, canal, estuary or coastal waters
- effects on dependent natural communities through changes in aquatic fauna and flora
- effect on irrigation schemes
- effect on recreational activities

8.3 Noise, vibration and lighting

- increase in ambient noise, vibration or illumination levels
- length of time that there will be noise, vibration or lighting impacts
- exacerbation of "creeping" ambient noise levels
- peace and quiet of tourist facilities and residential areas either during day- or night-time
- change in the quality of life due to artificial lighting
- functioning of schools, hospitals, and old peoples homes or informal recreation areas
- the need for individual protection against noise
- levels of annoyance and discomfort due to vibration caused by such activities as blasting and pile-driving
- structural damage caused to buildings by vibration
- effects on wildlife of nature reserves, sites of special scientific interest, or high quality habitat of local significance
- reduction of wilderness quality in declared wilderness areas

8.4 Visual pollution (see also Section 3 on Land-use and Landscape Character)

- existing level of visual pollution
- reduction in aesthetic quality of the environment through:
  - sign-boards and advertising
  - overhead transmission cables and telephone wires
  - unsightly or inappropriate walls, buildings, roads or other installations

8.5 Solid or liquid waste and by-product disposal

- existing or proposed waste disposal plans
- choice of alternative means of disposal
- alternative treatment technologies, as distinct from disposal
- choice of disposal sites

- biological and chemical characteristics of the leachates generated within the disposal site
- the quantity of leachates produced
- measures to reduce or treat leachates
- potential pollution of nearby surface waters
- potential groundwater pollution
- waste minimization potential of process
- containment and treatment of wastes at site of generation
- final disposal option
- gas emissions from landfill
- allowance for physical and chemical variation in waste generated
- visual intrusion caused by waste disposal site or disposal plant
- potential health hazard to nearby residents
- suitability of traffic to transport the waste materials
- volume of traffic to transport the waste materials
- proposed after-use of the site and its management

9. RISK AND HAZARD

Could the proposed development have a significant impact upon, or be constrained by, the following?

- the level and identity of hazard to the public
- probability of occurrence
- extent of effect - local, regional or panoramic
- standards required for process equipment in chemical and processing industries:
  - safety and design reviews
  - safety audits
  - hazard and operability reviews
  - failure mode and effect analysis
- safety/degree of risk for construction workers
- safety/degree of risk for park staff
- safety/degree of risk for tourists
- safety/degree of risk for neighbors
- the level of risk and hazard for other living organisms (eg, animal health)
- level of risk and hazard for habitats, ecotones and ecosystem functioning

10. HEALTH AND SAFETY

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

- effects in the workplace through
  - dust, fumes and particulate matter
  - noise
  - odors
  - gasses
  - vapors
  - use of dangerous chemicals
  - lighting
  - heat
  - cold
  - noise
  - vibration
  - radiation
  - protective clothing and equipment
  - access to recreational facilities
  - risk of workplace accidents
  - risk of major disasters involving multiple loss of life or injury
  - availability of services such as creches, factory-based health services, canteens, change-rooms, toilets

- effects in the surrounding areas through
  - dust
  - fumes
  - particulate matter
  - noise
  - vibration
  - radiation
  - odor
  - gaseous emissions
  - vapors
  - use of dangerous chemicals
  - lighting
  - risk of major disasters involving explosions or major leaks of toxic liquid or gases
  - solid waste disposal techniques
  - liquid waste effluent and disposal

11. POLICY CONSIDERATIONS

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

- TANAPA policy
- National Environmental Conservation policy
- Park Management Plans
- Park Zoning Plans
- national legislation
- local authority bye-laws and legislation

12. AWARENESS AND PUBLICITY

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

- publicity of the park
- public relations of TANAPA
- awareness of communities neighboring the park
- involvement of neighboring communities and non-government organizations
- environmental education objectives
- promotion of the concept of sustainable lifestyles
- insight into key environmental issues and options (eg, poverty, population growth)
- things that tourists can do to promote the wise use of resources
- appropriate behavior by park and associated officials, in setting examples
- lobbying for a national policy and procedure to integrate development and environmental management

13. CUMULATIVE AND SYNERGISTIC EFFECTS

Could the proposed development have a significant impact upon, or be constrained by, any of the following?

- the ability of the natural and social environments to assimilate cumulative stresses placed on them
- the likelihood of negative synergistic effects
- existing or future development rights because of a precedent being set

14. ENHANCEMENT OF POSITIVE CHARACTERISTICS

Could the proposed development be modified to enhance the positive aspects of the following?

- any of the characteristics listed in points 1 to 13 above

SECTION IV was prepared by the IUCN/TANAPA Environmental Impact Assessment Workshop June 15-18, 1993.

Mitigation Strategy by Activity Phase

Phase Mitigation Strategy	*Planning/Design*	*Construction*	*Operation*	*Decommissioning*
Avoid Impact				
Minimize or Diminish Effect				
Rectify by Repair or Rehabilitation				
Reduce or Eliminate over Time				
Provide Compensation				
Other				

Module 11

11. What is an Initial Environmental Examination (IEE) or Environmental Review?

Description/Objectives

This session provides you with the opportunity to hear directly from a practitioner how that individual has dealt with the Environmental Review or IEE process, and to receive some initial exposure to the methods and realities of IEE preparation and the use of the environmental screening form for preparation of PVO/NGO sub-grant environmental reviews. You will gain familiarity with describing activity, project or program purpose/outputs and potential environmental impacts including: (i) determining the type of grant; (ii) identifying the environmental category the grant falls under [categorical exclusion, negative determination, or positive determination], and (iii) the content and appropriate use of environmental review reports.

Attachments

Example IEE or Environmental Review and Environmental Screening Form

INITIAL ENVIRONMENTAL EXAMINATION
OR
CATEGORICAL EXCLUSION

PROGRAM/ACTIVITY DATA:

Program/Activity Number: 621-0174 (TU-SUA Linkages), 621-0180 (PERM), 621-0192 (Tanzanian Environment and Natural Resources Partnership

Country/Region: Tanzania

Program/Activity Title: SO2 - Foundation Established for Adoption of Environmentally Sustainable Natural Resource Management Practices in Tanzania, *proposed/approved by Mission to become* **Improved Conservation of Biodiversity in Targeted Areas**

Funding Begin: FY 95? **Funding End:** FY 2003 **LOP Amount:** $40 million
Sub-Activity Amount: $ NA

IEE Prepared By: Charlotte Bingham, Regional Environmental Advisor **Current Date:** May 1, 1999

IEE Amendment (Y/N): X If "yes", Number & date of original IEE: September 95 PERM IEE; September 95 TU-SUA deferral; 23tanz5.iee (Kagera)

ENVIRONMENTAL ACTION RECOMMENDED: (Place X where applicable)

Categorical Exclusion: X Negative Determination: X
Positive Determination: X Deferral: ____

ADDITIONAL ELEMENTS: (Place X where applicable)

EMEMP: ____ CONDITIONS: X PVO/NGO: X

SUMMARY OF FINDINGS

This IEE provides documentation pursuant to 22 CFR 216 for existing and planned SO2 activities; resolves the existing deferral for the TU-SUA Linkage project (IEE deferral of 9/95); and considers the need for the Environmental Monitoring, Evaluation and Mitigation Plan (EMEMP) required by the PERM IEE but not undertaken. This SO2 IEE, hence, incorporates or revises 1995 threshold determinations, based on the proposals and work plans of SO2 Cooperative Agreements and contracts. It should be noted that the SO2 partners, most of whom were technically covered by the PERM IEE process, have initiated the process described therein as have other partners, such as TU-SUA, who were requested to incorporate this process in their work. The intent of the IEE is to cover all SO2 activities and to provide an appropriate vehicle for amendment when activities are added, extended or modified.

SO2 has approximately 20 partners engaged in an integrated partnership to achieve environmental and natural resources results under various thematic areas and IRs. The directly USAID-funded partners are Environmental Policy and Institutional Strengthening (EPIQ)/Tanzania, Department of Interior (DOI), Environment Education and Communication Project (GreenCom), World Resources Institute (WRI), University of Rhode Island (URI) Tanzanian Coastal Management Partnership (TCMP), Africare, African Wildlife Federation (AWF), World Wildlife Fund-US (WWF), the Peace Corps and the Tuskegee University-Sokoine University of Agriculture (TU-SUA) Linkage project. Other members of the partnership funded through these partners or government contributing agencies include the Division of Environment, the Wildlife Division, Tanzania National Parks (TANAPA), National Environment Management Council (NEMC), Lawyers Environmental Action Team (LEAT), Journalists Environmental Association of Tanzania (JET) and the Maasai Advancement Association.

Categorical Exclusions are recommended for policy-related studies, research, training, capacity building and similar activities of EPIQ/Tanzania, DOI, Greencom, WRI and URI/TCMP, pursuant to 22 CFR 216.2(c)(2)(i) [technical assistance and training], 216.2 (c)(2)(iii) [analyses,studies, workshops and meetings] and 216.2 (c)(2)(v) [document and information transfers].

Negative Determinations with Conditions are recommended for activities of Africare (PORI 1-3 and PORI-4), African Wildlife Federation, US Peace Corps, WWF-US and TU-SUA Phase II Linkage project, **excluding** roads in national parks. The conditions are utilization of and adherence to the Africa Bureau **environmental screening review**

procedures. This IEE (Section 4.2 and Annex A) lays out a set of steps to ensure adequate environmental review of USAID-supported activities, based on the Bureau's *Environmental Guidelines for Small-Scale Activities in Africa*. This negative determination also urges that SO2 partners receive training and capacity building in how to apply the procedures and ensure environmentally sustainable activities.

A **Positive Determination** is recommended for road-rehabilitation activities to be undertaken by SO2 partners (currently TANAPA and AWF) in protected areas, in this case, Tarangire and potentially Lake Manyara National Parks. A positive threshold decision has been reached, because 1) potential impacts on relatively undegraded forest pursuant to FAA Section 118(c)(15), endangered species/habitat per 22 CFR 216.5 or other potentially significant adverse effects cannot be excluded without further study of each road segment; and 2) a joint Programmatic Environmental Assessment with TANAPA will satisfy USAID needs, achieve compliance with TANAPA policy, build capacity in EIA and set the stage for more broadly applicable road-related environmental analysis, mitigation and monitoring in national parks.

In order to comply with SO team responsibilities under ADS 204, the SO2 team will monitor all ongoing and proposed new activities to ensure that they remain Categorical Exclusions or within the bounds of the Negative Determination with conditions for environmental screening and review. The team will, at a minimum, re-validate the determinations when the SO2 partners submit annual work plans. For any extension or modification of an existing contract or agreement or any new contract or agreement with these partners, an IEE amendment will be prepared to substantiate or revise this determination in accordance with the proposed activities.

APPROVAL OF ENVIRONMENTAL ACTION RECOMMENDED: (Type Name Under Signature Line)

CLEARANCE:
Mission Director: _____ Date: _____
Lucretia Taylor

CONCURRENCE:
Bureau Environmental Officer: Carl M. Gallegos Date: 6/15/99
Carl M. Gallegos Approved: X
Disapproved: _____

File No: 29tanz3.iee (AID/W)

CLEARANCE:
General Counsel (Africa Bureau) _____ Date: 6/18/99
John Power

ADDITIONAL CLEARANCES:
Mission Environmental Officer: /s/ Date: 5/19/1999
Gilbert Kajuna, USAID/Tanzania

SO Team Leader: /s/ Date: 6/7/1999
Ron Ruybal, USAID/Tanzania

Regional Environmental Officer: /s/ Date: 5/19/1999
Charlotte Bingham, REDSO/ESA

national parks. The conditions are utilization of and adherence to the Africa Bureau **environmental screening and review procedures**. This IEE (Section 4.2 and Annex A) lays out a set of steps to ensure adequate environmental review of USAID-supported activities, based on the Bureau's *Environmental Guidelines for Small-Scale Activities in Africa*. This negative determination also urges that SO2 partners receive training and capacity building in how to apply the procedures and ensure environmentally sustainable activities.

A **Positive Determination** is recommended for road-rehabilitation activities to be undertaken by SO2 partners (currently TANAPA and AWF) in protected areas, in this case, Tarangire and potentially Lake Manyara National Parks. A positive threshold decision has been reached, because 1) potential impacts on relatively undegraded forest pursuant to FAA Section 118(c)(15), endangered species/habitat per 22 CFR 216.5 or other potentially significant adverse effects cannot be excluded without further study of each road segment; and 2) a joint Programmatic Environmental Assessment with TANAPA will satisfy USAID needs, achieve compliance with TANAPA policy, build capacity in EIA and set the stage for more broadly applicable road-related environmental analysis, mitigation and monitoring in national parks.

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APPROVAL OF ENVIRONMENTAL ACTION RECOMMENDED: (Type Name Under Signature Line)

CLEARANCE:
Mission Director: L Taylor — Lucretia Taylor — Date: 25 May 99

CONCURRENCE:
Bureau Environmental Officer: _____ — Carl M. Gallegos — Date: _____ Approved: _____ Disapproved: _____

File No: (AID/W)

CLEARANCE:
General Counsel (Africa Bureau) _____ — Drew Luten — Date: _____

ADDITIONAL CLEARANCES:
Mission Environmental Officer: _____ — Gilbert Kajuna, USAID/Tanzania — Date: May 19, 1999.

SO Team Leader: /draft/ — Ron Ruybal, USAID/Tanzania — Date: _____

Regional Environmental Officer: /s/ — Charlotte Bingham, REDSO/ESA — Date: *May 19, 1999*

INITIAL ENVIRONMENTAL EXAMINATION

PROGRAM/ACTIVITY DATA:

Program/Activity Number: 621-0174 (TU-SUA Linkage)/also cited as 623-0000-00-0032, 621-0180 (PERM), 621-0192 (Tanzanian Environment and Natural Resources Partnership)

Country/Region: Tanzania

Program/Activity Title:SO2 - Foundation Established for Adoption of Environmentally Sustainable Natural Resource Management Practices in Tanzania *proposed/approved by Mission to become* **Improved Conservation of Biodiversity in Targeted Areas**

1.0 BACKGROUND AND PROJECT DESCRIPTION

1.1 Purpose and Scope of IEE

The purpose of this IEE is to: a) provide documentation pursuant to 22 CFR 216 for existing and planned SO2 activities; b) resolve the existing deferral for the TU-SUA Linkage project (IEE deferral of 9/95); and c) consider the need for the Environmental Monitoring, Evaluation and Mitigation Plan (EMEMP) required by the Participatory Environmental Resource Management (PERM) IEE but not undertaken. Subsequent to the 9/95 IEE for PERM and the 1996 USAID/Tanzania CSP, a Strategic Objective (SO) 2 has been in the process of revision and refinement. Monies have been added to SO2 through global buy-ins and the activities of PERM partners have evolved and responded to changing circumstances. In addition, the TU-SUA project has become a part of the SO. During the period 1997-1998, when SO2 was being redesigned, the Mission agreed to follow and to initiate the environmental screening and review process described in the PERM IEE for all of its partners in the SO and to prepare an SO-level IEE when the SO Results Framework had been completed.

This SO2 IEE, hence, incorporates or revises 1995 threshold determinations, based on the proposals and work plans of SO2 Cooperative Agreements and contracts. Nevertheless, it should be noted that the SO2 partners, most of whom were technically covered by the PERM IEE process, have initiated the process described therein as have other partners, such as TU-SUA, who were requested to do so in mid-1998.

This IEE does not cover any pesticide use. As stated in the Africa Bureau *Environmental Guidelines for Small-Scale Activities* (1966): *Use is interpreted broadly to include the handling, transport, storage, mixing, loading, application, clean up of spray equipment, and disposal of pesticides, as well as the provision of fuel for transport of pesticides, and providing technical assistance in pesticide management. USAID finances pesticides only on a case-by-case basis..and then only after specific additional evaluation that would consider the potential benefits conferred by the use of the pesticide.* [See Agency's guidelines for pesticide use in 22 CFR 216.3(b).] The screening form and review process may be used to determine what level of analysis is required for pesticide use, but the minimum is to provide the documentation required in 22 CFR 216.3(b)(1)(i) (a) through (l).

In summary, the IEE consolidates threshold decisions for activities currently under SO2 and provides a single vehicle for future IEE amendments, as new or amended contracts or agreements are put in place, new activities are designed and others are modified or extended.

1.2 SO2 Results Framework

To provide a framework for the specific activities described in Section 1.3 and any future activities that may require analysis in an amended IEE, USAID/Tanzania's SO2 is outlined below (taken from 31 March 99 *Rationale for Revising SO2)* The SO2 Results Framework has been in the process of refinement during 1997 and 1998. As approved by USAID/Tanzania (April/May 1999), the SO statement is: Improved Conservation of Biodiversity in Targeted Areas.

Intermediate Result (IR) 2.1 -- Key Natural Resource Management Policies Applied. This IR focuses on assisting the Government of Tanzania (GOT) to implement the new Wildlife Policy of Tanzania, including supporting the drafting of legislation, regulations and procedures. SO2 also expects to assist the Department of Environment to implement Environmental Policy. Another focus is to develop an Integrated Coastal Management Policy. Additional policy reforms may be pursued during the life of the SO2 program.

IR 2.2 -- Increased Effectiveness of Institutions that Support NRM. SO2 will work with selected GOT institutions and Tanzanian Community Based Organizations (CBOs) and Non-governmental Organizations (NGOs). The approach is to increase the skill base of individuals in targeted institutions and to promote organizational improvements directed by the institutions themselves. US-funded partners will assist their Tanzanian counterpart organizations in this regard.

IR 2.3 -- Improved Management of Targeted Protected Areas. This result focuses on improving the management of targeted protected areas in both parks and fame reserves. The current focus is on Tarangire Park and Lake Manyara Park. USAID intends to work with the Wildlife Division in Ugalla Game Reserve.

IR 2.4 -- Community Natural Resource Management Regimes Functioning in Target Areas. SO2 will assist communities to gain legal authority to manage wildlife and to develop and implement collaborative district and community level plans for use and management of natural resources in communities adjacent to protected areas. Included in this IR are a) assistance to promote legislation to implement the Wildlife Policy through establishing Wildlife Management Areas (WMAs) and/or Community Forest Reserves and to develop WMA and Natural Resource Management Plans; and b) training and skill development for NRM approaches, such as improved beehives and beekeeping and the development and management of natural resource-based enterprises utilizing sustainable practices.

1.3 SO2 Activities

Activities described below are funded under the Participatory Environmental Resources Management (PERM) Project, the Tuskegee University-Sokoine University of Agriculture Linkage Project and several buy-ins to global projects, which in FY 99 have been grouped and notified to Congress as the Tanzanian Environment and Natural Resources Partnership. Separately funded activities are described individually.

1.3.1 EPIQ/Tanzania Natural Resources Management Program

The USAID/Tanzania Environmental Policy and Institutional Strengthening Project task order contract under the overall EPIQ contract obligated $1.8 million during the period September 1997 through September 1999 with a ceiling of $3.574 million. EPIQ/T has been responsible for managing a Partner Support Unit (PSU) to support achievement of SO2 results. According to the 1997 contract, this unit serves as a focal point for collaboration, information dissemination and the like. EPIQ/T also supports policy analyses in cooperation with the GOT and the Ministry of Natural Resources and Tourism. Activities include administrative and logistic support, information networks (including a newsletter), program monitoring and reporting, establishment of a policy framework, building analytical capacity and support for training, field studies and data collection.

The March 1998 work plan describes these EPIQ/T focus areas:

1) Natural Resources Management/Environment Policy. EPIQ's role is to coordinate SO2 Partnership activities in the policy arena to shape a supportive policy environment in coastal and wildlife management issues, monitor, report and support targeted policies where appropriate.
2) Institutional Strengthening. EPIQ/T provides institutional support to organizations identified by SO2 partners, such as the Lawyers Environmental Action Team (LEAT), Journalists for Environment in Tanzania (JET), Wildlife Conservation Society of Tanzania, National Environmental Management Council, Wildlife Division, or others.

3) Community Conservation and Game Reserve Regimes (Ugalla pilot area). Workshops and other facilitation, including reports and monitoring.

4) Community Conservation and National Park Regimes (pilot area Tarangire/Lake Manyara complex). Partner coordination meetings, workshops, reports and monitoring.

5) Partnership Support. Support as identified by the partners where economies of scale or comparative advantage indicate EPIQ could provide assistance, Dar support bases, communication base and identification of services.

6) Program Performance Monitoring. Help redefine SO and IRs, facilitate program planning and reporting and performance monitoring and evaluation.

Based on a February 1999 stock-taking of EPIQ/T and questions concerning a two-year extension, the recommendation is to make a "planned shift toward relative greater work in policy and institutional strengthening." This decision has not yet been made, pending completion of the revised SO2 Results Framework.

1.3.2 African Wildlife Foundation (AWF) Cooperative Agreement (CA) for Partnership Option for Resource-Use Innovation (PORI) Project 1-3

The PORI 1-3 CA for $3.65 million covers the four-year period April 1998 through 2002. The activity target areas are the Tarangire and Lake Manyara ecosystems/National Parks. The partners/cooperating agencies for this activity are the Tanzanian National Parks Authority (TANAPA), the Ministry of Natural Resources and Tourism, the Maasai Advancement Association (MAA), NGOs and the private sector. According to the CA, the emphasis is on community-based natural resources management (CBNRM) in pastoral areas and modern methodologies for new challenges to national parks. The main mechanism by which AWF will implement the activities is the AWF Community Conservation Service Center (AWF-CCSC), based in Arusha. The following description is derived from the 1998 CA.

> Component 1 IR -- CBNRM catalyzed and supported in targeted pastoral areas adjacent to Tarangire and other protected areas in northern Tanzania. MAA (formerly Inyuat e Maa) is a principal project partner. Activity Category 1 is supporting and tracking development of community-based natural resources management, which will be accomplished through awareness raising and providing a basic package of support services. Inputs can include study tours, video, workshops, community mapping transferred to GIS, training, provision of inputs, economic/ecological assessment of options, legal support, and set up of financial mechanisms. Activity Category 2 is to strengthen locally-active NGOs to be accomplished by strengthening MAA and identification and strengthening of other locally-active NGOs. Activity Category 3 is appropriate information support for CBNRM to be accomplished through local use of information to inform decision-making and monitoring and evaluation systems for community conservation activities. Inputs include assessment of information needs, assessment of communications technologies and a monitoring and evaluation support function at the AWF-CCSC.
>
> Component 2 IR -- Innovative methodologies in operational planning, visitor services and park outreach being effectively implemented to address challenges to the long-term integrity of Tarangire National Park resources. The principal partner agencies are Tarangire and Lake Manyara National Parks and TANAPA's Tourism Department, Community Conservation Service and Planning Unit. Activity Category 1 is to build a proactive strategy for park visitorship through developing a Strategic Action Plan for the Tourism Department of TANAPA, building capacity for tourism management at TANAPA HQ, providing resources to implement the Strategic Action Plan for Tourism, and implementing tourism aspects of the Tarangire Management Zoning Plan/General Management Plan, including campsites, training, interpretive materials and other refurbishments. Activity Category 2 is to increase the conservation impact of park outreach programs by strengthening core capacity of TANAPA CCS at headquarters, Tarangire and Manyara, linking parks to community natural

resource areas and monitoring of CCS Strategic Plans and conservation impact. Activity Category 3 is the application of additional planning methodologies for Tarangire National Park. AWF proposes to go from a Management Zone Plan (MZP) and a CCS Strategic Action Plan to other steps, which will include the development of an annual operations plan, a full General Management Plan (GMP), and a system for monitoring implementation of the MZP/GMP. The Department of Interior (DOI) is expected to assist AWF in these activities.

1.3.3 African Wildlife Foundation (AWF) Cooperative Agreement (CA) for Partnership Option for Resource-Use Innovation (PORI) Project 4

The PORI 4 CA, which concerns Interpretation and Infrastructure for Tarangire and Lake Manyara National Parks, for $4.4 million covers the four-year period September 1998 through 2002. The partners/cooperating agencies with AWF for this CA are TANAPA Departments of Tourism, Planning and Community Conservation, DOI, and WEGS Consultants. Principal objectives are to ensure that 1) the two parks have capacity to maintain key roads; 2) majority of TANAPA staff in the parks to have access to safe, clean and sufficient water; 3) incremental improvements are made in providing accommodation and office space; and 4) visitor services are improved through infrastructure and interpretive materials. Nearly $2 million are slated for infrastructure development and another million for vehicles and heavy equipment. TANAPA plays a key role in implementing and is the main authority responsible for activities under this CA. The proposal was based on the premise of continuing technical input from DOI, particularly input for standard design guidelines, training TANAPA in use and care of heavy equipment, roads, Master Plans for facilities development, interpretive plans and interpretive materials. WEGS provides architectural and engineering assistance and environmental assessment expertise.

Concerning capacity (skills and equipment) to maintain key roads to appropriate specifications for administrative and visitor use, AWF and/or WEGS (with DOI and TANAPA) will procure road equipment, design road rehabilitations and specifications for a borrow pit, conduct tender processes, and perform work supervision.

Implementation of the water component entails conduct of a survey of water sources and needs, design of the infrastructure, the tender process and supervision of the work. Wells, distribution systems and water storage are planned at eight locations in Tarangire of which five are ranger posts and three other locations are headquarters or zonal headquarters, but the provisioning is similar. One of the ranger posts is new and one existing post will be relocated closer to a water source. Similar water provisioning will be undertaken at six Lake Manyara locations.

Incremental improvement in accommodation and office space according to standardized design guidelines and a facilities master plan for each national park will be accomplished through development of TANAPA-wide standard guidelines for design and construction, comprehensive facilities development plans, renderings and designs for staff houses and a tendering process.

Improved visitor services will be accomplished through construction of an appropriate main gate entry sequencing and the operation of interpretive plans. The development and design of interpretive plans, art work and exhibits, production of renderings and drawings, conduct of a tender process and installation of interpretive exhibits are envisioned. Standard design guidelines for TANAPA-wide use will be developed.

The project envisions that relevant TANAPA staff from other parks and from headquarters will participate and learn from the infrastructure and interpretation activities.

The key inputs provided by AWF (or through them by WEGS) are personnel, technical services, office services, training, travel, meetings, workshops and seminars, vehicles and road building equipment, and costs associated with the water provisioning, the entry sequences, car park and access road, ranger station, interpretive center, public toilets,

picnic area, visitor pick-up area, footpaths, related site works, interpretive displays and junior staff housing at Tarangire National Park as well as very similar improvements at Lake Manyara National Park.

1.3.4 World Wildlife Fund (US) Tarangire National Park Project

The WWF CA for $2.74 million covers the five-year period September 1998 through 2003. The existing CA covers only Tarangire National Park, but the CA could be amended in the future to cover activities in Lake Manyara National Park. The partners/cooperating agencies with WWF are WWF-Dar Es Salaam, TANAPA Departments of Tourism, Planning and Community Conservation, Ministry and Natural Resources and Tourism, the Institute for Resource Assessment, OIKOS (an Italian NGO), the National Herbarium of Tanzania and the Frankfurt Zoological Society. According to the CA (pg. 8), the "main focus of the project is conservation of the Tarangire River system and capacity building in ecological monitoring, vegetation and participatory land use mapping, and large mammal surveys within the park and in the dispersal areas surrounding it." The purpose of the project is to help TANAPA manage Tarangire National Park more effectively within the overall goal of sustainably conserving the natural resources of the Park. Focus areas identified in the CA are described below.

> Develop and implement a strategy/management plan for sustainable conservation of the Tarangire wetland system. Activities are to: 1) study the wetland system; 2) develop action plans based on the study; and 3) implement recommended activities (not yet identified). WWF expects to issue grants to local NGOs to carry out activities.
>
> Produce vegetation and participatory land use maps and associated databases for selected areas. Activities are 1) use of satellite imagery/aerial photos to produce vegetation maps; 2) selection of ecological indicators and establishment of a monitoring program; 3) participatory land use maps and database for areas outside Tarangire National Park that are suitable for Wildlife Management Areas, based on PRA techniques; 4) comparison of aerial photography and satellite images to assess vegetation and land use changes; 5) in service training for relevant Park staff; and 6) assisting a Tanzanian student in thesis/dissertation.
>
> Carry out ecological monitoring in Tarangire National Park. Activities include 1) counts of various large mammals; 2) inventories/surveys of flora and fauna; 3) writing reports on said surveys; 4) capture-collar and radio-tracking of elephants; 5) ground surveys of large herbivores; 6) collection of data about large carnivores in and around the park; 7) training of relevant Tarangire National Park staff; 8) assisting a Tanzanian student in thesis/dissertation; and 9) establishment of a GIS Training Center and Database to produce maps concerning large mammal distributions. *WWF proposes to construct the GIS Training Center.*
>
> Establish and train desktop publishing unit at TANAPA Headquarters. The WWF CA will provide hardware and software as well as training and will produce publicity materials and guidebooks for Tarangire National Park.

1.3.5 Department of Interior (DOI)/Partnership for Biodiversity

This Interagency contract for $900,000 can offer technical assistance and training in wildlife law enforcement, infrastructure development and maintenance, biologically-based quota setting, and eco-tourism and interpretation. Partnership activities, according to the DOI April 98 work plan, are planned to focus on the Tarangire/Lake Manyara Complex and the Ugalla Game Reserve. Illustrative activities undertaken by DOI include an assessment of the conditions of Tarangire NP roads with recommendations to TANAPA on improvements and upgrades to all-weather conditions, wildlife enforcement capability assessment of park staff and infrastructure at Tarangire and at Ugalla Game Reserve, priority setting planning session with TANAPA, workshop for infrastructure development, law enforcement training, and assessment of fire management and suppression capability of Tarangire National Park. Additional workshops and assistance with roads and other infrastructure, including interpretive strategies and visitor services, are planned as are continued technical assistance in wildlife law enforcement and sustainable wildlife utilization.

1.3.6 Ugalla Community Conservation Project with Africare

The Africare CA for $1.996 million covers the near three-year period January 1998 through September 2000. The thrust of the CA is to 1) provide technical expertise in CBNRM; 2) assist in organizational development of village governments and resource-user associations and 3) promote bee-keeping, fisheries, small enterprise development and agricultural development within the areas near the Ugalla Game Reserve (managed by the Division of Wildlife). The Ugalla Community Conservation Project (UCCP) seeks to achieve awareness and support for conservation and responsible use of resources in the Ugalla Game reserve and surrounding Forest Reserves and non-protected areas; responsible resource utilization practices; testing of approaches for community management of natural resources; increased income levels from environmentally sound small enterprises; and the strengthening of organizations for sustainable natural resource use. Project activities, as described in the CA, are as follows.

Socio-economic study of target communities, training in Participatory Rural Appraisals (PRAs) for staff and partners, conduct of PRAs, training in conservation and sustainable resource use for communities, and workshops/planning to explore direct community involvement in conservation and land use practices.

Development and testing of appropriate technologies for beekeepers and fishermen and other resource users. Examples include fish smoking techniques, bee smokers, bee protective equipment, hivemaking techniques and the like.

Facilitation of the process of land demarcation, surveying and land titling, assistance to village governments in pilot communities to develop land use plans and negotiate for establishment of Wildlife Management Areas. Assistance in selected villages to develop hunting programs (such as permit auctions, revenue collection and patrol regime by game scouts) and explore options for joint forest management of villages inside or adjacent to Forest Reserves.

Assistance to women's groups and individuals to identify income-generating opportunities, e.g., bee products, agro-processing and marketing of local products, including sunflower seed oil pressing, palm oil pressing, value-added bee products, irrigated horticulture and poultry products.

Capacity building through training of district officials in CBNRM, PRA and other skills, training of Ugalla Game Reserve personnel, village governments and resource user groups.

1.3.7 GreenCOM

USAID/Tanzania has a task order of approximately $700,00 with the Environment Education and Communication Project (GreenCOM) contract for the period September 1997 through October 1999. This cross-cutting activity serves SO2 partners in providing environmental awareness and public participation in natural resource issues, building human an institutional capacity for EE&C, audiovisual materials for EE&C and an action plan, materials and training for the Tarangire visitor/resource center. Objectives are achieved through such activities as strategy formulation, an environmental awards scheme, production of audiovisual materials, training workshops, strengthening of the Journalists Environmental Association of Tanzania (JET) and other collaborative efforts with SO2 partners.

1.3.8 World Resources Institute

USAID/Tanzania has a task order of approximately $600,00 with World Resources Institute (WRI) for the period 1997-1999. The results WRI seeks to achieve during a three to five year period, per their final work plan of September 1998, are 1) policy research and outreach capacity established for three Tanzanian NGOs; 2) institutional assessment and performance monitoring capacity established in one Tanzanian NGO; and 3) NGO policy information shared with policy-makers in and policy-reform processes. The three NGOs targeted are the Lawyers Environment Action Team

(LEAT), the Journalists Environmental Association of Tanzania (JET) and Friedkin Conservation Fund (FCF). The approaches and tools to accomplish the results include joint NGO/WRI policy research, performance monitoring and outreach; NGO fellowships to WRI; regional exchanges; and formal training. In order to identify critical areas for strengthening, EPIQ is made responsible for undertaking the baseline institutional assessment.

The policy research and outreach activities through LEAT will focus on wildlife management policies, especially outside the National Parks, and the enabling environment for civil society, including Tanzanian policies on NGO participation, such as the NGO Act, access to information, court rulings, etc. JET will develop primers for journalists to write related articles on both wildlife management and NGO-related issues. FCF, which has in the past concentrated on field activities in game reserves, needs stronger analytic and outreach capabilities. With WRI collaboration, FCF, with its established relationship to the trophy hunting sectors, will carry out analytical activities for the Ugalla Game Reserve, e.g., inventory of existing data and information, review of current activities and models to monitor protected areas, a plan for Ugalla resource use monitoring, and a prototype Ugalla monitoring report.

1.3.9 Tanzania Coastal Management Partnership (TCMP)

USAID/Tanzania has a buy-in of $1.7 million for the period 1997 through 2001 with the University of Rhode Island Coastal Resources Center's Global Bureau CA. This buy-in provides assistance in Integrated Coastal Management (ICM). URI/CRC helped to design the TCMP in March 1997 through a collaborative effort among USAID/Tanzania, USAID/G/ENR and the National Environment Management Council of Tanzania. Based on the document, *Programmatic Guidance and Principles for Cooperation*, URI and NEMC established the TCMP Support Unit, whose primary responsibility is facilitating the national ICM policy. TCMP also collaborates with GreenCom, EPIQ and WRI in community awareness and capacity building.

The TCMP seeks these results: 1) ICM policy effectively applied (action plans and implementing mechanisms to be articulated); 2) intersectoral mechanisms for addressing coastal economic opportunities demonstrated (development guidelines for different economic sectors and achieving clarity of roles and responsibilities for various government levels); 3) enabling conditions for ICM improved (link field initiatives ongoing with a variety of donors to national policy processes); 4) human and institutional capacity for integrated coastal management built (short courses for practitioners with the view toward building an ICM program in a Tanzanian academic institution); and 5) Tanzania coastal zone management informed by and contributing globally (exchanges with international consultancies and between Tanzania and other national ICM programs).

1.3.10 US Peace Corps Community-Based Natural Resources Management

USAID/Tanzania, through a $500,000 PASA (1996-1999, extended in 1998 through 2001) with the Peace Corps. This PASA supports volunteers working with communities to improve NRM in areas in and around the Tarangire/Lake Manyara Parks (Monduli, Hanang and Babati). The purpose of the project is to improve natural resources in selected districts by using PC volunteers at the village level to strengthen selected district capacity, in land degradation, participatory village-level resource planning; and sustainable natural resource management technologies. The PASA funds volunteers and nationals, training, small-scale equipment and material support. Illustrative activities are promotion of technologies, such as clay stoves, water harvesting and biogas; tree nurseries and tree planting projects; introduction of alternative agricultural and animal husbandry techniques; women's small-scale income generating projects; farmer to farmer visits; and environmental education.

1.3.11 Tuskegee University Sokoine University Linkage Project

In October 1995, USAID/Tanzania funded "Capacity Building for the Development of Sustainable Agriculture through Community Based Management of the Natural Resources of Tanzania." This was a follow-up to the 1990-1995 Linkage project, "Enhancing Teaching, Research and Outreach Capabilities of Sokoine University of Agriculture." Known as the TU-SUA Linkage Project throughout the time period, the CA is for $5.1 million from 1990 through

2000.

In late September 1995, the IEE for Phase II of the TU-SUA Linkage Project received a deferral that has remained unresolved. In May 1997, the REO recommended that USAID/Tanzania resolve the deferral by preparing the Africa Bureau umbrella IEE for environmental screening and review, using then standard language. By April 1998, because of the urgency to apply appropriate procedures, the REO prepared a letter to TU-SUA describing the environmental screening and review process and requested that it be followed, as a temporary expedient. An adaptation of the model IEE was left with the Mission for finalizing. By June 1998, TU-SUA had submitted screening forms and draft reviews, but an amended TU-SUA IEE to formally resolve the deferral had not been completed. Because a final SO2 framework was anticipated shortly and the TU-SUA Linkage project would be under the revised SO2, the recommendation was made to cover this partner and all other SO2 partners in the same SO2-level IEE, with the caveat that if the revised SO2 were delayed beyond October, the Mission should finalize an amended TU-SUA IEE. The SO2 revision was delayed, but no amended IEE was completed. Hence, the deferral is being resolved in this SO2-level IEE.

Phase II (the second five-year tranche) has nine focus areas: land use practices; management of resources for horticultural production; sustainable crop production practices; production of poultry, goats and cattle; aqua-culture; services for community well-being; animal power and equipment; irrigation and flood control; and co-existence between wildlife protected areas and neighboring communities. Activities being undertaken by TU-SUA are numerous, based on the identification of priorities in CBNRM in project villages (in Morogoro, Kilombero and Kilosa districts). Illustrative examples are fish ponds, cattle vaccinations, cattle dipping, nurseries, afforestation, bee-keeping, small-scale irrigation, forest management, soil conservation practices, rice husbandry, rodent control training, drinking water and related activities.

2.0 COUNTRY AND ENVIRONMENTAL INFORMATION (BASELINE INFORMATION)

Because not all locations for future interventions covered under this IEE are known and because of the variety of environmental situations encompassed by potential activities, this IEE provides neither comprehensive nor detailed baseline environmental information. Implementation of the recommendations for environmental screening and review (see Section 4) will require implementing partners to provide descriptions of the affected environment specific to the setting in which their activities are carried out in their preparation of environmental reviews.

- Section 2.1 contains general information derived from USAID/Tanzania's Country Strategic Plan of 1996, 1995 PERM IEE, and information supplied by several of the SO2 partners.

- Section 2.2 reviews Tanzania Environmental Impact Assessment regulations and related matters, which will have important implications for some of the SO2 partners, who may need to ensure that various activities they undertake comply with Tanzanian law.

2.1 Overview

2.1.1 Country Information

Tanzania is a large and varied country, encompassing 945,090 square kilometers (km^2) of land and water. It is home to 30 million people, with a population growth rate of 2.8 percent per year. About 85 percent of the total population live in rural areas; however, the urban population is growing at a rapid 7 to 8 percent per year. While Dar es Salaam accounts for about half of the urban population, Mbeya, Morogoro, Mwanza, Arusha and Tanga, among others, are large and growing regional urban centers.

Tanzania is endowed with an abundance of natural resources. In mainland Tanzania, about 50 percent of the total land area is forest and woodland; 40 percent is grassland and scrub; and six to eight percent is cultivated. The terms forest and woodland are comprehensive and only two percent of the country is covered by dense closed forest (1.4 million

hectares). The tsetse-fly infested areas of West Central and South East Tanzania constitute a large proportion of the woodland. The largest area of mangrove forests, which are an environmentally significant resource in East Africa can be found in Tanzania (0.1 million hectares). Grassland and scrub include most of the rangeland area of the country and support an estimated 13 million cattle and 10 million sheep and goats. However, almost 60 percent of this livestock is concentrated on 10 percent of the land in the north and central parts of the country. The cultivated area is worked largely by smallholder farmers. Although about one percent of the total land area is held in large farms (which are concentrated in the northern parts of the country), shifting cultivation is still common, particularly in the drier parts of the rainfed agriculture zone. The high potential of irrigated agriculture has not been realized due to high investment costs (only 20 percent of irrigable land is currently irrigated, of which four-fifths is under traditional small-scale irrigation).

Biodiversity is one of the country's greatest assets. Sites, such as Ngorongoro Crater, the Serengeti, the Eastern Arc mountains, and the Great Rift Valley lakes, are world renowned. Tanzania is among the five most diverse countries in Africa for mammals, birds and swallowtail butterflies, and the second most diverse for plants. The country is also important for endemic species, that is, species that are found nowhere else. Important sites for endemic species include the great lakes for fish and the forests of the "Eastern Arc" mountains, where one quarter of the surveyed flora is endemic.

Aquatic resources are important for Tanzania. The country's lake and river systems, the largest in Africa, are a major wetland resource. These include large portions of Lakes Victoria, Tanganyika and Nyasa, as well as a variety of other small lakes, swamps and floodplains. Marine resources include fish stocks, coral reefs, sandy beaches, mangroves, marine grasses, salt resources and great biological diversity. Marine fisheries are mainly coastal, but there is high potential for game and commercial fishing in deep off-shore waters. There is also off-shore oil and gas potential.

Energy and mineral resources are another important component of the resource base. The major energy resources are woodfuel, hydropower and coal. There is also potential for natural gas, solar energy and wind energy. Petroleum imports supplement these national resources. The country depends heavily on woodfuel (and charcoal-90% use) for primary energy use. Coal reserves are estimated at 2,200 million tons, but little exploitation has yet taken place. Although minerals only make up a small part of GDP (gross domestic product), mining of gold, diamonds, coal, tin, salt, gypsum, sand, lime, gemstones and exploration for gas all occur and have important local environmental impact.

This natural resource endowment is most directly affected by human activity in the realm of food production. Agriculture is the mainstay of the Tanzanian economy, employing over 80% of the adult work force and accounting for about 50% of GDP and 75% of foreign exchange earnings. Through their agricultural activities, millions of rural families are the day to day managers of much of the country's land, water and vegetation resources. In the past, natural resource utilization strategies were compatible with conservation of the natural resource base. Crop production activities allowed for the recuperation of soil fertility, nomadic and transhumant herding was practiced on marginal lands, and forest products were harvested at a sustainable rate. However, the dynamics of rural life have been drastically affected by colonial rule, post-independence policies, global market trends, urban immigration, and population growth. Today, a large proportion of rural Tanzanians are impoverished. Increased pressure on the resource base due to population increases, erosion of indigenous knowledge, and competing activities such as tourism, irrigation and hydropower generation have led to unsustainable farming, herding, and wildlife utilization practices. This increasingly difficult situation is accompanied by a rise in the illicit use of resources.

The Government of Tanzania has recognized the importance of its natural resource base and has set aside some twenty-five percent of the Mainland in protected areas in national parks, game, forest, and marine reserves. Various laws have been enacted and policies and planning documents have been drawn up to encourage sustainable use of natural resources. Unfortunately, there is no clear and consolidated policy or framework for natural resource management, and enforcement of existing legislation has been weak or absent. This, coupled with a lack of appreciation of the need for sustainable natural resources management (NRM) by many Tanzanians, is resulting in the degradation of the resource base.

2.1.2 SO2 Partnership Focus Areas

Partnership activities' have geographic focus in the Tarangire/Lake Manyara complex in the north, the Ugalla Game reserve in the west, 17 villages in Morogoro region and the Dar es salaam Coastal zone.

Tarangire National Park is the fourth largest park in Tanzania with one of the highest densities of elephants in the country. It is part of Tanzania's popular northern tourist circuit that includes Arusha, Mt. Kilimanjaro, Lake Manyara, and Serengeti National Parks as well as Ngorongoro Conservation Area.

Lake Manyara National Park is located north of Tarangire National Park. The park is small and thus best considered as part of a larger ecosystem. The park contains a large soda lake, which provides crucial habitat for exceptional numbers of birds including Flamingos. The park also has large numbers of macro-fauna including elephant, buffalo, hippopotamus, giraffe, wildebeest, and zebra.

The 40,000 square km Ugalla ecosystem comprises Ugalla Game Reserve (UGR), adjacent buffer zones and neighboring communities in Tabora, Sikonge, Mpanda and Urambo districts. It encompasses important forests and grasslands that serve as habitat for a diverse assembly of wildlife. Natural resources utilization activities, by residents as well as non-residents in the ecosystem include bee-keeping, seasonal fishing in the Ugalla river and licensed trophy hunting. UGR is one of the lesser-known game reserves of Tanzania. Located in miombo woodlands, it is isolated and away from all major routes. Ugalla Game Reserve serves as a link in the long but disjointed span of protected areas in western Tanzania. Ugalla Game Reserve is home to a wide variety of flora and fauna. One of Ugalla's most notable species is sable antelope. The Reserve is also home to leopard, lion, cheetah, elephant, crocodile, eland, buffalo, waterbuck, zebra, and reedbuck. The Reserve also contains valuable timber species.

Phase I (1990-1995) of the Sokoine University of Agriculture - Tuskeege University (SUA-TU) Linkages Project in Morogoro had it's focus on internal capacity building at SUA. In phase II (1996-2000) there is a major shift of focus to increased engagement on the part of SUA in it's intended role as a national agricultural university. Consequently, SUA is working with rural communities to improve their well-being by using sustainable CBNRM practices as building blocks for more viable economic/production opportunities.

The geographic area of impact includes 17 villages in Morogoro and Kilosa districts It will impact about 75,000 low-income farmers and rural population. The distribution of villages by district is: five villages in each of Morogoro and Kilombero districts, and seven in Kilosa. The demographic impact will be much greater with the perceived dissemination of SUA's experience from the current focus area to the broader national level.

Tanzania's coastline stretches 800 km along the Western Indian Ocean. This strip of land and water encompasses a diversity of ecosystems, including sandy beaches, rocky out crops, coral reefs, sea grass beds, islands and extensive mangrove stands. Tanzania coastal ecosystems are of great importance to the well-being of coastal communities. The coast also has great significance to the nation's economic development. For example, tourism, fishing, shipping, mariculture, salt mining, natural gas, and urban development are viewed by national government as important economic opportunities. Along this stretch there are five administrative regions which encompasses thirteen (13) coastal districts. This coastal area is home to about a quarter of the country's population. About eight million people, live in coastal regions, most of these live in coastal villages, with little access to infrastructure or services. They depend on coastal resources for food, security and very modest livelihoods.

The five coastal regions contribute about one third of the national Gross Domestic Product (GDP). They are rich in natural resources and currently contribute more than a proportionate share of the nation's income. The coast also contains resources that will be the engine for the nation's development. Coastal tourism, mariculture development, agriculture, and natural gas exploitation are just beginning. These resources are seen as potential activities for national economic development and the gradual improvement of the quality of life of coastal communities. The challenge is to

maintain and improve the resource base on which the rural coastal economy depends, while developing new economic opportunities in ways that benefit the people of the coast and the nation as a whole.

2.2 Tanzania Environmental Policies and Procedures

In Tanzania, recognition of environmental impact assessment (EIA) in supporting sustainable development is demonstrated in a series of official policies and strategies, such as the National Conservation Strategy for Sustainable Development (NCSSD), the National Environmental Action Plan, the National Environmental Policy (December 1997), National Parks Policy, Wildlife Policy and Forest Policy. All call for the use of EIA as a key policy implementation and development tool. Several initiatives have also been taken by government institutions and donors to operationalize the use of EIA in development planning. Despite these indications of official recognition and commitment to EIA, Tanzania does not yet have a legally established and comprehensive EIA policy. At the same time, Tanzania is seriously lacking in professional capacity to put EIA into operation across the board.

The National Environmental Management Council (NEMC) is promoting a comprehensive policy and has been engaged in a participatory process to establish pertinent EIA guidelines, procedures, legislation and enforcement machinery. The challenge will be to consolidate an EIA process in all sectors and at the decentralized local level planning units (IUCN & NEMC, "Establishment of an Environmental Impact Assessment System and Capacity Building Programme in Tanzania," 1997). At the same time, the continuing challenge will be to forge the process in such a way that it becomes more effective in Tanzania than heretofore (Mwalyosi & Hughes, "The Performance of EIA in Tanzania," 1998).

In the context of SO2, it is notable that TANAPA now requires the preparation of an EIA for all developments and activities within and adjacent to park boundaries. This policy includes all development activities proposed by TANAPA as well as other government agencies and private sector proponents. EIA was being extended to cover the General Management Plans for each park. The Department of Wildlife draft policy requires all significant development proposals within the protected areas (game-controlled areas, game reserves and forest reserves) to undergo EIA.

3.0 EVALUATION OF PROJECT/PROGRAM ISSUES WITH RESPECT TO ENVIRONMENTAL IMPACT POTENTIAL

3.1 Overall Evaluation

Several of the partners, EPIQ/T, DOI, Greencom, WRI and TCMP, are engaged solely in activities that have no direct environmental effects. These policy development, educational/training, awareness raising activities are achieved through studies, workshops, training courses, and expert technical assistance. Their principal thrust is development and application of environmental policies, increased environmental awareness, environmental education, improved environmental information and assistance to promote environmentally sound implementation of CBNRM.

Cooperative Agreements with AWF (PORI 1-3 and PORI-4), Africare, WWF and TU-SUA as well as the PASA with the Peace Corps, in general, entail 1) a variety of on-the-ground activities in CBNRM (in agriculture, aquaculture, beekeeping, pastoral activities, etc.), both in the vicinity of protected areas[2] and more widely through TU-SUA and the

[2] Protected areas, in this context, include national parks, reserves forests and the like, but in the administrative context of Tanzania, protected areas exclude national parks, considered another category.

Peace Corps; 2) various buildings, road improvements, provision of water sources, and other visitor-related infrastructure and ecological monitoring and surveying in National Parks and potentially other protected areas; and 3) capacity building, research, training and technical assistance related to CBNRM and protected areas.

Infrastructure development projects are likely to have impacts on the biophysical environment, although such impacts are not expected to be adverse nor significant, considering the intended results of SO2. Indeed, the expectation is to protect, restore or more sustainably manage natural resources and improve conservation of biodiversity. Nevertheless, the specific characteristics and locations of these activities depend upon specific information concerning project design and location. Thus, their characteristics cannot be known in advance nor in detail in the context of this IEE and the potential for adverse environmental impacts cannot be excluded. The range of physical and topographic conditions, climate, soils, and ecosystems as well as social and economic characteristics that could be encountered is also quite variable. Each activity therefore, requires environmentally-sound design and assessment to determine the specific nature and magnitude of potential impacts and where adverse impacts may exist the need to mitigate effects and monitor for unforeseen changes in the environment/natural resource base.

In anticipation of the need for environmental screening and review of the variety of small-scale activities to be undertaken on the ground as well as studies, workshops, trainings and similar, all SO2 partners were requested to utilize Africa Bureau environmental screening forms and reviews, pending the finalization of the revised SO2, and the preparation of this IEE. EPIQ/T and URI for TCMP submitted screening forms that confirmed they had activities that were not physical in nature and would not have direct environmental effects.

Neither the Peace Corps nor WWF has utilized the screening and review process to date. AWF submitted an initial attempt, but the documentation was neither appropriate nor sufficient. Africare submitted documentation, including an environmental review of beekeeping activities, to which modest revisions have been requested to provide supplemental information, prior to approval. TU-SUA has submitted screening forms and environmental reviews, which are close to being finalized, based on Mission review.

3.2 Tobacco and Pesticide Issues

The Africare CA, approved in January 1998, describes potential interventions, such as fuel efficient designs for curing barns and fuelwood tree planting to assist "tobacco growers, including almost all of the seasonal fishermen and beekeepers." Pursuant to recent Agency cable guidance concerning support to tobacco-related work, Africare must review this support with USAID/Tanzania, in light of USAID Notice 0329. Africare may need to modify activities or propose substitute activities with the target population.

Concerning TU-SUA's activities under the Phase II Linkage project, screening forms and draft environmental reviews (not yet approved) submitted to date indicate that activities fall with Categories 1 and 2 of the screening form, with the exception of cattle dipping for which a restricted use pesticide (typically requires an Environmental Assessment) has been proposed. The Mid-term Evaluation Report (November 30, 1998) inaccurately portrays the status of environmental compliance of the TU-SUA project. TU-SUA does not have an operative IEE (only a deferral); hence, the statement in the review that the project did not receive a negative determination on its IEE because of the livestock dip is moot. Environmental reviews have neither been finalized nor approved. The livestock dipping activity will require, if a restricted use pesticide is pursued, a positive threshold determination and preparation of an Environmental Assessment. If a non-restricted use pesticide is substituted, the pesticide analysis in accordance with 216.3(b)(1)(a through l) is a minimum requirement.

3.3 National Park Road Rehabilitations

The support to TANAPA road rehabilitation in Tarangire and, potentially Lake Manyara, National Parks, occurs through both DOI technical assistance, AWF support, and provision of substantial heavy equipment for road rehabilitation. The possible road improvements, all planned to be road rehabilitations, have been specifically reviewed

in light of applicable provisions of the Foreign Assistance Act (FAA) Sections 118 and 119. These are:

> FAA 118(c)(14): Deny assistance under this chapter for:
> (B) actions which significantly degrade national parks or similar protected areas which contain tropical forests or introduce exotic plants or animals into such areas.
>
> FAA 118(c)(15): Deny assistance under this chapter for the following activities unless an environmental assessment indicates that the proposed activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development:
> (B) The construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands.
>
> FAA 119(g)(11): Deny any direct or indirect assistance under this chapter for actions which significantly degrade national parks or similar protected areas or introduce exotic plant or animals into such areas.

Although the concerns of FAA 118(c)(14)(B) and 119(g)(11) would probably not be triggered, one cannot, at this stage, exclude the applicability of FAA(c)(15)(B) without conducting an ecological inventory and evaluation of each road. Similarly, there is insufficient information to exclude the applicability of provisions of 22 CFR 216.5 concerning endangered species and their habitat. Some of the road rehabilitations, including potential re-routings in some cases, would traverse black cotton soils, swampy terrain and water courses.

In its Draft Road Assessment Report (Tarangire National Park, DOI, April 1998), DOI developed a route classification for the park, recommended a series of improvements, developed alternatives, and noted the generic need for environmental assessment, resulting in some cases in DOI's recommendation for an Environmental Impact Statement (using DOI and US terminology pursuant to the US Council on Environmental Quality regulations, which are not applicable to USAID).[3] The report did not include information about the condition of vegetation or forest, in most instances.

The Africa Bureau environmental screening form, if applied, to the road infrastructure would result in categorization of the road rehabilitation activities in the National Parks as Category 3 and would require submission of an Environmental Review to the Bureau Environmental Officer, for a determination concerning a USAID Environmental Assessment (EA). While this mechanism could be chosen, with environmental reviews sent to the BEO for each road rehabilitation and a separate determination made concerning the need for an EA in each instance, this approach would neither be the most efficient nor the most environmentally sound one.

A Programmatic EA (PEA) that also incorporates TANAPA's own Environmental Impact Assessment (EIA) policy (National Policies for National Parks, 1994) and does so jointly with TANAPA could use Tarangire National Park roads as potential examples (and adding others, if necessary) in order to develop in the long-run, criteria for road rehabilitation and building in national parks. The PEA for Road Improvements in National Parks approach would have two important advantages: 1) it would satisfy USAID environmental regulations by achieving a result that would be fully within USAID's SO2; and 2) provide a process for environmental screening and review of TANAPA roads that

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[3]The DOI report utilizes the term Categorical Exclusion (typically applied to road rehabilitations within an existing disturbed roadway corridor) in a way not permitted under USAID's 22 CFR 216. Its references to Categorical Exclusions must be read as the need for a threshold decision that might result in a Negative Determination with modest conditions. Use of the term environmental assessment appeard to correspond to the need for an EA or a Negative Determination with major conditions; when the report uses the term Environmental Impact Statement, it would likely translate into the need for an EA in USAID terms.

goes beyond USAID and leaves a legacy with TANAPA. The PEA would serve the following purposes:

1) provide documentation for Tarangire and potential Lake Manyara National Park roads so that USAID's environmental regulations are satisfied; and

2) use the Tarangire National Park roads as case examples in order to provide environmental design criteria and guidelines for roads in National Parks generally, i.e., provides the basis for TANAPA to determine what level of environmental analysis and documentation needs to be done for what types of roads, what to look at to make these decisions and what criteria/guidelines/standards should be followed.

3) provides capacity building opportunity to promote EIA within TANAPA in accordance with their own EIA procedures.

3.4 Other National Park or Protected Area Infrastructure

In addition to rehabilitated roads, several kinds infrastructure improvements in Tarangire and Lake Manyara National Parks are proposed. These range from very modest (e.g., signing) to modest buildings (interpretive center, headquarters, 280-square meter, staff housing unit) buildings and wells/water provisioning for ranger posts and other locations. Integral to the provision of this infrastructure are technical assistance services to develop standard guidelines for design and construction, comprehensive facilities development plans, manual of guidelines and environmental assessment, as described in the AWF Cooperative Agreement. The WWF GIS Centre is proposed to be a 100-square meter facility. These improvements will be inside the National Parks or in a few cases their immediate vicinity. Neither FAA Sections 118(c)(14) and 119(g)(11) nor 22 CFR 216.5 concerning endangered species or their habitat would likely apply; the improvements would occur in specific, circumscribed locations, which except for two relocations and one new post, already have inhabitants and infrastructure. Calling for a USAID EA of this infrastructure is premature at this time, considering that a) facilities are very modest; and b) AWF's environmental consultant has already carried out an EIA of Tarangire National Park Proposed Borehole Development.

While the potential for impacts at a level that might require a USAID EA cannot be excluded, use of the environmental screening and review procedure is the approach likely to be most efficient in terms of determining the actual nature and extent of impacts and whether a USAID Environmental Assessment is needed.

4.0 RECOMMENDED MITIGATION ACTIONS (INCLUDING MONITORING AND EVALUATION)

4.1 Recommended Threshold Decisions and Conditions

Categorical Exclusions are recommended for activities of EPIQ, DOI, Greencom, WRI and URI/TCMP, pursuant to 22 CFR 216.2(c)(2)(i) [technical assistance and training], 216.2(c)(2)(iii) [analyses,studies, workshops and meetings] and 216.2(c)(2)(v) [document and information transfers]. The 1995 PERM IEE called for an EMEMP because of the policy-related activities that were to be carried out. Nevertheless, the activities of this SO are specifically designed to develop, enhance and result in application of sound environmental policies. Hence, no special Environmental Monitoring, Evaluation and Mitigation Plan (EMEMP) is considered appropriate, as the direct, anticipated results of the activities should not precipitate unforeseen adverse environmental impacts. If such should occur, this would be apparent from the Mission's overall performance monitoring for SO2 targets and indicators.

Negative Determinations with Conditions are recommended for activities of Africare (PORI 1-3 and PORI-4), African Wildlife Federation, US Peace Corps, WWF and TU-SUA Phase II Linkage project, **excluding** roads in national parks. The conditions are utilization of and adherence to the Africa Bureau **environmental screening review procedures** as briefly outlined in Section 4.2 and discussed in detail in Annex A, based on the Bureau's *Environmental Guidelines for Small-Scale Activities in Africa.* These screening and review conditions will flow down from the

principal implementors to subcontracts, subgrants or other subsidiary partners. Single or closely tied sets of activities will be individually screened, environmental reviews prepared and mitigative measures and monitoring performed in accordance with the set of procedures described in this IEE.

In addition to application of the overall environmental screening and review procedures, USAID/Tanzania must draw the SO2 partners' attention to the issues noted below.

Infrastructure (Other than Roads) in Protected Areas. Application of the screening form will place buildings, potable water development and other non-road infrastructure in national parks (or other protected areas) in Category 3. According the form's instructions, the Environmental Review will need to be prepared, before jumping to an EA. The Review should pay specific attention to FAA 118 and 119 and 22 CFR 216.5 issues and explain in detail all mitigative measures and monitoring. The Review should demonstrate that the activity avoids any effects on undegraded forests, does not jeopardize endangered species or their habitat and does not significantly degrade protected areas, assuming this to be the case. All Environmental Reviews for Category 3 (including this park infrastructure, except roads, see Positive Determination below) must be submitted to the BEO for his approval and determination as to whether an EA must be prepared.

Water Quality. The SO2 partnership in general, but in particular Africare, AWF, Peace Corps, WWF, and TU-SUA, along with EPIQ/T in its support role need to be aware and informed of the USAID cable guidance (State 98 108651) concerning provision of new, expanded or rehabilitated potable water supplies. The guidance states that prudent practice would dictate that environmental reviews carried out in accordance with 22 CFR 216 should include testing for arsenic in addition to the usual testing for coliform bacteria and nitrite/nitrate. Tests for additional contaminants should also be performed, as appropriate, when a nearby pollution source (e.g., Industry, mining, heavy pesticide or fertilizer use) suggests that additional contaminants may be present. Hence, this IEE makes testing of potable water supplies mandatory, based on the use of Tanzanian or World Health Organization standards for water quality testing.

Pesticides. USAID/Tanzania will inform SO2 implementors subject to a Negative Determination with Conditions about USAID's requirements for specific analysis when pesticides are involved. As stated in the Africa Bureau *Environmental Guidelines for Small-Scale Activities*: *Use is interpreted broadly to include the handling, transport, storage, mixing, loading, application, clean up of spray equipment, and disposal of pesticides, as well as the provision of fuel for transport of pesticides, and providing technical assistance in pesticide management. USAID finances pesticides only on a case-by-case basis...and then only after specific additional evaluation that would consider the potential benefits conferred by the use of the pesticide.* The Agency's guidelines for pesticide use are contained in 22 CFR 216.3(b). Any environmental review for activities contemplating the general use pesticides must include the required analysis. Any use of restricted use pesticides should be referred to the Mission Environmental Officer and the Bureau Environmental Officer for advice on how to proceed.

Tobacco. USAID General Notice 0329 and Cable State 99 20749 provide guidance on USG policy concerning support to sale or export of tobacco. Review of this information with the SO2 partnership, particularly as it may affect the work of Africare with farmers in the Ugalla area, should be pursued.

Host Country Policy, Legislation and Procedures. USAID/Tanzania will inform (or provide copies of the relevant legislation) all SO2 implementors concerning relevant Tanzanian environmental impact assessment policy and procedures. It is assumed that most if not all partners are aware of TANAPA's EIA policy as well as overall EIA policy and procedures and the role of NEMC. USAID/Tanzania will also inform all SO2 implementing partners, *current and future*, that conformance with USAID environmental procedures is not in lieu of environmental requirements of Tanzania or vice-versa.

A **Positive Determination** is recommended for road-rehabilitation activities to be undertaken by SO2 partners

(currently TANAPA and AWF) in protected areas, in this case, Tarangire and potentially Lake Manyara National Parks. A positive threshold decision has been reached, because 1) potential impacts on relatively undegraded forest pursuant to FAA Section 118(c)(15), endangered species/habitat per 22 CFR 216.5 or other potentially significant adverse effects cannot be excluded without further study of each road segment; and 2) a joint Programmatic Environmental Assessment with TANAPA will satisfy USAID needs, achieve compliance with TANAPA policy, build capacity in EIA and set the stage for mor broadly applicable road-related environmetnal analysis, mitigation and monitoring in national parks.

In order to comply with SO team responsibilities under ADS 204, the SO2 team will monitor all ongoing and proposed new activities to ensure that they remain Categorical Exclusions or within the bounds of the Negative Determination with conditions for environmental screening and review. The team will, at a minimum, re-validate the determinations when the SO2 partners submit annual work plans. For any extension or modification of an existing contract or agreement or any new contract or agreement with these partners, an IEE amendment will be prepared to substantiate or revise this determination in accordance with the proposed activities.

4.2 Mitigative Measures and Monitoring

The primary mitigative and monitoring measure, for activities accorded Negative Determinations with Conditions, is the process for environmental screening and review, which contains within it the need to devise activity or site-specific mitigative and monitoring measures. The Africa Bureau environmental screening and review procedures (Annex A) specify how activities will be examined in order to comply with these Negative determinations (see Section 4.1). These procedures are intended to result in environmental accountability and soundness, by requiring that USAID/Tanzania and the relevant SO2 partners put mechanisms in place that promote the goals and objectives of the Agency's environmental regulations. To ensure that interventions are designed in a sound and sustainable manner, the SO2 Team will work with the appropriate implementing partners to achieve compliance with these procedures, with assistance from the Mission Environmental Officer (MEO).

USAID/Tanzania assumes ultimate responsibility for environmental review and decision-making concerning USAID-funded activities to which this IEE has recommended that the environmental screening and review process apply. USAID/Tanzania is responsible for assuring conformity with the procedures summarized below (and described in more detail in Annex A). AWF, Africare, the Peace Corps, WWF, TU-SUA, and future cooperators, contractors or grantees to which the process may apply are considered to be the contractual implementing partners, because they receive USAID funds directly. As appropriate, these implementing partners are encouraged to delegate the responsibility for applying the screening and review process to the on-the-ground or actual implementing partners, which may be NGO or government partners, subcontractors, subgrantees or the like. In the language that follows these implementing agents are referred to jointly, for convenience, as the "implementing partners."

- Implementing partners will take into consideration potential environmental impacts and their mitigation, including avoidance, and will design, implement and monitor their activities to achieve environmental sustainability.

- Implementing partners will screen activities according to the Africa Bureau Screening and Environmental Review Process (see Annex A and accompanying form), which results in a categorization of activities and the need for an Environmental Review when activities fall in Categories 2 and 3. The MEO will review and pass on to the REO and BEO any Category 3 (or 4) documentation and, as he/she determines the need, Category 2 documentation. All Category 2 Environmental Reviews must be approved by the MEO. All Category 3 Environmental Reviews must be approved by the BEO.

- Implementing partners will take into account the *Environmental Guidelines for Small-Scale Activities in Africa* and other appropriate Bureau and generic environmental assessment sources to assist in determining what potential impacts should be of concern for different types of development activities in various settings and

which impacts to mitigate and monitor for a particular development activity.

- Implementing partners must identify in the Environmental Review reports all proposed environmental mitigation and monitoring requirements.

- Once the Environmental Review reports are approved, the mitigative measures and monitoring procedures stated in the Environmental Review report shall be considered a requirement.

- Implementors will ensure implementation of agreed-upon mitigative measures and environmental impact monitoring.

- Implementing partners' annual reports and, as appropriate, progress reports shall contain a brief update on mitigative measures being implemented, results of environmental monitoring, and any major modifications/revisions to the activities, mitigative measures or monitoring procedures.

- USAID/Tanzania in concert with its implementing partners will design, conduct and apply environment assessment training, in conjunction with other USAID and Tanzanian organizations.

- USAID/Tanzania must report on an annual basis (through the R4 and in more detail as the BEO may require) on the status of environmental screening and review and the implementation of mitigation and monitoring requirements.

- USAID/Tanzania will review implementing partners' progress and annual reports to help determine if environmental mitigation and monitoring procedures are in place and are successful;

- USAID/Tanzania will incorporate into Mission field visits and consultations with implementing partners periodic examination of the environmental impacts of activities and associated mitigation and monitoring (assistance of the BEO or REO/REA in preparing guidelines or assisting with the monitoring and evaluation can be solicited).

- USAID/Tanzania is responsible for evaluation of activities after implementation with respect to environmental effects, a process which should be integrated into the Mission's pertinent Performance Monitoring and Evaluation Plan.

- Periodic visits from AFR/SD/PSGE, REDSO's REO or REA or through contracted consultants should be requested for assistance and/or validation that environmental processes are in place.

5.0 SUMMARY OF FINDINGS

This IEE provides documentation pursuant to 22 CFR 216 for existing and planned SO2 activities; resolves the existing deferral for the TU-SUA Linkage project (IEE deferral of 9/95); and considers the need for the Environmental Monitoring, Evaluation and Mitigation Plan (EMEMP) required by the PERM IEE but not undertaken. This SO2 IEE, hence, incorporates or revises 1995 threshold determinations, based on the proposals and work plans of SO2 Cooperative Agreements and contracts. It should be noted that the SO2 partners, most of whom were technically covered by the PERM IEE process, have initiated the process described therein as have other partners, such as TU-SUA, who were requested to incorporate this process in their work. The intent of the IEE is to cover all SO2 activities and to provide an appropriate vehicle for amendment, when activities are added, extended or modified.

SO2 has approximately 20 partners engaged in an integrated partnership to achieve environmental and natural resources results under various thematic areas and IRs. The directly USAID-funded partners are Environmental Policy and Institutional Strengthening (EPIQ)/Tanzania, Department of Interior (DOI), Environment Education and

Communication Project (GreenCom), World Resources Institute (WRI), University of Rhode Island (URI) Tanzanian Coastal Management Partnership (TCMP), Africare, African Wildlife Federation (AWF), World Wildlife Fund-US (WWF), the Peace Corps and the Tuskegee University-Sokoine University of Agriculture (TU-SUA) Linkage project. Other members of the partnership funded through these partners or government contributing agencies include the Division of Environment, the Wildlife Division, Tanzania National Parks (TANAPA), National Environment Management Council (NEMC), Lawyers Environmental Action Team (LEAT), Journalists Environmental Association of Tanzania (JET) and the Maasai Advancement Association.

Categorical Exclusions are recommended for policy-related studies, research, training, capacity building and similar activities of EPIQ/Tanzania, DOI, Greencom, WRI and URI/TCMP, pursuant to 22 CFR 216.2(c)(2)(i) [technical assistance and training], 216.2(c)(2)(iii) [analyses,studies, workshops and meetings] and 216.2(c)(2)(v) [document and information transfers].
Negative Determinations with Conditions are recommended for activities of Africare (PORI 1-3 and PORI-4), African Wildlife Federation, US Peace Corps, WWF-US and TU-SUA Phase II Linkage project, **excluding** roads in national parks. The conditions are utilization of and adherence to the Africa Bureau **environmental screening review procedures**. This IEE (Section 4.2 and Annex A) lays out a set of steps to ensure adequate environmental review of USAID-supported activities, based on the Bureau's *Environmental Guidelines for Small-Scale Activities in Africa.* This negative determination also urges that SO2 partners receive training and capacity building in how to apply the procedures and ensure environmentally sustainable activities.

A **Positive Determination** is recommended for road-rehabilitation activities to be undertaken by SO2 partners (currently TANAPA and AWF) in protected areas, in this case, Tarangire and potentially Lake Manyara National Parks. A positive threshold decision has been reached, because 1) potential impacts on relatively undegraded forest pursuant to FAA Section 118(c)(15), endangered species/habitat per 22 CFR 216.5 or other potentially significant adverse effects cannot be excluded without further study of each road segment; and 2) a joint Programmatic Environmental Assessment with TANAPA will satisfy USAID needs, achieve compliance with TANAPA policy, build capacity in EIA and set the stage for mor broadly applicable road-related environmetnal analysis, mitigation and monitoring in national parks.

In order to comply with SO team responsibilities under ADS 204, the SO2 team will monitor all ongoing and proposed new activities to ensure that they remain Categorical Exclusions or within the bounds of the Negative Determination with conditions for environmental screening and review. The team will, at a minimum, re-validate the determinations when the SO2 partners submit annual work plans. For any extension or modification of an existing contract or agreement or any new contract or agreement with these partners, an IEE amendment will be prepared to substantiate or revise this determination in accordance with the proposed activities.

Annex A -- Environmental Screening and Review Concept and Requirements[4]

A.1 Recommended Planning Approach

Often, development activities proposed for support are presented and considered as discrete interventions, in isolation from other planned community developments. This linkage argues strongly for the adoption of an integrated approach towards activity planning and implementation. Although an integrated approach towards program planning and management is more complex and time-consuming "up-front," it will reap significant dividends over the longer term in the form of more cost-effective, sound and sustainable community investments and improved natural resources management. For maximum efficiency and effectiveness, these review procedures are intended to be applied within the context of development plans, natural resource management plans or land use plans developed for the areas in which the activities will take place.

A.2 Environmental Screening and Review

These environmental screening and review procedures specify how activities will be examined on in order to comply with the determinations (see Section 4 of the main body of the IEE) in accordance with the Agency's Environmental Procedures, Section 216.3(a)(2). These procedures are intended to result in environmental accountability and soundness, by requiring that USAID/Tanzania put in place specific mechanisms to ensure that interventions are designed, implemented and monitored in a sound and sustainable manner (see A.1). The USAID Activity Managers and the SO Team Leader will work with the appropriate implementing partners to achieve compliance with these procedures, with assistance from the Mission Environmental Officer (MEO).

The screening/review procedures are based upon utilization of a Screening Form, presented in Attachment 1. This form is consistent with the "Environmental Screening Form for NGO/PVO Activities and Grant Proposals" contained in the Africa Bureau *Environmental Guidelines for Small-Scale Activities in Africa.* USAID/Tanzania will facilitate the refinement of this form with its partners, if they so desire, and the REDSO REO/REA to meet program needs and to incorporate, where appropriate, information that will flag the need for environmental assessment in accordance with Tanzania's environmental assessment policy and future legislation.

Adherence to the procedures in this IEE, it must be emphasized, cannot be considered in lieu of Tanzanian requirements or vice versa. Efforts will be made, however, in the refinement of the Screening Form to dovetail respective assessment information requirements to the maximum extent allowable.

This IEE does not cover pesticides or other activities involving procurement, use, transport, storage or disposal of toxic materials, and any situation dealing with such will require an amended IEE, except to the extent covered in Category 2 of the Screening Form attached. The latter, however, requires that the pesticide analysis in conformity with 22 CFR 216.3(b) be part of any environmental review.

Activities will be screened using the Screening Form, which utilizes a four-tier categorization process consistent with Africa Bureau's *Environmental Guidelines*, as defined below:

> *Category 1*: Activities that would normally qualify for a categorical exclusion under Reg 216 (e.g., community awareness initiatives, training at any level, provision of technical assistance, controlled experimentation exclusively for the purpose of research and field evaluation which is confined to small areas and carefully monitored, etc.). Certain, specifically defined, small-scale activities entailing rehabilitation of

[4] This annex contains information typically contained in Section 4 of an umbrella IEE for environmental screening and review. It has been placed in an Annex because of the complexity of agreements and partners covered in the body of the IEE.

water points and construction or rehabilitation of facilities have also been placed in this category. State 108651 cable guidance concerning water quality testing still applies.

Category 2: Activities that would normally qualify for a negative determination under Reg 216, based on an environmentally-sound approach to the activity design and incorporation of appropriate mitigation and monitoring procedures. For example, the design followed, and the manager has access to and will follow, a series of guidelines for the design of small-scale environmentally-sound activities in forestry, natural resource management, infrastructure, etc.

Category 3: Activities that have a clear potential for undesirable environmental impacts and normally under Reg 216 require an Environmental Assessment, such as those involving activities in protected areas or sensitive environments, planned resettlement, penetration road building, substantial piped water supply and sewage construction, large-scale irrigation projects, and projects involving large-scale or area-wide application of pesticides. All activities listed in Reg. 216 (Sect. 216.2(d)(1)) are automatically included, unless they are small-scale and can qualify for a negative determination in accordance with the criteria listed under Category 2. *In the specific case of planned park infrastructure (excluding roads) under SO2 in Tanzania, these will be placed in Category 3.*

Category 4: This category groups activities that either USAID cannot fund or for which specific findings must be made in an Environmental Assessment prior to funding. Interventions that are likely to jeopardize a critical habitat for threatened or endangered species or degrade a protected area must be placed in this category. Category 4 lists activities that trigger provisions of Sections 118 or 119 of the Foreign Assistance Act, which generally relate to degradation of national parks or protected areas, introduction of exotic species, or effects on tropical or undegraded forest lands.

Implementing partners will employ the Screening Form [Attachment 1, to be refined as needed in consultation with the BEO and REDSO/REO or REA] and prepare Environmental Review Reports, as a result of the categorization process, to evaluate activities. Preferably, the direct or actual implementor of an activity will prepare the forms and the environmental reviews, which will be reviewed by the implementing partners prior to submittal to USAID/Tanzania. Activities may be screened as a complete set, by geographic location, or by type of intervention. Environmental Review reports can be prepared in the same way, but typically are easier to prepare for related activities in a particular location (several activities in a village, for example) or by type of intervention (several wells or farm interventions that are alike).

An Environmental Review Report shall be prepared for all Category 2 activities. The MEO or Mission Director (or Acting Director), on behalf of USAID/Tanzania, shall be responsible for clearances on the category determination and Environmental Review reports. It is assumed that the majority of activities will fall within Categories 1 and 2, and will, therefore, be approvable locally by USAID/Tanzania without further external review. This delegation of responsibility, without regard to dollar amount of activities, is predicated on the assumption that appropriate and environmentally sound implementation and environmental monitoring and mitigation procedures will be in place. The MEO, should he/she have questions, will pass Category 2 activities and their reviews to the REO and Bureau Environmental Officer (BEO) for consultation.

An Environmental Review report shall also be prepared as the first step for all Category 3 activities to help the REO and BEO determine if an Environmental Assessment is required. While an Environmental Review report may be prepared for Category 4 activities, it is recommended that developers of activities and proposals consult with the USAID MEO before preparing elaborate documentation. All Category 3 and 4 activities (if there are any) shall be subject to additional environmental evaluation, as deemed appropriate, in consultation with the BEO and REO, and shall be passed on to the Regional and Bureau Environmental and Legal Officers for further review and clearance.

Prior to the approval of an activity or group thereof, results of the environmental categorization must be available and

considered. For Category 2 projects, Environmental Review reports, including MEO review and, if needed, REO or BEO review, must be performed prior to funding. For any Category 3 or 4 activities, approval cannot be made until the Environmental Review and any additional environmental documentation as determined by the BEO have been prepared and cleared. Implementing partners may, if they desire, categorize or review categorization of activities, based on use of the screening form, prior to approving a subcontract or subgrant to proceed with final design. This procedure would allow activities that are in Category 1 (no environmental review required) to be carried out and for the implementing partner or the subgrantee or subcontractor to undertake appropriate environmental documentation according to the procedures for Category 2, 3 or 4 activities. Any such awards shall contain clauses stating that funding of Category 2, 3 or 4 activities is contingent upon findings, recommendations and clearance of the environmental documentation.

The MEO or SO Team Leader shall on a routine basis pass to the REO and BEO an updated summary of activities and the results of the environmental categorization and review process, in order to keep them apprised of the type/nature, scale, funding levels and implementation status of the individual activities approved under the process described in this IEE and any corresponding mitigation and monitoring requirements. Reference to this process will also be made in the Mission's R4 submittal to AFR/W.

A.3 Promotion of Environmental Review and Capacity Building Procedures

The procedures described above and incorporated within the Screening Form are intended to ensure environmental accountability and soundness on the assumption that USAID/Tanzania has the following additional elements in effect to build environmental capacity with its implementing partners to enhance their capacity:

- Implementing partners will help design, conduct, participate in, and apply environmental assessment and management training, in conjunction with USAID and Tanzanian resource organizations and agencies, such as the Regional Environmental Assessment Training Course, and pursue follow-up training to assist these partners in properly fulfilling the screening and review requirements in conjunction with concerned Tanzanian organizations and agencies;

- Implementing partners will also be encouraged to apply appropriate Tanzanian environmental assessment policies and procedures; and

- A monitoring and evaluation process will be put in place and used by implementing partners, in collaboration with any concerned Tanzanian agencies, and USAID project management.

A.4 General Responsibilities

USAID/Tanzania assumes ultimate responsibility for environmental review and decision-making for USAID-funded activities to which this IEE has recommended that the environmental screening and review process apply. USAID/Tanzania is responsible for assuring conformity with the procedures spelled out in this Annex.

- Implementing partners will take into consideration potential environmental impacts and their mitigation, including avoidance, and will design, implement and monitor their activities to achieve environmental sustainability.

- Implementing partners will take into account the *Environmental Guidelines for Small-Scale Activities in Africa* and other appropriate Bureau and generic environmental assessment sources to assist in determining what potential impacts should be of concern for different types of development activities in various settings and which impacts to mitigate and monitor for a particular development activity.

- Implementing partners will use the Screening Form to categorize proposal and will prepare Environmental Reviews.

- USAID/Tanzania through the MEO will review and pass on to the REO and BEO any Category 3 or 4 and, as he/she determines, Category 2 activities where questions arise.

- Periodic visits of the REO or REA or AFR/SD/PSGE will also be requested for advice, refresher training and validation that environmental processes are in place.

- USAID/Tanzania must report on an annual basis (through the R4 or in more detail as the BEO may require) on the status of environmental screening and review and the implementation of mitigation and monitoring requirements.

A.5 Mitigative Measures and Monitoring

- Environmental Review reports must identify all proposed environmental mitigation and monitoring requirements.

- Once the Environmental Review reports are approved, the mitigative measures and monitoring procedures stated in the environmental review report shall be considered a requirement.

- Implementing partners will ensure implementation of agreed-upon mitigative measures and environmental impact monitoring.

- Implementing partners' annual reports and, as appropriate, progress reports shall contain a brief update on mitigative measures being implemented, results of environmental monitoring, and any major modifications/revisions to the activities, mitigative measures or monitoring procedures.

- USAID/Tanzania is ultimately responsible for monitoring environmental impacts of all activities, as further specified below, as well as ensuring conformity the screening and review procedure (see A2 and A4 above. Responsibilities include:

  review of implementing partners' progress and annual reports to help determine if environmental mitigation and monitoring procedures are in place and are successful;

  incorporation into Mission field visits and consultations with implementing partners periodic examination of the environmental impacts of activities and associated mitigation and monitoring (assistance of the BEO or REO/ REA in preparing guidelines or assisting with the monitoring and evaluation can be solicited).

  evaluation of activities after implementation with respect to environmental effects, a process which should be integrated into the Mission's pertinent Performance Monitoring and Evaluation Plan.

ENVIRONMENTAL SCREENING/REPORT FORM FOR NGO/PVO ACTIVITIES

BACKGROUND

USAID, as a "re-engineered, learning institution," has introduced major changes in its new operations systems, with a strengthened focus on results (not activities), greater accountability and empowerment, teamwork, participation and customer orientation. For example, projects are replaced with "results packages" provide USAID operating units and collaborators the flexibility they need to adapt to changes during implementation. The underlying rationale is to focus on results, while still managing inputs and monitoring outputs properly, and to give those responsible (including the host country partners) for achieving results the flexibility to change approaches and tactics as situations change or lessons are learned.

USAID's Africa Bureau Environmental Office, in conjunction with the Regional Environmental Offices, has been developing an initiative for environmental management capacity building. This initiative is intended to support USAID/AFR Missions, their implementing agents and collaborators. An important rationale for this initiative is that Africa Bureau environmental and legal staff anticipate providing significantly enhanced responsibility to carry out environmental reviews to those USAID Mission programs whose designers and/or implementors have successfully completed an Environmental Assessment course and/or participated in related capacity-building activities. Relevant agency experience has shown that such enhanced Mission authority can greatly facilitate field-level program activity design and implementation. These NGO Environmental Guidelines are consistent with USAID's new precepts of flexibility.

The present Environmental Screening and Reporting Form (ESF) is designed to be consistent with the Initial Environmental Examination process, and to assist USAID Missions and their implementing partners design and implement activities in an environmentally sound manner in accordance with all salient agency policies and procedures. Use of the ESF will greatly reduce the need for review and approval of NGO activities at the regional or Washington levels.

INTRODUCTION TO USE OF THIS FORM

This form is to be utilized to screen USAID-funded activities, including grantees of the PVO umbrella projects, and proposals submitted for consideration for funding under other USAID programs including grants management units, where USAID has approved through an Initial Environmental Examination that this process be put in place. This is a *generic* form , illustrative only, and its final contents are to be refined and jointly determined among the affected partners -- NGO, USAID, host country agencies, etc. To the extent possible, the form should reflect host government environmental policies and procedures, e.g., accounting for existing designated protected areas.
Typically, two broad categories of projects will be funded: (a) those designed to strengthen local institutional capacities to manage the natural resource base and (b) those designed to support the development of appropriate infrastructure needed for sustainable natural resource management. Activities could include training, technical assistance and other institutional support, income-generating activities through the exploitation of natural resources in a self-sustaining and environmentally sound manner or development of physical infrastructure to further natural resource management at the district level. Under other components of USAID-funded programs, training, technical assistance, research, studies, and information-related activities and other types of activities can be funded *This form is intended to be adaptable to unique circumstances*. In using this form, adjustments as needed can be made in consultation with the Regional and Bureau Environmental Offices. It is strongly advised that the Mission Environmental Officer make on-site visits prior to finalization of the ESF, and that the ESF be rational and fully defensible and without ambiguity as to how the conclusion was reached that the activity(ies) will have no significant impact.

ENVIRONMENTAL SCREENING/REPORT FORM FOR NGO/PVO ACTIVITIES

Grantee: _____

Activity Name: _____

Duration (proposed start and completion dates): _____

Geographic Location: _____

Activity Description (paragraph(s) describing purpose/outputs and potential environmental impacts):

[add space as needed]

Determine the Nature of the Activity

a. **Environmental Review Report Needed.** Does the activity include funds to support any physical natural resource management activities, or any community and rural development services, infrastructure, public facilities or road rehabilitation? Does it involve development of income-generating or resource management systems, or certain kinds of applied ecological or natural resources research? It will likely require an Environmental Review of the kind described in Step 4 of this form. Determine under which Category the activity falls to establish the need for the Environmental Review.

b. **No Further Environmental Review Required.** Is the activity exclusively to provide technical assistance, training, institutional strengthening, or research, education, studies or other information analysis, awareness-building or dissemination activities *with no foreseeable negative impact on the biophysical environment*? This probably qualifies as a Category 1 activity -- no further environmental review or action may be necessary. Complete form to establish this circumstance.

c. **Emergency Circumstances Apply.** Does the activity involve an emergency circumstance (e.g. drought)? Under specific conditions, the activity may be *exempt* from further environmental review. Must be determined by Bureau Environmental Officer with input from Regional and Mission Environmental Officers. Sound environmental implementation principles are to be applied to any urgent programs. Note that exemptions *cannot* be applied in the case of assistance for use or procurement of *pesticides*.

d. **Multiple Categories.** Many activities will have components or sub-activities in more than one category. Simply mark all that apply. The form will guide you to the appropriate next steps.

Step 1. Determine Category of Activity:

- **Africa Bureau *Category 1* -- no further environmental review needed:**

➢ ***Does the activity involve (mark yes where applicable):***

_____ Provision of education, technical assistance, or training. Does *not* qualify for "Category 1" if such programs include activities directly affecting the environment.

_____ Community awareness initiatives.

_____ Controlled experimentation exclusively for the purpose of research and field evaluation confined to small areas (normally under 4 ha., i.e., 10 acres) and carefully monitored (when no protected or other sensitive environmental areas could be affected).

_____ Technical studies and analyses and other information generation activities not involving intrusive sampling of endangered species or critical habitats.

_____ Document or information transfers.

_____ Nutrition, health care or family planning. Such programs do *not* qualify for "Category 1" if (a) some included activities could directly affect the environment (construction, water supply systems, etc.) or (b) biohazardous (esp. HIV/AIDS) waste is handled or blood is tested.

_____ Rehabilitation of water points for domestic household use, shallow, hand-dug wells or small water storage devices (when no protected or other sensitive environmental areas could be affected). *Pursuant to USAID guidance on water quality, testing required for arsenic, nitrates, nitrites and coliform.*

_____ Construction or repair of facilities if total surface area to be disturbed is under 10,000 sq. ft. (approx. 1,000 sq. m.) (*and* when *no* protected or other sensitive environmental areas could be affected).

_____ Support for intermediate credit arrangements (when *no* significant biophysical environmental impact can reasonably be expected).

_____ Programs of maternal and child feeding conducted under Title II of Public Law 480.

_____ Food for development programs under Title III of P.L. 480, when <u>no</u> on-the-ground biophysical interventions are likely.

_____ Studies or programs intended to develop the capability of recipients to engage in development planning. Do *not* mark "yes" if these involve activities directly affecting the environment.

- **Africa Bureau *Category 2* -- Negative environmental impacts possible, environmental review required (specific conditions, including monitoring, may be applied):**

Note: The Environmental Review (Step 4 below) must address why there will be no potential adverse impacts on protected areas, endangered or threatened species or their critical habitat; or relatively undegraded forest, i.e., justify your conclusion that the proposed Category 2 activities do not belong in Category 3 or 4. Even for activities designed to protect or restore natural resources, the potential for environmental harm exists (e.g., re-introduction of species, controlled burning, fencing, wildlife water points, spontaneous human population shifts in response to activities undertaken, etc.). *If you do not find an exact match listed here for the activity you are undertaking, and it is not in Category 1, 3 or 4, then use the last item in Category 2 to describe the activity and treat it as Category 2 for purposes of environmental review.*

➢ ***Does the activity involve (mark yes, where applicable):***

_____ Small-scale agriculture, NRM, sanitation, etc. (*list and scale to be defined mutually among the appropriate partners* -- NGO, donor, host country agencies, REDSO, etc.).

_____ Controlled experimentation exclusively for the purpose of research and field evaluation *(areas of 4 ha. or more,* i.e., 10 acres) and carefully monitored, when neither protected or other sensitive environmental areas could be adversely affected nor threatened and endangered species and their habitat jeopardized.

_____ Small-scale construction or rehabilitation of facilities or structures in which the surface area to be disturbed exceeds 10,000 sq. ft and funding level is not in excess of $200,000 and where no protected or

other sensitive environmental areas could be affected.

_____ Minor construction or rehabilitation of rural roads less than ca. 10 km (with no change in alignment or right of way), with ecologically sensitive areas at least 100 m away from the road and not affected by construction or changes in drainage; likewise, no protected areas or relatively undegraded forest should be within 5 km of the road.

_____ Nutrition, health care or family planning, *if* (a) some included activities could directly affect the environment (construction, water supply systems, etc.) or (b) biohazardous (esp. HIV/AIDS) *waste is handled or blood is tested.*

_____ Construction or rehabilitation of small-scale water points or water storage devices for domestic or non-domestic use, not covered in Category 1, when neither protected or other sensitive. environmental areas could be adversely affected nor endangered and threatened species jeopardized. *Pursuant to USAID guidance on water quality, testing required for arsenic, nitrates, nitrites and coliform.*

_____ Quantity imports of commodities such as fertilizers.

_____ Food for Development programs under Title II or III, involving known biophysical interventions with potential to cause environmental harm (e.g., roads, bore holes).

_____ Support for intermediate credit institutions when indirect environmental harm conceivably could result .

_____ Institutional support grants to NGOs/PVOs when the activities of the organizations are known and raise the likelihood of some environmental impact.

_____ Technical studies and analyses and other information generation activities that could involve intrusive sampling, including aerial surveys, of endangered species or critical habitats.

_____ Small-scale use of USEPA-registered least-toxic *general-use pesticides*, limited to NGO-supervised use by farmers, demonstration, training and education, or emergency assistance. Environmental review must be carried out consistent with USAID Pesticide Procedures as required in Reg. 16 [22 CFR 216.3(b)(1)].

_____ Other activities not in Category 1 and not in Category 3 or 4. Specify:

_____

_____

➢ ***Were the following used by the PVO/NGO in designing the above Category 2 activities (yes, no, N/A)?***

_____ *USAID/AFR's Environmental Guidelines for NGO and PVO Use in Africa*

_____ Any applicable Programmatic Environmental Assessments:_____

_____

Other(s):_____

- **Africa Bureau *Category 3* -- Significant environmental impacts likely. Environmental review required, and Environmental Assessment likely to be required:**

➢ ***Does the activity involve (mark yes where applicable):***

_____ River basin or new lands development

_____ Planned resettlement of human populations

_____ Penetration road building, or rehabilitation of roads (primary, secondary, some tertiary) over 10 km length, and any roads which may pass through or near relatively undegraded forest lands or other sensitive ecological areas

_____ Substantial piped water supply and sewerage construction

_____ Major bore hole or water point construction

_____ Large-scale irrigation

_____ Water management structures such as dams and impoundments

_____ Drainage of wetlands or other permanently flooded areas

_____ Large-scale agricultural mechanization
_____ Agricultural land leveling
_____ Procurement or use of restricted use pesticides, or wide-area application in non-emergency conditions under non-supervised conditions
_____ Light industrial plant production or processing (sawmill operation, agro-industrial processing of forestry products)
_____ Potential to significantly degrade protected areas, such as introduction of exotic plants or animals
_____ Potential to jeopardize threatened & endangered species or adversely modify their habitat (esp. wetlands, tropical forests)

The above Category 3 activities are consistent with USAID criteria for activities that normally require a USAID-specific document with a defined format and procedure, called the Environmental Assessment (EA). It is recognized that some of these categories are ambiguous. Mark "yes" if they apply, and show in the Environmental Review (Step 4) the extent and magnitude of activities and their impacts, so that USAID and its partners can determine if an EA is necessary or not.

- **Africa Bureau *Category 4* -- Activities not fundable or fundable only when specifically defined findings to avoid or mitigate the impacts are made, based on an Environmental Assessment:**

  ➢ ***Does the activity involve (mark yes where applicable):***

_____ Actions determined likely to significantly degrade protected areas, such as introduction of exotic plants or animals
_____ Actions determined likely to jeopardize threatened & endangered species or adversely modify their habitat (esp. wetlands, tropical forests)
_____ Conversion of forest lands to rearing of livestock
_____ Planned colonization of forest lands
_____ Procurement or use of timber harvesting equipment
_____ Commercial extraction of timber
_____ Construction of dams or other water control structures which flood relatively undegraded forest lands
_____ Construction, upgrading or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands.

Step 2. Summarize and Itemize Activities.

List activities by all categories to which *Yes* was answered.

Categories of activities as determined below (add entries as required):

Activity/Sub-Activity	Funding:	Category

Step 3. Determine Need to Prepare Environmental Review.

If all activities are in Category 1, sign and date the form. For any activities in Category 2 and 3, prepare an Environmental Review Report assessing all of these activities' impacts. For Category 3 activities, further documentation would be required, once USAID has confirmed the applicability of Category 3, based on the Review. If Category 4 is possible, consult USAID before proceeding with the Environmental Review to determine if activities can be funded and/or whether required EA findings could be made.

For all Category 2 and 3 activities, proceed to Step 4 to prepare Environmental Review.

Step 4. Prepare Environmental Review

Suggested Format for Environmental Review

The Environmental Review should be about 5-8 pages long (more if required) and consist of following sections:

1. **Background, Rationale and Outputs/Results Expected** -- summarize and cross-reference proposal if this review is contained therein.

2. **Activity Description** -- Succinctly describe location, siting, surroundings (include a map, even a sketch map). Provide both quantitative and qualitative information about actions needed during construction, how intervention will operate and any ancillary development activities that are required to build or operate the primary activity (e.g., road to a facility, need to quarry or excavate borrow material, need to lay utility pipes to connect with energy, water source or disposal point or any other activity needed to accomplish the primary one but in a different location). If various alternatives have been considered and rejected because the proposed activity is considered more environmentally sound, explain these.

3. **Environmental Situation** -- Affected environment, including essential baseline information available for all affected locations and sites, both primary and ancillary activities.

4. **Evaluation of Activities and Issues with Respect to Environmental Impact Potential** -- Include impacts that could occur before construction starts, during construction and during operation, as well as any problems that might arise with restoring or reusing the site, if the facility or activity were completed or ceased to exist. Explain direct, indirect, induced and cumulative effects on various components of the environment (e.g., air, water, geology, soils, vegetation, wildlife, aquatic resources, historic, archaeological

or other cultural resources, people and their communities, land use, traffic, waste disposal, water supply, energy, etc.). Indicate positive impacts and how the natural resources base will be sustainably improved.

5. **Environmental Mitigation Actions** (including **monitoring and evaluation**) -- For example, indicate means taken to avoid, reduce or compensate for impacts, such as restoration of borrow or quarry areas, replanting of vegetation, compensation for any relocation of homes and residents. Indicate how mitigative measures will be monitored to ensure that they accomplish their intended result or what monitoring might be needed for impacts that one is uncertain about.

6. **Other Information** (as appropriate) -- where possible, include photos of the site and surroundings; list the names of any reference materials or individuals consulted.

Note: Specific plans for monitoring of key environmental indicators and mitigation of impacts during activity implementation are especially important; these must be addressed in the review. Information on monitoring results and mitigation of impacts are to be included in all progress reports. Important information and a criterion for evaluation of environmental soundness is showing how the activity is part of or guided by an integrated, community-based resource and land use plan or planning and management framework that considers the appropriate use of multiple resources.

Drafted by: _____ Date: _____

Reviewed by: _____ Date: _____

PVO/NGO Director (if different from above) _____ Date: _____

Clearances:

USAID Activity Manager or Designee: _____ Date: _____

MEO: _____ Date: _____

OR

USAID Mission Director: _____ Date: _____

Indicate here recommendation that an Environmental Assessment (EA) be prepared, if any activities are classified in Category 3 or 4, OR explain why an EA is thought not to be required.

All activities designated Category 3 or 4 **must be referred** to the REDSO/ESA REO/REA and BEO and, in some cases, the RLA. The MEO should also refer any questionable Category 2 activities.

REDSO REO/REA, RLA and BEO Referrals (if appropriate, list names and dates):

1INITIAL ENVIRONMENTAL EXAMINATION
OR
CATEGORICAL EXCLUSION

PROGRAM/ACTIVITY DATA:

Program/Activity Number: 617-SO02
Country/Region: Uganda/Africa
Program/Activity Title: Strategic Objective No. 2 Conserve Biodiversity for Sustainable Development (COBS) Program
Funding Begin: FY 97 **Funding End:** FY 01 **LOP Amount:** **$30 million**
IEE Prepared By: Daniel Moore, MEO/SO2 Team Leader

Current Date: July 18, 1997

Amendment (Y/N): Y If "yes," number & date of original IEE: Action Program for the Environment July 31, 1991

ENVIRONMENTAL ACTION RECOMMENDED: (Place X where applicable)

Categorical Exclusion:	X	Negative Determination:	X
Positive Determination:	X	Deferral:	

ADDITIONAL ELEMENTS: (Place X where applicable)

EMEMP:		CONDITIONS:	X	PVO:	X

SUMMARY OF FINDINGS: This Initial Environmental Examination (IEE) for the **Conserve Biodiversity for Sustainable Development (COBS) Program** is developed in conformity with Africa Bureau environmental procedures for umbrella activities and reflects conditions regarding delegation of environmental review responsibility to Missions for PVO/NGO umbrella type projects (Cable 95 STATE 257896). This IEE will be amended if and when new activities are designed under SO2 which do not fit fully within the current scopes of the IEE. The new Strategic Objective Grant Agreement for the COBS Program will incorporate ongoing, fully-funded APE Program activities under the "umbrella" of the SO2 Program. Therefore, this IEE also takes precedence over and effectively replaces the APE Program IEE as concerns ongoing APE Program-funded activities. The APE IEE has been amended to reflect the cooperative management. Based on the use of a pro-active approach, incorporation of environmental review procedures, promotion of environmental review, capacity building, and monitoring, evaluation and mitigation procedures specified in this IEE, to which the Mission commits itself, the following environmental determinations are recommended:

1. A **Categorical Exclusion** is recommended for Program-supported technical assistance, capacity building (training and institutional strengthening), commodity support, and performance monitoring activities that have no physical interventions and no direct effects on the environment pursuant to 22 CFR 216.2(c)(1)(i) and 216.2(c)(2)(i), (iii) and (v). **The Environmental Screening Form (Attachment 1.) will be used to confirm this determination for each activity.** This categorical exclusion does **not** apply to any of the activities listed above that may directly affect the environment, such as construction of facilities, per 216.2(c)(2)(i), **nor** to studies, projects or programs intended to develop the capability of recipient countries to engage in development planning when designed to result in activities directly affecting the environment, per 216.2(c)(2)(xiv).

2. A **Negative Determination with Conditions** is recommended for all other activities entailing conservation of biodiversity. This IEE specifies a set of steps, in accordance with the Africa Bureau's *Environmental Guidelines for Small-Scale Activities in Africa*, to ensure adequate environmental review of USAID-supported activities, including capacity-building elements. This negative determination is also conditioned on the provision of supplemental project technical assistance and training support to augment existing efforts. These capacities will be developed and implemented in close collaboration with USAID/Uganda and the SO2 Team.

APPROVAL OF ENVIRONMENTAL ACTION RECOMMENDED:

CLEARANCE:
Mission Director: _____ Date:_____
Donald B. Clark

CONCURRENCE:
Bureau Environmental Officer _____ Date:_____
Carl M. Gallegos

Approved:_____
Disapproved:_____

File No: 27ugan2.iee **(AID/W)**

CLEARANCE:
General Counsel (Africa Bureau) _____ Date:_____
Drew Luten

ADDITIONAL CLEARANCES:

Mission Environmental Officer _____ Date:_____
Daniel Moore, USAID/Uganda

Regional Environmental Officer Via E-Mail CBingham Date: 7/29/97
Charlotte Bingham, REDSO/ESA

INITIAL ENVIRONMENTAL EXAMINATION

PROGRAM/ACTIVITY DATA:

Program Number:	617-SO02
Activity Number:	
Country/Region:	Uganda/Africa
Program/Activity Title:	Strategic Objective No. 2 Conserve Biodiversity for Sustainable Development (COBS) Program

1.0 BACKGROUND AND PROGRAM DESCRIPTION

1.1 Background

The 1992-96 Country Program Strategic Plan for USAID/Uganda identified conservation of biological diversity as the focus of one the Mission's strategic objectives (SO2: "stabilize biodiversity in target areas"). Since 1992, USAID's principal vehicle of assistance to the sector has been the Action Program for the Environment (APE). The APE Program has focused in part on improving the management of protected areas with unique or high levels of biodiversity and in part on protected area policy, technical capacity, infrastructure, financing, benefit sharing, and collaborative management. More recently, the Mission's strategic planning exercise for the period 1997-01 resulted in a reaffirmation of conservation of biological diversity as the continued logical focus of USAID resources available for the environment and natural resource sector (SO2: "Critical ecosystems conserved to sustain biological diversity and to enhance benefits to society"). Therefore, under the COBS Program, USAID will continue its focus on conserving Ugandan biodiversity. Biodiversity conservation in Uganda is an expressed priority of both USAID and the GOU, and USAID/Uganda is expected to continue to play a valuable role is assisting the GOU. While significant gains have been made in biodiversity conservation in Uganda's protected areas under the APE Program, it must be noted that these areas encompass only a limited portion of national biodiversity. Critical ecosystems may also be communally and privately held lands, marginally protected forest reserves, and free access bodies of water. Accomplishments in protected area conservation under the APE Program during the previous strategy period permit the Mission to consider promising activities in biodiverse and economically important non-protected areas as well under the COBS Program.

In developing the COBS Program, the Mission has also "re-engineered" its operations. The bilateral agreement for the COBS Program will be a Strategic Objective Grant Agreement (SOAg), and encompass all activities supported by USAID/Uganda during the period. The SOAg thus governs all activities to be funded with these resources under the SOAg, as well as ongoing activities funded under the APE Program.

1.2 Conserve Biodiversity for Sustainable Development (COBS)

To achieve SO2, the COBS Program is designed to address three interrelated factors affecting the integrity of critical ecosystems:

- Unsustainable management and utilization of ecosystem components themselves;
- Increasing pressure on ecosystems due to non-sustainable use of extraneous but ecologically linked resources; and
- Sound but young framework for conservation and sustainable natural resource management.

These factors led to the identification of three intermediate results (IRs) which COBS aims to achieve:

IR 2.1 Critical ecosystems managed to ensure biological integrity;

IR 2.2 Pressure on critical ecosystems reduced; and

IR 2.3 Supportive framework for conservation and sustainable development maintained.

A range of potential activities is available to the COBS Program for use in achieving the various IRs. This Section presents a set of "core" activities that will serve as mechanisms through which specific activities will be later developed and implemented. Following the core activities, a list of illustrative activities by second-level IR is presented.

Core Activities: Core activities will provide the framework for identifying, selecting, and implementing activities and achieving results. Core activities will include technical assistance, a grants program, and management support.

1) Technical Assistance: Technical assistance will be provided to the COBS Program through several means. Principal technical assistance, as well as coordination of overall assistance, will be provided by an institutional contractor throughout the life of the SO2 Program. Additional technical assistance may be provided through other means. Technical assistance requirements (i.e. timing, duration and technical specifications) will be determined by the COBS Program as part of normal activity selection.

2) Grants Program: A Grants Management Unit (GMU) will oversee management of a portfolio of USAID-administered grant and awards and conduct capacity-building activities. Grant activities will be determined according to criteria developed by the SO2 Team responsible for managing the COBS Program.

3) Program Support Activities: Program support activities will include: a USAID/Uganda SO2 management team; logistical support to technical assistance and management; commodities (e.g. equipment); capacity building (e.g. training) and performance monitoring.

Illustrative Activities: Figure 1 presents an illustrative list of activities by second-level IR. These potential activities may be implemented through or under any of the above core activities, and are listed as they are seen to contribute to achievement of the IR. The list is not exhaustive in nature.

Figure 1: Summary List of Activities by Intermediate Result

IR 2.1 Critical ecosystems managed to ensure biological integrity
IR 2.1.1 Protected area management plans implemented
System-Level Management Planning Management Planning Capacity Management Plans Management Plan Implementation Collaborative Ecosystem Management Revenue Management
IR 2.1.2 Community resource use agreements implemented
Community Resource Use Agreements Guidelines Community Resource Use Agreements Community Resource Use Agreements Implementation

IR 2.1.3 Ecologically sound private sector investments undertaken
Concessions Policy and Procedure EIA Capacity Building Microenterprise Investment in NRM Wildlife User Rights
IR 2.2 Pressure on critical ecosystems reduced
IR 2.2.1 Increased dependence on sustainable resource use systems
Sustainable Resource Use Forest Resource Development Resource Tenure Reform
IR 2.2.2 Population Pressure on environment mitigated
Resettlement (facilitation only) Family Planning
IR 2.3 Supportive framework for conservation and sustainable development maintained
IR 2.3.1 NEAP Objectives strategically important for conservation of critical ecosystems implemented
Capacity Building - Decentralized NRM Institutions Capacity Building - Environmental Liaison Units Sustainable Financing Mechanisms for NRM Sector Environmental Standards Development and Implementation Biodiversity Conservation Strategy Forest Sector Coordination
IR 2.3.2 Knowledge base improved to better guide natural resources management policy decisions
National Level Environmental Information Ecosystem Monitoring Ecological Research Support Special Studies
IR 2.3.3 Role of civil society in natural resources management policy formulation increased
Policy Advocacy Utilization of Environmental Management Tools
IR 2.3.4 Sectoral laws enacted in consultation with lead agencies
Environmental Policy/Regulation Development and Reform
IR 2.3.5 Political leadership mobilized in support of environmental management
Targeted Environmental Awareness
IR 2.3.2.1 to 2.3.5.1 Public awareness in support of conservation and sustainable development increased
Community Conservation/Environmental Education Environmental Public Awareness

Activity Selection Criteria: Selection of activities to be supported under the COBS Program must carefully consider the relevance of the activities to achieving results across all IRs and in such a way that contributes effectively to the achievement of SO2 itself. Given the array of potential interventions and wide range of ecosystems that might be deemed "critical," choices must be made. The COBS Program will employ and modify over time a set of criteria to assist in selection of appropriate activities.

1.3 Purpose of IEE

The purpose of this IEE is to establish for the COBS Program a set of processes and procedures consistent with those laid out in *Environmental Guidelines for Small-Scale Activities in Africa* (Section 5.3, June 1996) and 95 STATE 257896 Cable. USAID/Africa Bureau has developed these procedures specifically for undertakings like the COBS Program that may encompass a variety of activities, the specific nature of which may be unknown at this time, to be undertaken by a range of potential implementing agents. These procedures are consistent with USAID's environmental regulations (22 CFR Part 216) and enable broader delegation of responsibility for approval of environmental documentation to USAID/Uganda.

The new Strategic Objective Grant Agreement for the COBS Program will incorporate ongoing, fully-funded APE Program activities under the "umbrella" of the SO2 Program. This was done to facilitate coordination and management of the Mission's SO2 activities (i.e. ongoing APE activities and new activities funded under COBS), and to more fully "re-engineer" the SO2 portfolio. Therefore, this IEE also takes precedence over and effectively replaces the APE Program IEE as concerns ongoing APE Program-funded activities. The APE IEE has been amended to reflect the cooperative management. However, the consequences of this action on APE Program activities is limited for two reasons: (1) the APE Program is not expected to fund any additional (new) activities; and (2) all current APE Program-funded activities have fulfilled USAID's environmental regulations as per the APE Program IEE and subsequent documentation. Therefore, environmental compliance actions related to APE Program funded activities are expected to be limited to ongoing monitoring and mitigation activities defined under relevant IEE's (as in the case of the APE Program grant to Aquatics Unlimited for assistance to the GOU in water hyacinth control) and Environmental Reviews in force for the various activities.

2.0 COUNTRY AND ENVIRONMENTAL INFORMATION (BASELINE INFORMATION)

2.1 Uganda Environmental Policies and Procedures

The Uganda Environment Statute of 1995 establishes general principles for environmental management in Uganda as well as requirements for environmental planning at both national and local (district) levels; a framework for environmental impact assessment (EIA); requirements for adoption of environmental standards; environmental management measures for sensitive resources; provisions for environmental restoration orders; and other requirements. Currently, EIA guidelines and standards are in final stages of development. The development of both the Statute and the various implementing regulations concerning environmental review has benefitted considerably from technical assistance (provided by USAID under the APE Program and also USAID/REDSO staff). As such, to date, much of the regulations and processes in place at present closely resemble those of the United States.

2.2 State of Natural Resources Base of Uganda

Potential interventions under the COBS Program will likely involve a range of geographic locations and environmental situations. Therefore, this IEE does not provide comprehensive or detailed baseline environmental information. The information presented in this section is derived from USAID/Uganda's 1996 Strategic Planning exercise as well as the State of the Environment Report for Uganda 1994 and is focused on information relevant to biological diversity. Additional detailed and up-to-date information will be available with the forthcoming publication of the State of the Environment Report for Uganda 1996.

Despite impressive economic recovery from the disastrous mismanagement during the period 1971-86, Uganda's per capita income level of $225 - an increase from $170 in 1990 - places it in the ranks of the world's poorest countries. Nearly 90% of the population are rural dwellers, making their living from increasingly fragmented smallholder agriculture. It is estimated that 85% of rural households have on average 2 ha or less for all food-, cash-crop, and livestock needs; in many cases this total is split between a number of non-contiguous plots.

Total population was estimated at 18.4 million in 1995, with an annual growth rate of 2.5%. Poverty and population growth represent major sources of pressure on the country's unusually rich natural resource base.

Although not a large country by African standards (241,000 km^2), Uganda is among the continent's richest countries with respect to its natural environment. Nearly 20% of the national surface area is covered by bodies of water, notably Lake Victoria. Seven of Africa's 18 biogeographic regions are represented - the highest concentration on the continent - and some 90 vegetation communities.

Occupying a transition zone between East African savanna systems and the moist tropical forests of the Congo Basin, Uganda's highly diverse landscape includes rift valleys, highlands and mountain ranges, papyrus swamps, acacia savannas, and an extensive network of interconnected rivers and lakes. Pronounced differences in elevation help define Uganda's agro-ecological zones: the Albert Nile valley along the northwestern border with Sudan is just 600 meters above sea level, while the Rwenzori mountain range, along the western border with Zaire, and Mt. Elgon on the southeastern border with Kenya, exceed 5,000 and 4,000 meters respectively. Annual rainfall varies from 500 mm in the arid northeast to over 2000 mm in mountainous areas and along the larger lakes. Uganda's ecosystems include:

- moist montane forest
- moist montane bamboo forest
- medium-altitude evergreen forest
- moist semi-deciduous forest
- swamp forest
- riverine forest
- forest-savanna mosaic
- moist thicket
- woodlands
- savanna
- dry thicket

Forest and woodland cover has declined rapidly in modern times, from an estimated 45% of land area in 1890 to around 21% at present. Agricultural conversion has played a major role in this process, although urbanization, infrastructure development, harvesting of woodfuels and logging are also factors. Population pressure has increased sharply: population density per unit of land area is now more than four times higher than in 1950. Cropland increased by 18% between 1980 and 1990.

Roundwood production has increased over 40% since 1980, to a total of roughly 15 million cubic meters in 1990. Of this figure, it is estimated that 13 million cubic meters - over 85% - consists of fuelwood and charcoal production. These traditional fuels account for 90% of the country's energy needs, an increase from the early 1970s, when commercial energy sources provided 22% of total supply. It is likely that fuelwood use by rural households on the whole has lower ecological impact than commercial production of charcoal and fuelwood, primarily destined for urban areas.

Uganda remains an exceptionally important area for biodiversity conservation. Some 15 mammal species and sub-species are endemic to Uganda. Nineteen species of primates are known, including the mountain gorilla, the Ugandan red colobus, and chimpanzee. The former rhinoceros population has been wiped out, but important elephant populations remain, and the IUCN has identified two butterfly species of particular conservation importance - the African giant swallowtail and the cream-banded swallowtail. Uganda has Africa's third-highest number of mammal species, and the fourth-highest number of bird species, as well as over half of the world's remaining population of mountain gorillas.

Conservation of key resource areas is a demonstrated priority of the GOU. Roughly 13% of Uganda's territory is protected under a comprehensive system of National Parks, Wildlife Reserves, and Forest Reserves. These areas are managed by the Uganda Wildlife Authority and the Forest Department.

Uganda's tropical high forests represent particularly important areas for biodiversity conservation; key sites of concern include:

- the Bwindi Impenetrable forest, with mountain gorilla, high species-richness for insect and amphibian populations, and endemic small mammals;
- the Bwamba forests, which form part of the Congo Basin moist forest system;
- the Sango Bay forests of Lake Victoria, with rare or endangered endemic tree species such as *podocarpus*;
- forests and woodlands of the Albertine rift valley system, of particular importance for bird species;
- woodland, savanna and palm savanna habitats of northern Uganda and Karamoja;
- the Rwenzori range of western Uganda, with afromontane vegetation and associated fauna; and
- the Kyaka-Mubende riverine forests and woodlands, with rare swamp forest communities and high bird species diversity.

Some of these sites (i.e. Bwindi Impenetrable) are now receiving an important level of conservation attention, while others fall within ineffective forest reserve management status. In addition, a number of Ugandan ecosystems, such as *Butyrospermum* savannas, are not presently represented within any category of the protected area system.

3.0 EVALUATION OF PROGRAM/ACTIVITY ISSUES WITH RESPECT TO ENVIRONMENTAL IMPACT POTENTIAL

As presented in Section 1.2, COBS Program activities will entail support for a variety of interventions in a number of potential settings. As such, the physical and topographic conditions, climate, soils, and ecosystems as well as social and economic characteristics that may be encountered are quite variable. Because the specific characteristics and locations of these activities are not definitive, the potential for adverse environmental impacts cannot be excluded, until additional information about activity design and location becomes available. Each, therefore, requires environmentally sound design and review to determine the specific nature and magnitude of potential impacts. In general, activity design and selection will retain an overall focus on SO2 itself - conserving critical ecosystems, and be held consistent with USAID Environmental Procedures as reflected in the Environmental Screening / Report Form for NGO/PVO Activities and Grant Proposals in *Environmental Guidelines for Small-Scale Activities in Africa*. Significantly, the majority of likely implementing agents under COBS were also the principal partners of USAID/Uganda's APE Program. Activities to be funded with the potential for adverse effects on the environment are small-scale in nature, or consist of larger grant activities best managed, from an environmental impact perspective, as consisting of a number of discrete small-scale activities. Under the APE Program, over 50 program partners have already participated in the Africa Bureau Environmental Assessment training course provided July 1996 for PVOs, NGOs and other APE implementing partners. Therefore, most COBS Program partners are in an excellent position to continue to promote appropriate processes of participatory environmental screening and review among potential COBS Program participants.

4.0 RECOMMENDED MITIGATION ACTIONS (INCLUDING MONITORING AND EVALUATION)

4.1 Recommended Planning Approach

Often, development activities proposed for support are typically presented and considered as discrete interventions, in isolation from other planned developments. This linkage argues strongly for the adoption of an integrated approach towards activity planning and implementation. Although an integrated approach towards

program planning and management is more complex and time-consuming "up-front," it will reap significant dividends over the longer term in the form of more cost-effective, sound and sustainable community investments and improved natural resources management. For maximum efficiency and effectiveness, these review procedures (see Section 4.2) are intended to be applied within the context of development plans, natural resource management plans or land use plans developed for the areas in which the activities will take place. Under the APE Program, significant investment has been made in establishing the foundation upon which such an integrated approach can be built. USAID has provided key technical assistance and in the development of environmental policy and legislation (including environmental assessment); built capacity among both GOU institutions and USAID partners in the use of environmental management tools such as environmental assessment. Continued assistance and capacity building in these areas will continue to be an important feature of the COBS Program.

Since the COBS Program will employ and modify over time a set of criteria to assist in selection of appropriate activities and grant activities will be determined according to criteria developed by the SO2 Team responsible for managing the COBS Program (as stated in Section 1), an integrated environmental planning approach and adoption of the environmental screening and environmental review procedures will be included among the set of criteria.

Specific activities for continued investment in the "planning approach" have yet to be defined. However, COBS expects to be involved in the following types of activities that will build capacity among relevant partners and further solidify the foundation for sound environmental planning and management:

- An Environmental Assessment Course patterned after the Africa Bureau Environmental Assessment training course provided in July 1996 for PVOs, NGOs and other APE implementing partners is expected to be adapted for use by the SO2 Team with assistance from the REDSO REO, for use in training District-level environmental managers;

- The current APE Program institutional contractor (which will continue as the principal source of technical assistance to COBS during the coming two years) plans to feature Eras as the key activities in developing management plans for protected areas. During this period, it is expected that two major management plan revisions for protected areas suites (i.e. national parks and their associated wildlife reserves) will be conducted as capacity building exercises.

- It is expected that COBS will continue to provide strategic technical assistance to NEMA in further defining and adapting their environmental assessment and monitoring capacities (see illustrative list of COBS activities).

- The Mission has added a full time local hire PSC position specifically designed to bolster Mission environmental assessment and capacity building capabilities. The new position is expected to spend approximately one-third of his/her time as MEO working to ensure compliance of SO2 and other Mission SOs with Reg. 216, and one-third or his/her time working with SO2 (and potentially other SO) partners (i.e., GOU agencies, PVOs/NGOs, Districts, etc.) in providing assistance and training in implementing GOU environmental regulations.

Such an approach has proved extremely effective in the past - witness the Environment Statute and GOU standards and guidelines in place. On the USAID side, grantees (both appropriated dollar and local currency recipients) have successfully used their accumulated knowledge and training (derived from the Africa Bureau Environmental Assessment training course and subsequent follow up assistance and training from the GMU, MEO and REO) to submit acceptable Environmental Reviews to the GMU and USAID for approval. In one case, the APE grantee Aquatics Unlimited, with the assistance of REDSO and USAID/AFR has over the past 16 months conducted a highly publicized EIA on water hyacinth control that has become a training and information exercise for not only the agencies involved, but for all of Uganda. As the EIA process culminates, the USAID-funded monthly insert (for July 1997) in the Ugandan daily "New Vision" features the EIA process. The COBS Program is design to continue to build and expand on this success.

4.2 Environmental Screening and Review

These environmental screening and review procedures specify how all COBS Program activities will be

examined on an individual basis in order to comply with the determinations (see Section 5) of this IEE in accordance with 22 CFR Section 216.3(a)(2).

These procedures are intended to result in environmental accountability and soundness, by requiring that USAID/Uganda puts in place specific mechanisms to promote environmental review capacity and other environmental capacity for the implementing partners. To ensure that interventions are designed in a sound and sustainable manner (see Section 4.1), the Mission Environmental Officer (MEO) and/or SO2 Team Leader will work with the appropriate implementing partners to achieve compliance with these procedures.

These procedures are based upon utilization of a Screening Form, presented in Attachment 1. This form is consistent with the "Environmental Screening Form for NGO/PVO Activities and Grant Proposals" contained in the Africa Bureau *Environmental Guidelines for Small-Scale Activities in Africa*. USAID/Uganda will facilitate the refinement of this form with SO2 implementing partners and the REDSO/REO to meet individual activity needs and to incorporate, where appropriate, information that will serve to identify any need for environmental assessment in accordance with Uganda's environmental assessment policy and legislation.

Adherence to the procedures in this IEE, it must be emphasized, cannot be considered in lieu of Ugandan requirements or vice versa. Efforts will be made, however, in the refinement of USAID procedures (i.e. the Screening Form) to ensure a maximum degree of compatibility of the two respective assessment information requirements.

This IEE does not cover pesticides or other activities involving procurement, use, transport, storage or disposal of toxic materials, and any situation dealing with such will require an amended or separate IEE for that particular activity, except to the extent covered in Category 2 of the Screening Form attached.

All funded activities will be individually screened using the Screening Form, which utilizes a four-tiered categorization process consistent with Africa Bureau's *Environmental Guidelines*, as defined below:

- *Category 1*: Activities that would normally qualify for a categorical exclusion under Reg. 16 (e.g., community awareness initiatives, training, provision of technical assistance, controlled experimentation, etc.). Certain, specifically defined, small-scale activities entailing rehabilitation of water points and construction or rehabilitation of facilities have also been placed in this category.

- *Category 2*: Activities that would normally qualify for a negative determination under Reg. 16, based on an environmentally-sound approach to the activity design and incorporation of appropriate mitigation and monitoring procedures. For example, the design followed, and the implementation partner has access to and will follow, a series of guidelines for the design of small-scale environmentally-sound activities in forestry, natural resource management, infrastructure, etc.

- *Category 3*: Activities that have a clear potential for undesirable environmental impacts and typically under Reg. 16 require an Environmental Assessment, such as those involving land development, planned resettlement, penetration road building, substantial piped water supply and sewage construction, large-scale irrigation projects, and projects involving the procurement and/or use of pesticides, or of large-scale or area-wide application of pesticides. All activities listed in Reg. 16 (Sect. 216.2(d)(1)) are automatically included, unless they are small-scale and qualify for a negative determination in accordance with the criteria listed under Category 2.

- *Category 4*: This category groups activities that either USAID cannot fund or for which specific findings must be made in an Environmental Assessment prior to funding. Interventions that are likely to jeopardize a critical habitat for threatened or endangered species or degrade a protected area must be placed in this category. Category 4 lists activities that trigger provisions of Sections 118 or 119 of the Foreign Assistance Act, which generally relate to degradation of national parks or protected areas, introduction of exotic species, or effects on tropical or non-degraded forest lands.

The COBS Program will employ the Screening Form [Attachment 1, to be refined as needed in consultation with the REDSO/REO] and the Environmental Review Reports prepared as a result of the categorization process to evaluate activities and/or proposals. Preferably, the implementation partner of an activity will prepare the

forms and the environmental reviews, which will be reviewed by the USAID/Uganda MEO. In cases where activities are managed under the GMU, those forms will be first reviewed by the GMU before final review and submittal to USAID/Uganda for review by the MEO.

Screening Procedures and Responsibilities:

Screening procedures and responsibilities for each of the Core Activities described in Section 2.1 are defined below:

1) Technical Assistance: Most or all technical assistance is expected to qualify for a Categorical Exclusion (e.g., Category 1). The SO2 Team Leader or MEO will be responsible for using the Screening form to confirm such cases. In cases where technical assistance can not be excluded from review requirements (e.g., Category 2), the MEO will be responsible for preparing an Environmental Review Report.

2) Grants Program: Most, if not all, COBS Program activities that may fall into Category 2 (or above) will be managed by the GMU or its successor. For such activities, the GMU, with the assistance of the MEO, will spearhead the environmental review process. This is expected to entail provision of guidelines for inclusion of environmental review considerations at the proposal stage, and in cases where activities are actually funded, assistance in preparation of the Environmental Review Report (see below). For activities managed by the GMU, Reports will be submitted through the GMU and be subject to GMU approval before final submission to USAID for approval. For any Category 3 activities, see below.

3) Program Support Activities: Most or all Program Support activities are expected to qualify for a Categorical Exclusion (e.g., Category 1). The SO2 Team Leader or MEO will be responsible for using the Screening form to confirm such cases. In cases where technical assistance can not be excluded from review requirements (e.g., Category 2), the SO2 Team Leader or MEO will be responsible for preparing an Environmental Review Report.

An Environmental Review Report shall be prepared for all Category 2 activities. The MEO, SO2 Team Leader, Mission Director, or Acting Director, on behalf of USAID/Uganda, shall be responsible for clearances on the category determination and Environmental Review Reports. It is assumed that the majority of activities will fall within Categories 1 and 2, and will, therefore, be approved locally by USAID/Uganda without further external review. This delegation of responsibility, without regard to dollar amount of activities, is predicated on the assumption that appropriate and environmentally sound implementation and environmental monitoring and mitigation procedures will be in place. The MEO, should he/she have questions, will pass Category 2 activities and their reviews to the REO and/or Bureau Environmental Officer (BEO) for consultation. An Environmental Review Report shall also be prepared as the first step for all Category 3 activities to help the REO and BEO determine if an Environmental Assessment is required. While an Environmental Review Report may be prepared for Category 4 activities, it is recommended that developers of activities and proposals consult with the USAID/Uganda MEO or SO2 Team Leader (through the GMU if necessary) before preparing elaborate documentation. All Category 3 and 4 activities (if there are any) shall be subject to additional environmental evaluation, as deemed appropriate, in consultation with the REO and BEO, and shall be passed on to the Regional and Bureau Environmental and Legal Officers for further review and clearance.

Prior to the approval of an activity, results of the environmental categorization must be available and considered. For Category 2 projects, Environmental Review Reports, including MEO review and, if needed, REO or BEO review, must be performed prior to funding. For any Category 3 or 4 activities, approval cannot be made until the Environmental Review and any additional environmental documentation as determined by the BEO have been prepared and cleared. The COBS Program may, if it desires, categorize or review categorization of activities, based on use of the screening form, prior to approval to a proposer to proceed with final design. This procedure would allow activities that are in Category 1 (no environmental review required) to be carried out and for the proposer to undertake appropriate environmental documentation according to the procedures for Category 2, 3 or 4 activities. Hence, such awards shall contain clauses stating that funding of Category 2, 3 or 4 activities is contingent upon findings, recommendations and clearance of the environmental documentation.

The MEO and/or SO2 Team Leader shall on a routine (semi-annual) basis pass to the REO and BEO an updated summary of activities and the results of the environmental categorization and review process, in order to keep

them apprised of the type/nature, scale, funding levels and implementation status of the individual activities approved under the process described in this IEE and any corresponding mitigation and monitoring requirements. Reference to this process will also be made in the Mission's annual R4 submittal to the USAID Africa Bureau.

4.3 Promotion of Environmental Review and Capacity Building Procedures

The procedures described above and incorporated within the Screening Form are intended to ensure environmental accountability and soundness, on the assumption that the COBS Program has the following additional elements in effect to build environmental capacity with implementing partners:

- The COBS Program and its appropriate partners will help design, conduct, participate in, and apply environmental assessment and management training, in conjunction with USAID and Ugandan resource organizations and agencies, such as the Regional Environmental Assessment Training Course (which has already been conducted), and pursue follow-up training to assist these partners in properly fulfilling the screening and review requirements in conjunction with concerned Ugandan organizations and agencies;

- The COBS Program and its appropriate partners will also be encouraged to apply appropriate Ugandan environmental assessment policies and procedures; and

- A Performance Monitoring Plan will be put in place and used by the COBS Program and its appropriate partners, in collaboration with any concerned Ugandan authorities.

4.4 Environmental Responsibilities

USAID/Uganda assumes responsibility for environmental review and decision-making for all COBS Program activities as outlined below:

- For all proposed activities, potential implementing partners (or USAID), with the assistance of appropriate partners, proposers will submit proposals that take into consideration potential environmental impacts and their mitigation, including avoidance, and will design the activities with an environmental monitoring system in place;

- The potential implementing partner (or USAID) will use the Screening Form to categorize proposals, and the MEO will review and pass on to the REO and BEO any Category 3 or 4 and, as he/she determines, some Category 2 activities;

- The potential implementing partner (or USAID) , with the assistance of appropriate partners, will ensure implementation of agreed-upon mitigating measures and environmental impact monitoring;

- USAID/Uganda's MEO and the SO2 Team Leader will be ultimately responsible for monitoring environmental impacts of all project-financed activities, as further specified below (Section 4.5); and

- Periodic visits of the REO will also be requested for advice, refresher training and validation that environmental processes are in place.

4.5 Monitoring, Evaluation and Mitigation

An environmental monitoring, evaluation and mitigation process will be established and used by the implementing partners in collaboration with USAID. All COBS Program activities shall incorporate appropriate mitigation and monitoring procedures as listed below:

- The COBS Program and its implementing partners will utilize the *Environmental Guidelines for Small-Scale Activities in Africa* to assist them in determining what potential impacts should be of concern for different types of development activities in various settings. Using the information from this and other documents cited therein (advice should also be solicited from the MEO, REO, or other appropriate entity) the

implementing partners, will determine which impacts to mitigate and monitor for the particular development activity;

- The COBS Program and its partners must identify in each proposal and in the accompanying environmental review reports all proposed environmental mitigation and monitoring requirements;

- Once the environmental review reports are approved, the mitigative measures and monitoring procedures stated in the environmental review report shall be considered a requirement;

- The implementing partner, with assistance of other appropriate entities, shall be responsible for implementation of agreed-upon mitigation measures and monitoring of impacts; and

- All periodic reports of COBS' implementing partners, under these procedures to USAID/Uganda (or to whatever entity has provided the funding) shall contain a section on environmental impacts, success or failure of mitigative measures being implemented, results of environmental monitoring, and any major modifications/revisions to the project, mitigative measures or monitoring procedures.

USAID/Uganda is ultimately responsible for assuring conformity with the procedures spelled out above, including environmental categorization and review procedures. With particular respect to monitoring, evaluation and mitigation, the Mission is responsible for:

- Monitoring and evaluation of activities after implementation with respect to environmental effects that may need to be mitigated, a process which should be integrated into the Mission's pertinent Performance Monitoring Plan;

- Review of all implementing partners' reports with respect to results of environmental mitigation and monitoring procedures;

- Incorporating into Mission field visits and consultations with implementing partners periodic examination of the environmental impacts of activities and associated mitigation and monitoring (assistance of the REO in preparing guidelines or assisting with the monitoring and evaluation can be solicited); and

- Reporting on implementation of mitigation and monitoring requirements as part of the summary of activities and their status that is passed to the REO and BEO.

5.0 SUMMARY OF FINDINGS

This IEE for the **Conserve Biodiversity for Sustainable Development (COBS) Program** is developed in conformity with Africa Bureau environmental procedures for umbrella activities and reflects conditions regarding delegation of environmental review responsibility to Missions for PVO/NGO umbrella type projects (Cable 95 STATE 257896). This IEE will be amended if and when new activities are designed under SO2 which do not fit fully within the current scope of the IEE.

Environmental Determinations

Based on environmental review procedures, promotion of environment review, capacity building, and monitoring, evaluation and mitigation procedures specified in this IEE, to which the Mission commits itself, the following environmental determinations are recommended:

1. A **Categorical Exclusion** is recommended for Program-supported technical assistance, capacity building (training and institutional strengthening), commodity support, and performance monitoring activities that have no physical interventions and no direct effects on the environment pursuant to 22 CFR 216.2(c)(1)(i) and 216.2(c)(2)(i), (iii) and (v). **The screening form will be used to confirm this determination for each activity.** This categorical exclusion does **not** apply to any of the activities listed above that may directly affect he environment, such as construction of facilities, per 216.2(c)(2)(i), **nor** to studies, projects or programs intended to develop the capability of recipient countries to engage in development planning when designed to result in activities directly affecting the environment, per 216.2(c)(2)(xiv).

2. A **Negative Determination with Conditions** is recommended for all other activities entailing conservation of biodiversity. This IEE specifies a set of steps, in accordance with the Africa Bureau's *Environmental Guidelines for Small-Scale Activities in Africa*, to ensure adequate environmental review of USAID-supported activities, including capacity-building elements. This negative determination is also conditioned on the provision of supplemental project technical assistance and training support to augment existing efforts. These capacities will be developed and implemented in close collaboration with USAID/Uganda and the SO2 Team.

Conditions

USAID's support for the COBS Program will follow a formalized environmental review process for its activities. A key component of this review process is the use of a Screening Form (Attachment 1) to categorize activities, and review and screen them for potential environmental impacts. Use of this screening form and the categorization process are recommended in accordance with the USAID African Bureau *Environmental Guidelines for Small-Scale Activities in Africa.*

USAID/Uganda assumes responsibility for environmental review, with clearance by the MEO, SO2 Team Leader or USAID Director or Acting Director in accordance with the environmental review procedures outlined herein for Category 1 and Category 2 activities. All activities classified as Category 3 or 4, based on the procedures for categorization and review (in the unlikely event there are any), and possibly some in Category 2, at the discretion of the MEO, will be subjected to additional environmental assessment, as deemed appropriate, in consultation with the REO and/or BEO, and will be passed to the Bureau and Regional Environmental and Legal Officers for further review and clearance.

The COBS Program may, if it desires, categorize or review categorization of activities, based on use of the screening form, prior to approval to a proposer to proceed with final design. This procedure would allow activities that are in Category 1 (no environmental review required) to be carried out and for the proposer to undertake an appropriate environmental review in accordance with the procedures for Category 2, 3 or 4 activities. No activities classified in Category 2, 3 or 4 will be funded until the environmental documentation required by this IEE has been prepared, reviewed and cleared. Hence, such awards shall contain clauses stating that funding for such activities is contingent upon adherence to the findings and clearance of the environmental documentation.

Implementing partners of the COBS Program will help design, conduct, participate in and apply appropriate environmental assessment/design and implementation/mitigation procedures for each activity. The COBS Program will support appropriate environmental training and will do follow-up training to assist these partners in properly fulfilling this review requirement, in conjunction with concerned Ugandan organizations and agencies.

An environmental monitoring, evaluation and mitigation process shall be established and used by the implementing partners, including grantees, in collaboration with USAID. Up-dated summaries of activities and their status, based on the procedures described in this IEE, will be periodically submitted to the REO and BEO to keep them apprised of the type, scope and implementation status of the activities and their corresponding mitigation and monitoring requirements. Reference to this process will be made in the Mission's annual R4 submittal to the USAID Africa Bureau.

This IEE does not cover pesticides or other activities involving procurement, use, transport, storage or disposal of toxic materials, and any situation dealing with such will require an amended or separate IEE.

Adherence to the procedures in this IEE are not in lieu of any environmental assessment procedures required under Ugandan law, nor can adherence to Uganda's environmental procedures be substituted for compliance with the procedures in this IEE. However, efforts will be made to ensure a maximum degree of compatibility of the two respective assessment information requirements.

Module 12

12. Working Group: Role Play on Environmental Review Issues

Description/Objectives

The purpose of this exercise (role play as representative stakeholders in a major activity) is to obtain stakeholder views concerning a proposed project. You are expected to demonstrate the variety of views and concerns that stakeholders, who stand to gain, lose or both, may have. The intent of the role play is to illustrate that there is often no one right answer in determining beneficial and adverse environmental and social impacts. In preparation for the stakeholder meeting you will meet within assigned groups.

You are to review your interests and formulate a position that represents your stakeholders. You will also determine what **priority** concerns you would like addressed in an environmental assessment or review document.

The groups defined comprise many interests, which in real life might not be associated with each other. However, because of time constraints, the number of groups represented must be limited. If your particular group cannot come to some agreement or meetings of minds, the group may elect to splinter into subgroups, bearing in mind that the presentation time allotted to the original group must also be shared. Alternatively, the group may elect to have their spokesperson represent the diverse viewpoints of the group. We invite you to take on the persona of the stakeholder you represent.

After the working group sessions and completing your summary of stakeholder interests, your work group will then present a summary of the groups findings to a general session, including a specialist group of commentators.

Readings

IEE or Environmental Review document.

Vipepeo Community Campground
Preliminary Stakeholder Consultation
Instructions to Participants

In this exercise, a preliminary stakeholder consultation, you will act, i.e., play, the roles of representative stakeholders concerned about the management of natural resources adjacent to and associated with a protected area. The purpose of this preliminary stakeholder consultation is to obtain stakeholder views concerning a Community-Based Organization's (CBO's) proposal to establish a community campground , located outside the gate to the Vipepeo protected area, in cooperation with Vipepeo protected area authorities. The Nakabanda Protected Area Trust (NAKPAT) has called the stakeholder meeting because they have some concerns about the proposed community campground and are not certain if the Trust should provide funds to support the activity or not. The intent of the role play is to illustrate that there is often no right answer in determining beneficial and adverse environmental and social impacts; through this process we will expose you to elements of the process of preparing an environmental review . **Disclaimer:** *This activity is fictitious. The names of stakeholder groups and organizations used in this exercise are also fictitious and in no way represent actual entities or their views.*

In preparation for the stakeholder meeting, the course organizers will assign each participant to a group. You will then meet within your assigned groups. Your agenda is to:

- select a chairperson (mediator, traditional healer, dictator, boss, chief bureaucrat, headman/headwoman, etc.) and rapporteur for your group in order to maintain some measure of decorum among your potentially unruly group participants;

- review your interests and formulate a position that represents your stakeholders;

- determine what **priority** concerns you would like addressed in an environmental review document;

- summarize your dialogue on flip chart paper; and

- select a spokesperson to present a summary of the group's deliberations.

Each group will have a maximum of three minutes to present its summary.

The groups defined below comprise many interests, which in real life may not be associated with each other. However, because of time constraints, the number of groups represented needed to be limited. If your particular group cannot come to some agreement or meeting of the minds, the group may elect to splinter into subgroups, bearing in mind that the presentation time allotted to the original group must also be shared. Alternatively, the group may elect to have its spokesperson represent the diverse viewpoints of the group. We invite you and urge you to take on the persona of the stakeholder you represent by modifying your dress, voices, personality and philosophy.

Each of you as a concerned stakeholder should familiarize yourself with the background on the Vipepeo Protected Area and the proposed Vipepeo Community Campground found on the next page.

You should also be aware that, as in real life, situations are rarely static. The debate over the Vipepeo Community Campground is no different. New information may be introduced (by stakeholder's or others during the course of stakeholder consultations), and you are free to change your position or views based on this additional knowledge.

Each group listed below will be provided with separate, brief instructions related to the interests they represent:

1. Kampia Vipepeo Community Association (KAVICA)

2. Scared Community Association of Local People (SCALP)

3. Sometimes Allied Environmental NGOs (SOMALENGO)

4. University of Nakabanda

5. Nakabanda National Parks and Protected Areas (NAKAPAPA)

6. Texas International Hotels, Inc. (TIHI)

7. The Nakabanda Preservation Society (NPS)

8. Merchants for More Money (M3)

9. Nakabanda Protected Area Trust (NAKPAT) and Objective Nasty Reporters (ONARPS)

In general session, each spokesperson will:

- Identify himself or herself by group name/affiliation
- Limit statements to no more than 3 minutes
- Be prepared to receive and respond to questions

Upon conclusion of these presentations, the NAKPAT and ONARPS will summarize the proceedings and provide **objective** comments and critiques. We then encourage all participants to engage in orderly (or disorderly) debate. **Remember you may change your opinion(s) based on new information you acquire.**

Preliminary Background
KAVICA Proposal for a Community Campground
Adjacent to Vipepeo National Park

Background

A Community-Based Organization Kampia Vipepeo Community Association (KAVICA) proposes this activity, in the amount of U.S. $50,000 to the Nakabanda Protected Area Trust (NAKPAT). The requested monies will provide for site preparation, construction and purchase of equipment and materials for a community campground in the vicinity of Vipepeo National Park. KAVICA has planned the proposed campground in consultation with Nakabanda Parks and Protected Areas (NAKAPAPA) Authority. The campground/lodge is meant to provide direct benefits to the communities neighboring the Park through employment and revenue generation together with other multiple use strategies for use of resources in peripheral areas of the Park. One intent of this activity is to help reduce lingering hostility of communities, which has resulted from the Park Authority's eviction of farmers from the Park in 1952 and the adoption of a policy that has ignored the interests of community members from 1952 to 1990.

Site and Surroundings

The proposed site is on 10 hectares of public land bordering the National Park. The entrance to the proposed campground is about 200 meters from the North Gate (See map). The site lies at approximately 1400 meters, and consists of rolling terrain below high volcanic hills. The primary vegetation type is disturbed Afro-montane rainforest; approximately 40 per cent of the site and the surrounding area outside the Park has been cleared for timber and planted to maize and sweet potato. About 2 hectares of forest on the site serves as a burial ground for the local community and contains several sacred tombs of potential archeological significance. The region receives 800 - 1000 millimeters of rain per year, with a dry season typically from June through August. Population density in the vicinity of Vipepeo National Park averages 250 per km^2 and the population growth rate is about 3.2% per year. Soil fertility and agricultural productivity have declined steadily over the last two decades. Per capita income averages approximately US $ 110/year and appears to be stagnant or falling. The deforestation rate in the region is about 3% per year. The nearest town, Ukungu, has a population of approximately 30,000 and is 40 kilometers from Vipepeo. The road providing access to the Park from Ukungu was once paved, but the pavement has deteriorated to such an extent that little pavement remains; because of large potholes and the bad condition of the road overall the average traveling speed is approximately 25km per hour. Drainage structures have not been maintained and in the rainy season the road is slippery and prone to landslides.

The Park Agency has no legal control of lands outside the boundaries of the park. Lands within and surrounding the communities in the buffer or peripheral zone of the Park are in some cases state land and in other cases held through traditional tenure, controlled by the head of each village. In a few cases, those with customary or traditional rights to land have "sold" their interests to persons or groups from outside the communities. Neither the regional nor local governments have exercised any control on land use, such as zoning, in the area adjacent to the Park. USAID has urged the development of a Master Plan for the Park that would include zoning and land use controls for the area adjacent to the park, including towns in the vicinity such as Ukungu.

The proposed campground site lies in a rain forest strip along the banks of Mvua Baridi River. Mvua Baridi is perennial and is the main source for Samawi Lake, a volcanic crater lake, important commercially for fish and crayfish. Vipepeo National Park has been designated a world heritage site because of its population of the endangered "*Fortrani*" chimpanzees, renowned for their basic binary computational skills and the endemic, Red Book listed snake, the Blue-eyed Boomslang. Professional opinion on the Park's maximum tourism carrying capacity varies, but is considered to be fewer than 100 persons per day. Some professionals have determined that the capacity is 48 persons per day in the dry season and 24 persons per day in the wet season. The Park Agency has determined that the entrance fee to the park is $200 per day for the right to visit the area where one can view the chimpanzees, with lesser fees yet to be determined for other types of use.

Proposed Activity

KampiaVipepeo Community Association (KAVICA) is proposing to NAKPAT that the Trust provide support to establish the campground. KAVICA consists of a small group (related by blood or marriage) of interested members residing in the community adjacent to Vipepeo National Park.

KAVICA proposes that the profits made from the tourists will be used to build schools, new wells and waterpoints, a health care center, and new roads. KAVICA expects creation of the campground to encourage the communities in the buffer zone to appreciate and value the Park more highly. In turn, as a result of gaining income from Park tourists, communities are expected to have greater interest in helping protect the Park from poachers. NAPKPAT seeks to foster joint community/Park authority co-management of Vipepeo National Park and buffer zone natural resources.

The campground, as proposed by KAVICA, would consist of 20 surplus Army tents left over from the Desert Storm war. Tents will be on raised wooden platforms and poles, with new mabati (tin) roofs over them to protect them from sun and rain. A generator will supply electric light and refrigeration to the campground; it will be placed far enough from the campground to minimize noise that could be heard by campground residents.

The site will be graded, to level areas on hillsides for tents and roads. Land will be cleared and cleared trees sold to help pay for clearing. The kitchen, storeroom and dining room/meeting room will be constructed of concrete block to keep out rats.

Tents will have outdoor showers and shallow (because of the difficulties of digging deeply in the soils of the area) pit latrines nearby. All will be close to the river to allow tourists to view the water and animals coming down to the river to drink. There will be an outdoor dining area, with a nightly bonfire for tourists. All rubbish will be burnt each evening, to prevent wild animals and rats from digging it up and consuming it.

Fees will be U.S. $3 per person/night (including breakfast).

NAKPAT's ROLE

NAKPAT has received the community campground proposal and is evaluating it for possible funding. NAKPAT is also aware that other groups are interested in developing tourism near the Park. For example, Texas International Hotels, Inc. (TIHI) has indicated that it is interested in developing a luxury lodge on the proposed campground site. The World Alliance of Trophy Hunters (WEALTH) believes that the Park agency should grant a trophy hunting concession and that neither a campground nor a luxury lodge is needed, because trophy hunters would stay in the Park in portable tents that would be moved as appropriate. NAKPAT and its board members have close links with many prominent NGOs who are supported by hotel and safari enterprises and other large, international companies.

NAKPAT is seeking to obtain a comprehensive and objective understanding of the community campground proposal and to learn more about the privately proposed and supported alternatives, before it determines if it should provide funding to support the community campground. NAKPAT must also submit an environmental review for any grant supported by USAID funds; indeed, NAKPAT has determined that these reviews are extremely valuable in improving the sustainability of activities and requires environmental reviews for all of its grants, regardless of the source of funds. NAKPAT has a long-standing policy of soliciting views and information about the proposed activity and the environment (physical, social, biological, cultural) from all concerned stakeholders prior to making decisions about grants that may be controversial.

- TIHI has obtained permit for airstrip
- M3 woman was seen coming out of a motel

Vipepeo Community Campground Association

Illustrative Stakeholders/Interests to be Represented (including Environmental Concerns):

This is a large and extended family has approximately 10-15 people with campground interests. Meet the following and expand upon their reasons for wanting the campground. Imagine the other members who are not described and think about their views. Do any of them disagree with the views below, perhaps?

- Our Family First (OFF), Mr. Yacobo Kifaru - Entrepreneur and former District Council Chairman. President of Kampia Vipepeo Community Association (KAVICA): This proposal from KAVICA will be good for the environment and for our community also. The money made from the tourists will be used to build schools, new wells and waterpoints, a health care center, and new roads. It will help the people of our community know the value of the Park, which even up til now they do not see. Therefore, the community will want to help protect the Park from poachers, and will be friendly to the Park Wardens. This can only bring good to everyone.

- Mr. Alfred Kifaru - Import/Export Dealer (Also Yacobo Kifaru's brother): I can say that the campground will be very modern and beautiful, with 20 imported tents remaining from the Desert Storm war, and new mabati (tin) roofs over them to protect them from too much sun and rain. At night there will be even electric light for the tourists, from a generator that will be kept far from the camp so it makes only little noise. This generator will also make it possible to store meats and sodas in a refrigerator and freezer, so that good foods will be attracting tourists to stay at the Campground.

laintain emaining forest "ontrani chimps

- Mr. Robert Tumbo - Builder (Husband of Merry Kifaru, Yacobo's youngest sister): We will only do small grading of the site, to make level areas on the hillsides for tents and roads. Land clearing will be only a little, and the trees will be sold to help pay for clearing. There shall be no problem. Each tent shall be on raised wooden platforms and poles beneath a mabati shelter. The kitchen, storeroom and dining room/meeting room shall be constructed of concrete block to keep out rats.

- Mrs. Lala Kubwa (Eldest sister of Yacobo Kifaru and Treasurer of KAVICA): The tents will have outdoor showers and modern pit latrines nearby. All will be close to the river so the tourists can see the animals drinking. Also, the women who work at the Campground will benefit from this because they will not have to walk far for water for washing beddings and clothings.

- Mrs. Kibiriti Moto (cousin of Alfred and Yacobo Kifaru): We shall have a very nice outdoor dining area, with a big bonfire for the tourists every night where they can enjoy themselves with eating and talking. Every morning the women will sweep the campground. It shall be so clean. All our rubbish will be burnt each evening, so that wild animals and rats will not dig it up and eat it.

Important Note for Environmental Review Example

The environmental review attached here is **illustrative only**. The review analyzes the impacts of a lodge alternative, not the campground, originally proposed. Does this mean that there is a right answer to the roleplay or that a lodge is an environmentally preferable alternative? The answers are no.

The writers of the environmental review assumed that, on economic grounds, the campground would not attract the clientele that could afford the park fees. Thus, the decision, as frequently happens, was not made on the basis of environmental criteria, although environmental factors were clearly considered in the design, construction and operation of the chosen alternative.

Environmental reviews could have been prepared for the various alternatives, e.g. campground, trophy hunting, or some other tourist facility different from the lodge described in the attached review. Clearly the campground would have had less environmental impact than the lodge. But the question you might ask yourself is: are the impacts of the lodge so serious that it should not be constructed? Other alternatives might have been considered or analyzed, such as locating a tourist facility further away from the Park or putting a more major facility in the nearest large town and sending tourists to the Park on a bus. If the no action alternative had been selected, there would be no environmental review.

Format suggested by screening form

KAVICA Environmental Review
for
Kampia Vipepeo Community Association Campground & Lodge

(Prepared for NAKPAT & USAID/Nakabanda - October 1999)

1. Background, Rationale, and Outputs/Results Expected

This planned activity, in the amount of U.S. $100,000 in USAID assistance, is proposed to the Nakabanda Protected Area Trust (NAKPAT) to provide for site preparation, construction and purchase of equipment and materials for a community campground/lodge in the vicinity of Vipepeo National Park. The proposed campground/lodge has been planned in consultation with Nakabanda Parks and Protect Areas (NAKAPAPA) to attract a class of tourist willing to pay a Park fee of $200/day to view the Vipepeo National Park's endangered *Fortrani* chimpanzees and the rare endemic snake, the Blue-eyed Boomslang. The campground/lodge is meant to provide direct benefits to the communities neighboring the Park through employment and revenue generation (See 2. below) together with other multiple use strategies for use of resources in peripheral areas of the Park. One intent of this activity is to help reduce lingering hostility of communities, which has resulted from the Park Authority's eviction of farmers from the Park in 1952 and the adoption of a policy that has ignored the interests of community members from 1952 to 1990.

2. Activity Description

The proposed site is on 10 hectares of public land bordering the National Park. The entrance to the proposed campground is about 200 meters from the North Gate (See map).

The Community-Based Organization (CBO) proposing to Nakabanda Protected Area Trust (NAKPAT) is known as the Kampia Vipepeo Community Association (KAVICA). KAVICA has been reconstituted from its original form (one representing related family members only) and now consists of an elected Board of Directors from the KAVICA Community. This new association was created after several open community forums and stakeholder meetings, initiated after the first KAVICA stakeholder consultation organized by NAKPAT.

The campground/lodge activity has also been altered based on additional information the results of the stakeholder consultations and now will consist of:

- Twenty-four (24) 5m x 6m tents on concrete slab, together with attached toilet and shower area also on slab. Total slab area: 5m x 11m.
- Dining room/meeting room/bar area on concrete slab. Area: 7m x 13m'.
- Outdoor dining area on dirt with reed fenced enclosure. Circular area with radius of 5m.
- Kitchen on concrete slab. Area: 7m x 10m.
- Reception/Office on concrete slab with attached men and women's toilets also on slab. Area: 5m x 12m.
- Manager's house, 2 bedrooms, sitting room, dining room kitchen, toilet and bath/showers. All on concrete slab. Area: 10m x 23m.
- Maintenance building/garage on concrete slab, including outdoor slab area for fueling vehicles from fuel drums. Area: 10m x 13m.
- Single lane gravel road to site and office reception area. Gravel parking lot 50 meters from office/reception area. Proposed lot is designed to hold up to 30 cars. Gravel road also passes around site to garage/maintenance building.
- Interpretative trail development in consultation with University of Nakabanda ecologist.
- Fuelwood to be purchased from small farmers practicing agroforestry, or private woodlot owners, for outdoor eating/meeting area and kitchen.
- Solid waste pit. Area: 5m x 10m.
- Tents, manager's house, and dining area will have wooden floors over concrete slab.
- Tent showers are open air with reed enclosures for privacy.
- Paths and trails are to be gravel only. Slate path from reception/office to dining/meeting area.

- All structures with thatch roofing (with water-proof inner polyethylene layer). Tents with be beneath thatch sheds for protection against sun. Walls of main structures will be natural materials (wood, bamboo or reed).
- All staff, except for manager and family live off-site.

Equipment:

- Piped water from covered well with photovoltaic pump to raised storage tank. Hot water provided from central boiler with solar water heater and bottled gas backup.
- All flush toilets with septic tanks and leach fields.
- Vanities, sinks, toilets, shower systems.
- Photovoltaics and lighting systems from U.S.
- Photovoltaic pumping system from U.S.
- Solar water heating system.
- Iron stoves from Nakabanda Stoveworks in Maua Mzuri.
- Manager's house kitchen will use stove with bottled gas.
- Main kitchen will have iron wood-burning stoves.
- Photovoltaic systems to provide radio communication for office & manager's house, evening lighting in tents and meeting/dining area. Refrigeration and ice production from bottled gas. Block ice purchased from Barafu Safi in the nearby town of Ukungu.
- 4x4 pickup.
- Minibus
- Fuel storage drums (kept outside maintenance shed/garage).

Site development will require temporary roads to tent sites; tree clearing; digging of septic tank pits and leach fields; drilling, placement and capping of well; laying of piped water system; and excavation of solid waste pit. Cement for concrete slabs will be brought by lorry from Ukungu. Cleared trees will be sawed and used for walls and flooring of lodge buildings. Materials such as thatch, bamboo, reed and any additional timber will be purchased locally from sources that grow such materials; thatch and reed supplies will need to be renewed seasonally.

In conjunction with another USAID and World Bank jointly funded activity, the road to the park will be rehabilitated to permit easier and safer travel. The road will not be paved, but the base will be stabilized and proper drainage structures constructed. Slopes will be stabilized to prevent landslides. The community has formed a road maintenance association that will perform regular maintenance. A village tax on tourists of three percent of campground/lodge accommodation and meal receipts will be utilized to pay for periodic maintenance as well as more major maintenance activities. A separate environmental review will be prepared for the access road to Ukungu.

Alternatives considered included:

(1) KAVICA originally proposed a basic community campground to attract low-budget backpackers. This campground would have included 20 tents on raised wooden platforms and poles, pit latrines, an open area/dining meeting area with dirt floor and thatch roofing, and a concrete block kitchen. Showers were to be adjacent to tents and hot water hand carried in pails from a wood-fired hot water boiler. This alternative was rejected in consultation with Vipepeo National Park planners and ecologists/planners from the University of Nakabanda. A higher paying tourist clientele was targeted, because of the limited tourist carrying capacity of the Park. Attracting backpackers who could not pay the $200/day Park fee to view the *Fortrani* chimpanzees or Blue-eyed Boomslang was not considered a wise Park/Community management strategy. The current proposal would provide a campground/lodge attractive enough to house tourists prepared to pay the Park fees, and expecting a moderate level of accommodation in an attractive natural setting.

(2) Texas International Hotels, Inc. (TIHI) proposed a luxury lodge for the site. TIHI would have provided employment for 20 members from the community, and approximately $100,000 per year to the community in bed levies. Texas International's proposal included an aesthetic layout designed in consultation with naturalist/ecologists

and applying natural materials in construction. Many of the features of the current KAVICA proposal described herein, incorporate TIHI concepts. However, the TIHI proposal was rejected by the community and Nakabanda National Parks, because Texas International could not justify going forward with the project unless they could build a facility large enough to accommodate 100 persons per day (50 beds) with a 60 percent accommodation rate. For ecological reasons Park/University of Nakabanda planners recommended against a lodge of this size. The decision to maintain the $200 per day entry fee and the subsequent permit system restricting the number of tourists visiting Vipepeo Park to a maximum 48 persons/day resulted in a decision by Texas International to withdraw their proposal.

(3) World Environmental Alliance of Trophy Hunters (WEALTH) proposed turning the site into a trophy hunting concession, arguing that fees from controlled trophy hunting in Vipepeo National Park and associated buffer zones would bring far more revenue to the Vipepeo National Park and KAVICA communities. Nakabanda Parks and Protected Areas planners and the Economics Department at the University of Nakabanda agree with this assessment. While trophy hunting might be encouraged in other Nakabanda Parks, it has been rejected by NAKAPAPA because of Vipepeo National Park's status as a world heritage site and its primary and growing attraction to non-consumptive ecotourists who would be distressed to encounter professional and legalized hunting within Vipepeo Park or surrounding buffer zones.

3. Environmental Situation

The site lies at approximately 1350 meters, and consists of rolling terrain below high volcanic hills. The primary vegetation type is disturbed Afro-montane rainforest; approximately 40 per cent of the site and the surrounding area outside the Park has been cleared for timber and planted to maize and potato. About 2 hectares of forest on the site serves as a burial ground for the local community and contains several sacred tombs of potential archeological significance. The region receives 800 - 1000 millimeters of rain per year, with a dry season typically from June through August. Population density in the vicinity of Vipepeo National Park averages 250 per km^2 and the population growth rate is about 3.2% per year. Soil fertility and agricultural productivity have declined steadily over the last two decades. Per capita income averages approximately US $ 110/year and appears to be stagnant or falling. The deforestation rate in the region is about 3% per year. The nearest town, Ukungu, has a population of approximately 30,000 and is 40 kilometers from the proposed KAVICA site. The road providing access to the Park from Ukungu was once paved, but the pavement has deteriorated to such an extent that little pavement remains; because of large potholes and the bad condition of the road overall, the average traveling speed is approximately 25km per hour. Drainage structures have not been maintained and in the rainy season the road is slippery and prone to landslides.

The Park Agency has no legal control of lands outside the boundaries of the park. Lands within and surrounding the communities in the buffer or peripheral zone of the Park are in some cases state land and in other cases held through traditional tenure, controlled by the head of each village. In a few cases, those with customary or traditional rights to land have "sold" their interests to persons or groups from outside the communities. Neither the regional nor local governments have exercised any control on land use, such as zoning, in the area adjacent to the Park. USAID has urged the development of a Master Plan for the Park that would include zoning and land use controls for the area adjacent to the park, including towns in the vicinity, such as Ukungu.

The proposed campground site lies in a rain forest strip along the banks of Mvua Baridi River. Mvua Baridi is perennial and is the main source for Samawi Lake, a volcanic crater lake, important commercially for fish and crayfish. Vipepeo National Park has been designated a world heritage site because of its population of the endangered "*Fortrani*" chimpanzees, renowned for their basic binary computational skills and the endemic, Red Book listed snake, the Blue-eyed Boomslang. Professional opinion on the Park's maximum tourism carrying capacity varies, but is considered to be no more than 48 persons per day in the dry season and 24 in the wet season. The Park Authority has determined that the entrance fee to the park is $200 per day for the right to visit the area where one can view the chimpanzees, with lesser fees yet to be determined for other types of use.

Baseline information includes a pre-construction site survey by a University of Nakabanda ecologist in consultation with a site architect selected by KAVICA and Nakabanda Parks and Protected Area (NAKAPAPA) Authorities. The ecologist conducted species counts of flora and fauna and took baseline transects. Five endemic plant species were

identified that merited special consideration for on-site preservation. An archeologist from the Nakabanda Preservation Society surveyed the tombs and sacred forest and developed a plan for preservation of the tombs and sacred forest on the site, and for community management of tourist visits to these sites.

Water quality was tested in the Mvua Baridi River and found to be free of coliform or other significant pollutants under dry season conditions. The river has a high silt content during much of the year making it unsuitable for drinking without filtration. Hydrological data indicate that groundwater recharge rates are adequate to support a year round pumped extraction rate of 4500 gallons/day (maximum campground/lodge demand - See Section 4.3). Soil and hydrological tests conducted by the University of Nakabanda reveal permeable alluvial sands, requiring special attention to prevent contamination of the Mvua and groundwater from septic tanks and leach fields, and the proposed solid waste pit. Site plans and a description of the rationale for selection of sites for tents and facilities is provided as Annex A. A socio-economic baseline survey and a Knowledge, Attitudes and Practices (KAP) survey was conducted in order to track campground benefits/costs on affected communities and to determine if the campground will have a beneficial effect on community/Park relations.

4. Evaluation of Activities and Issues with Respect to Environmental Impact Potential

The concept of a campground/lodge for no more than 48 tourists/day is consistent with the Nakabanda Regional Tourism plan and the Vipepeo National Park Management Plan. It has also been approved by Nakabanda Parks and Protected Area (NAKAPAPA) authorities. Siting of the campground/lodge was done in consultation with a qualified ecologist/planner and an architect familiar with minimizing impacts on land and environmental resources (See ECODESIGN, Inc. *Site Plan* and maps). Data available from the Ecotourism Society, such as *The Ecolodge Sourcebook for Planners and Developers* (Hawkins *et al.*, 1995) and contained in *Environmental Guidelines for Small-Scale Activities in Africa* (Knausenberger *et al.*, 1996) have been utilized in order to provide a sustainable design that avoids significant, adverse impacts.

Siting of the campground/lodge facilities, as a consequence of the sensitivity and ecological consideration with which site plans were developed (see Annex A) is not expected to have adverse impacts on rare fauna and flora resident in the site area nor on other environmental resources. Inadequate site planning could have led to unacceptable pollution of the Mvua Baridi River and camp drinking and cooking water; however, campground facilities are located at a sufficient distance from the river and with proper design to avoid such effects. Appropriate siting of the solid waste dump will result in no adverse impacts on groundwater and runoff.

4.1 Planning and Design Phase

No adverse environmental impacts are anticipated during the actual planning and design for the campground/lodge. Investigations and studies of ecological resources, water quantity and quality, soils and archeology carried out during site reconnaissance were not invasive and did not require disturbance of vegetation, clearing or the like. All test pits dug for soils and archeological investigations have been backfilled.

Land speculation, to the extent that information is available, has not occurred, but the possibility that local residents may be contemplating "sale" or transfer of land to enterprises cannot be ruled out.

4.2 Construction-Related Impacts

Potential adverse on-site impacts during construction include site clearing of indigenous tree and plant species, noise, dust and potential siltation of the Mvua Baridi. The total area to be cleared is approximately 0.8 hectares. As specified in Section 5 below, mitigative measures will be undertaken to reduce these short-term impacts and provide for long-term landscape maintenance.

Increased truck traffic, carrying equipment, fuel, other supplies, and construction materials will travel the principal access route from Ukungu. Estimated additional traffic is three lorries per day for a period of two months during peak construction and an average of one additional lorry per day for an additional two months.

Hydrological information indicates that a sufficient volume of water will be available from the river to prepare the needed quantities of concrete. Sand, present on site along the banks of the river, will be excavated for construction., in locations where bank erosion is not present. Gravel for use in concrete making and for the site roads and paths will be trucked in from an off-site quarry, approximately 5 km from the campground/lodge site.

Short-term employment will be generated as a result of the construction operations. The contractor and supervisory staff will number approximately three, who will reside in tents during the construction period. Temporary pit latrines will be dug to provide sanitary facilities during the construction period. Approximately 5 to 10 unskilled and semi-skilled laborers per day will be employed from the population in the surrounding communities for a period of four months. Thus, no construction camp will be needed and no adverse impacts typically associated with construction camps, such as disease transmission, sanitation problems, poaching, wood consumption or social effects are anticipated.

The source of fuel during the construction period will be purchased fuelwood for cooking and diesel fuel for operation of a concrete mixer.

4.3 Impacts of Campground/Lodge Operation

During operation, key concerns are the (1) quantity of water supply and potential for pollution of Mvua Baridi from sewage, shower and kitchen water, and clothes washing; (2) potential contamination of well water from the above; (3) downstream alteration in water quality, affecting communities on the river as well as juvenile fish and crayfish populations in Lake Samawi and the livelihood of Lake Samawi fishermen and Lake Samawi communities; (4) potential water pollution and disease vector transmission from solid waste disposal; (5) noise from camp operation; (6) threats to indigenous flora and fauna on site; (7) non-renewable energy sources versus use of wood, the extraction of which could become unsustainable; (8) potential site contamination with fuel and fuel byproducts; (9) potential for degradation of archeologically and historically important tombs and the community's burial ground/sacred forest; and (10) need to maintain architectural and landscape aesthetics to retain site appeal for tourists.

The volume of water utilized on a daily basis, assuming maximum occupancy of the camp and use of water by resident manager and staff, is estimated to be 70 gallons/person/day including laundry, cleaning and food preparation or a maximum campground/lodge demand of 4500 gallons/day. Washing will be done in concrete basins/tubs off the kitchen area, using pumped well-water. Runoff will be directed into the kitchen leach field. Water used in connection with laundry and catering will be re-utilized to the maximum extent practicable to maintain landscaping. The well for pumped water will be have a concrete cap to prevent contamination.

Tent sites, flush toilets and showers are more than 50 meters from the river. Human waste will be disposed of in septic tanks and leach fields are designed to drain away from the Mvua Baridi River, thereby minimizing downstream pollution effects. Septic tanks will also be checked every six months and emptied annually by Ukunga Gardens, Inc. or sealed as required. As indicated in Section 5, a water quality monitoring program to ensure that juvenile fish and crayfish population can be maintained downstream will be instituted.

The solid waste pit will be 100 meters from the river and from the campground. Solid waste will be disposed of and covered daily to sufficient depth to prevent rodents and wild animals from feeding on rubbish. The pit will have an estimated life of five years, after which it will be permanently covered and a new adjacent site opened. As indicated in Section 5, a waste management plan incorporating recycling and limitation on use of packaged materials as well as investigation into composting of garbage will be undertaken. No burning of refuse or garbage will be permitted.

Noise from camp operation will be minimized through (1) application of photovoltaics (in lieu of a generator) to provide electricity for radio communication, lighting and water pumping, and (2) use of bottled gas for refrigeration combined with purchase of ice blocks in the nearby town of Ukungu.

Indigenous, endemic flora and fauna will be protected under the University of Nakabanda's ecological component of the site management plan. The campground/lodge operator will provide to visitors information on both on-site and off-site flora and fauna with instructions regarding identification and need for respect and protection.

In order to minimize both the use of non-renewable energy sources and dependency on fuelwood, a combined strategy for energy supply has been adopted -- use of solar water heaters with bottled gas back-up to eliminate dependency on wood for water heating, solar -powered lighting, solar-powered pump, fuel efficient iron woodstoves in the lodge kitchen and a bottled gas stove for the manager's house kitchen. As noted in Section 5, sustainable wood production will be encouraged.

Fueling and maintenance of vehicles will be done over aluminum catch pans resting on a concrete slab. Oil and petrol wastes will be stored with appropriate labeling and then transported in sealed drums where they will be disposed of at Ukungu Hazardous Waste, Inc. , the only Government approved site in the region (established and sponsored under a grant from the Netherlands).

An archeological management plan developed by the Nakabanda Preservation Society will be followed to protect the on-site tombs and sacred forest resources, while also allowing community-controlled access to these sites for tourists.

The use of indigenous materials in the construction of facilities, particularly thatch, bamboo and reed, will need to be maintained and replenished in order to maintain the structures and their appeal to visitors. As indicated in Section 5, sustainable production will be fostered. The operator will maintain landscaping, following the precepts laid out in the ecological component of the site plan. In utilizing indigenous plants for landscaping, emphasis will be placed on maintaining or creating plant communities rather than use of specimens or formal plantings.

Positive economic benefits will result from operation of the community campground/lodge. In addition to the manager and his family (accounting for three-full time jobs), fifteen additional full-time jobs will be created for a maintenance personnel, security guards, gardener and groundskeeper, maids and cleaning services, cooks, waiters and kitchen help. Employees will be sought from the local community. Additional laborers will be engaged on a period basis to maintain buildings, tent sites, gravel paths and roads.

4.4 Induced and Indirect Impacts

Key positive impacts are anticipated from increased community/Park authority cooperation, reduced stress on the agricultural resource base through increased off-farm income, and enhanced co-management of the environment/natural resource base in the buffer zone surrounding the Park.

As a result of the campground/lodge (assuming it is successful) and the future rehabilitation of the access road from Ukungu, park planners and managers should anticipate induced tourism demand at Vipepeo National Park. Although plans for the community campground/lodge limit accommodation to no more than 48 tourists at one time, and thus limit indirect negative effects on Vipepeo National Park (with its permit quota system of 48 persons per day), pressure to build additional lodging is probable. Indeed, given that tourists might spend a first day arriving within the campground before visiting the park and a third day visiting in the area before departing, the argument could be made that three times as many tourists could be accommodated in tourist facilities outside the park. Induced demand for additional tourist lodging can be attributed only in part to the development of the community campground/lodge itself. This demand will largely be a result of the improved access to the Park and the increased demand for eco-tourism in general. Nevertheless, the presence of the campground/lodge will attract other entrepreneurs to develop snack-bars, craft shops and other types of development.

Over the longer term, community benefits from the campground/lodge and the future of Vipepeo National Park are threatened by a demographic growth rate that will result in a doubling of the population in KAVICA region within 20 years. Cumulative effects on an already stressed regional natural resource base will occur, unless measures are implemented to reduce population growth, promote sustainable resource use and control development.

4.5 Impacts of Decommissioning or Abandonment

While there is no reason to presume that the facility would need to be de-commissioned or abandoned in the future, assuming proper maintenance, the result of needing to abandon or remove the facility are considered to be minor. The

facility remnants would not create any long term threat to the environment; concrete slabs could be broken up and disposed of and the septic tanks and leachate fields could be filled, if warranted.

5. Environmental Mitigation Actions (including monitoring and evaluation)

5.1 Construction

Prior to site development, trees that must be cleared will be tagged; all others will be designated for preservation. Construction impacts will be minimized by accomplishing site grading, excavation and building during the dry season; careful siting of the construction road to avoid cutting of old growth rainforest; and transport of materials by wheelbarrow or cart wherever feasible. Interior site roads will have drainage channels. They will also be watered and surfaced with gravel to minimize dust. Use of gravel road surfacing will also reduce soil erosion and potential downstream siltation. Upon completion of construction, stumps will be removed, all exotic plant species will be removed and disturbed areas replanted with indigenous vegetation. The bids and specifications (tender) for the contractor will include these requirements as well as the requirement to develop a plan to control soil erosion and siltation and to utilize, as appropriate, siltation fences, straw or hay bales and the like to minimize effects of construction activities on water quality of the Mvua Baridi River.

Although construction-related noise will be generated, no noise control mitigation plan will be needed, because of the distance of the site from sensitive receptors (schools, churches and houses). Consultant ecologists have determined that the anticipated noise levels will not disturb indigenous wildlife, which are either not likely to be disturbed by the noise, not likely to be found resident or breeding near the site or will retreat further into the forest. When heavy machinery is utilized, workers will be provided with sound-attenuating protective gear.

The quarry site from which gravel will be extracted for the site access roads and paths will be limited in extent and depth so as not to disturb the water table and no drilling or blasting will be required. The contractor will be required to fill the excavation, restore site topography to the extent feasible and replant indigenous vegetation. Although the community indicated some interest in utilizing the quarry as a livestock watering point, this use was determined to be inappropriate and likely to engender adverse impacts on ecological resources in the vicinity of the quarry.

Temporary measures to fill holes and limited regrading of the principal access road from Ukungu will be needed in order to permit lorries to bring in materials and equipment. This work shall be coordinated in conjunction with the planned USAID/World Bank rehabilitation of the road; full-scale rehabilitation will occur after the principal haul activities for the campground/lodge are completed.

An independent inspector will monitor the contractor's construction activities, completed construction and restorations. The contract will include penalties for failure to perform mitigative measures as specified.

5. 2 Operations

Sustainable operation of the campground/lodge will need to rely on the implementation of on-going mitigative measures in the form of plans to manage extraction and use of material sources (such as wood and other materials) and the disposal, recycling or recovery of wastes. The following mitigative measures will be implemented and evaluated. Additional measures will be considered based on the results of these evaluations.

- Management and staff will be trained in water conservation practices and guests will be asked to participate in conserving water by using towels and sheets for several uses.

- A solid waste management plan will be developed to limit use of packaged materials for consumables, recycle containers, and reduce litter in order to minimize the volume of waste that will be disposed of in the solid waste pit. The campground/lodge management will work with CCNRM volunteers who are performing ongoing investigations into composting of biodegradable waste in connection with agro-forestry and farming activities.

- Although impacts of runoff, particularly during the rainy season, are controlled largely because of the site design and layout have taken into account ways to minimize these effects, a soil erosion and sediment control plan with instructions and recommendations for dealing with heavy precipitation events will be implemented.

- Impacts on forests and other vegetation, such as reeds, bamboo and sources of thatch, will be mitigated through (1) creation of an agroforestry fund from campground/lodge revenues to establish a local agroforestry/seed nursery and seed distribution center, and to provide small subsidies for tree seed and seedlings; (2) purchase of fuelwood and building materials from farmers practicing agroforestry or operating private woodlots in the vicinity of the camp; and (3) increased support for community co-management of Park forest resources including employment of community forest guards.

Monitoring and evaluation activities have been designed to identify selected, but potentially significant impacts that design and operational controls may not have avoided or minimized and the effectiveness of mitigative measures -- both those incorporated within the design and those that are ongoing management practices. Environmental monitoring will consist of re-checking transects and carrying out species counts every two years under the direction of the University of Nakabanda's Environmental Resource Centre to determine changes in plant and wildlife composition. River water and well-water quality will be tested by the camp manager every six months at selected sampling locations upstream, at the campground and downstream. The volume of waste generated and volumes placed in the disposal pit will be measured one day per month (coinciding with a peak capacity day over the period of operation). Vipepeo National Park Authority shall participate in an annual review of the campground/lodges impact on the Park and KAVICA communities, with the minutes of this meeting available to NAKAPAPA and the general public.

5.3 Indirect and Induced Impacts

Indirect and induced impacts as a result of the lodge and associated other tourist development will be difficult to control., unless a new approach to land use planning and development is adopted for the environs of the park. Cumulative effects of increased tourism and related development combined with the current rate of population growth in the area pose the most significant threats not only to the environment but to the quality of life of current and future generations.

The USAID-financed Park Masterplan, which includes a strategy for land use controls on tourist and non-traditional development outside the park, will examine the potential for growth in tourism at the Park as well as the appropriate zoning or other controls that can be used to limit development of facilities for tourists within acceptable limits. NAKPAT will work at the policy level to facilitate and encourage the implementation of strategies for controlled development.

Three percent of lodge revenues will be applied to the Vipepeo Family Planning Initiative, a separate donor supported activity in the Vipepeo region in recognition of the need to control population growth and increased pressure on fragile ecological resources.

Socio-economic and KAP surveys will be repeated every two years to determine the degree of community benefit from the campground/lodge and changes in community/Park authority relationships. These surveys will also help measure the effectiveness of agroforestry and family planning initiatives.

6. Other Information

Topographic Maps of Vipepeo National Park and environs. Department of Maps and Surveys
KAVICA Architectural Site Plan, ECODESIGN, Inc, October 1996.
Ecological Survey of Proposed KAVICA Community Campground/Lodge (including species counts and transects), University of Nakabanda Environmental Resource Center, August 1997.
Socio-economic Baseline Survey of Vipepeo National Park Buffer Zone Communities, University of Nakabanda Centre for Social Science Research (NCSSR), August 1997.
Vipepeo Buffer Zone Knowledge, Attitudes and Practices Survey, SECONSULT, July 1997.

Archeological/Cultural Site Plan for Kampia Vipepeo Community Association (KAVICA) Campground/Lodge, Nakabanda Cultural Society, June 1997.
Vipepeo Regional Tourism and Development Plan, October 1996.
Vipepeo National Park Management Plan (October, 1996)

Module 13

13. Environmental Mitigation and Monitoring

Description/Objectives

This session introduces you to mitigation and monitoring concepts needed in preparation for the field trip, including (i) basic terminology and the value of environmental mitigation and monitoring; (ii) the importance of developing mitigation and monitoring plans in the design process; and (iii) the kinds of information you will need in order to develop field trip case study mitigation and monitoring plans.

This module then goes into more detail, introducing participants to the concepts of mitigation, monitoring and evaluation. It defines the underlying reasons for mitigation, and the methods and steps to be followed. The development of a plan for environmental mitigation and monitoring is a tool to identify beneficial and adverse effects of known activities on the environment and natural resources. It is used to suggest and implement mitigation measures for adverse impacts, and to foster positive environment/natural resources management, so that sustainable development is promoted. The results of the plan can also be used by farmers, NGOs and government agents, for learning, problem-solving and decision-making in natural resources management.

The objectives of this module are: (i) to review problems and issues involved in mitigation and monitoring (including the issues of establishing controls and baseline, indicators, sample size and reliability, etc.); and (ii) to expose participants to the techniques used for mitigation and monitoring, including tips for minimizing the technical, financial and human resource requirements for effective mitigation, monitoring and evaluation. Topics to be covered under this module include:

- the concept of mitigation, monitoring and evaluation;
- the purpose of mitigation, monitoring and evaluation of programs, sectors, projects and umbrella projects;
- design of a plan for mitigation and monitoring;
- implementation of the plan;
- use of mitigation and monitoring results;
- mitigation of adverse environmental impacts;
- institutional responsibilities for environmental mitigation, monitoring and evaluation;
- the concept of program or multi-project environmental, monitoring, evaluation and mitigation plans (EMEMPS).

Working Groups

A session on Day 4 of the course also provides you with hands-on exposure to the design of activity, project or program plans for mitigation and monitoring. Participants will use the material produced as part of the field environmental review drafting exercise, especially the recommendations, and any other relevent material, to produce a sketch of a project plan for mitigation and monitoring. Workgroup draft plans will be summarized by rapporteurs in general session 5-10 minute presentations on flip chart paper. In preparing your mitigation and monitoring plan(s) you will be asked to:

Mitigation

- Select three to five most critical impacts that need to be mitigated. If you have extra time, you can do more.
- If you wish, use the "Mitigation Strategy by Activity Phase" format found in Annex 5 of this module, to organize and present your recommendations.
- How costly are the mitigative measures relative to project cost? If they are more than say, ten percent of the cost, you should perhaps recommend re-design.
- Who would be responsible for design, implementation and monitoring of the effectiveness of the proposed mitigative measures?

Monitoring

- Select three or four priority impacts/issues to be monitored and the indicator to be used (In all likelihood there may be many more possible indicators, but because of the time constraints for the workgroups we ask that you concentrate on only three or four);
- Indicate why you have chosen these indicators;
- Indicate whether comparisons will be to baseline situations, to control situations, or both;
- Explain who will be responsible for monitoring;
- Explain how often monitoring will be done (frequency);
- Include cost considerations for each indicator;
- State how the results will be used and what analysis will need to be done;
- Describe who the results will be shared with.

Readings

The Module Backgrounder.

Bingham, Charlotte S., *Role of Monitoring and Auditing in EIA*. 27 June-10 July 1993, CEMP 14th International Seminar on Environmental Assessment and Management, University of Aberdeen, 21 pp., plus one appendix

Chapter 4: 'Monitoring and Evaluation', *Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Humanitarian and Development Activities,* USAID, AFR/SD/PSGE, 1996.

Module 13: Annex 1 - Excerpts from 'Indicative List of Factors to be Monitored,' *Volume II Sectoral Guidelines World Bank Environmental Assessment SourceBook,* Electronic Version (1991).

Annex 2 - "Example of an NRM Project Monitoring and Evaluation Plan Outline - Guinea Natural Resources Management Project Monitoring and Evaluation Plan"

Annex 3 - "Excerpts from the electronic copy of *The World Bank Environmental Assessment Sourcebook* on mitigation"

Annex 4 - Selected Mitigation tables from the World Bank *Environmental Assessment Sourcebook*, Volume 2 (1991).

Form

Annex 5 - Mitigation Strategy by Activity Phase

MODULE BACKGROUNDER
Environmental Monitoring, Evaluation and Mitigation

1. Environmental Monitoring and Evaluation

1.1. Introduction

The process of environmentally sound project development does not stop when project or program environmental effects have been identified or decisions have been reached. After an environmental assessment is performed, an environmental monitoring plan may be designed and followed, and mitigation measures devised and implemented. Steps in the process, from initiating the environmental assessment through monitoring and mitigation are (or include):[1]

- Define action
- Predict impacts
- Identify and define major impacts and possible mitigation measures
- Obtain participation of agencies and affected parties
- Identify authority for controlling or mitigating impacts
- Design an environmental monitoring plan (either during the EIA process or thereafter);
    - Define monitoring objectives
    - Determine data requirements
    - Review the relationship of data requirements to monitoring objectives
    - Determine data availability
    - Conduct feasibility evaluation
    - Define monitoring system
- Implement the environmental monitoring plan
    - Collect data
    - Analyze data
    - Evaluate impacts
    - Response by responsible agencies or parties
    - Document changes
    - Refine mitigation strategies
- Implement effective mitigation measures

The Bingham reading accompanying this module: *Role of Monitoring and Auditing in EIA (July, 1993)* includes tables (Marcus, 1979) which provide greater detail on each of these steps.

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[1] Adapted from Marcus, L.G., "A Methodology for Post-EIS (Environmental Impact Statement) Monitoring," Geological Survey Circular 782, U.S. Geological Survey, Washington, D.C., Tables 8 and 9 , and Plates 1 and 2.

1.2. Terminology

1.2.1. Monitoring[2]

Environmental monitoring is defined as "an activity undertaken to provide specific information on the characteristics and functioning of environmental and social variables in space and time" (Bisset and Tomlinson (1988). It may include the systematic collection of data through repetitive measurements (Davies, 1989) or be thought of as a process of continuous assessment (Carley, 1986).

1.2.2. Evaluation

Typically, the objective of evaluation is to determine the extent to which projects are meeting intended goals and objectives. Environmental evaluation refers to the "generic process of analysis and interpretation and incorporates monitoring, surveillance and audit programmes...it involves making subjective, policy-oriented judgements about the effectiveness of EIA procedures and results" (Sadler, 1988).

1.2.3. Indicators

Environmental indicators are measurements or signals of environmental status or change. For example an organism or ecological community whose presence signals the presence of specific environmental conditions.

1.2.4. Baseline Information

Baseline data collection is defined as the "measurement of environmental parameters during a representative pre-project period for the purpose of determining the nature and ranges of natural variation and to establish, where appropriate, the nature of change" (Davies, 1989). In some instances, the establishment of baseline data may require that data survey work be expanded, refined or extended through seasons or years in order to establish reliable environmental information over time. Measuring changes in environmental conditions or progress toward sustainable development can only be done effectively if an adequate and reliable set of baseline data have been acquired. In general, data must be specific, as well as systematically and repetitively collected and organized to achieve some purpose. Unfortunately, often in the rush to meet funding obligation deadlines, programs and projects may be designed and implemented with inadequate baseline information. As a result, many environmental assessments are carried out and interventions implemented with insufficient commitments of time and resources for collection and analysis of baseline data.

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[2] Substantial portions of the text that follows (except where otherwise noted) are taken from Bingham, Charlotte, "*Role of Monitoring and Auditing in EIA*", CEMP 14th International Seminar on Environmental Assessment and Management, 27 June - 10 July 1993, University of Aberdeen.

1.3. Why Monitor the Environment?

Integrating monitoring activities in project design and implementation is not intended to prevent use of natural resources, but rather to promote their sustainable utilization.

Hecht et. al., 1991 emphasize that:

"Before any data collection effort begins, it is essential to understand thoroughly what questions we are trying to answer, what difference the answer will make, and therefore what kind of information we will need to gather." There is no single approach to monitoring. "Anyone who makes decisions needs information; the exact decisions will determine what information will be of value and the form which monitoring should take. Thus, we cannot begin a discussion of monitoring by asking what data to collect or what indicators to follow. Rather, we must begin...by asking what questions we need to answer, and only then can we consider what data or indicators might provide those answers. Monitoring can be an extremely expensive and time-consuming activity; therefore it is essential that we consider what we hope to get out of it before we require anyone to do it."

There are several generic forms of monitoring, the purposes of which overlap:

Tracking: Monitoring to determine if activities are on schedule and to identify any unanticipated constraints or issues. Often tracking is internal to a project or program and carried out by the managers and/or affected parties. However, when tracking is used as a form of oversight or control, or an activity is politically sensitive, it is often desirable to use outside expertise, both to maintain objectivity and additional checks and balances over decision-making.

Impact or Effects Monitoring: Monitoring to assess impacts on target or non-target populations in order to determine whether interventions are having desired outcomes or whether they are creating other unanticipated negative (or positive) effects. This type of monitoring may be particularly important whenever there are uncertainties about possible future environmental impacts, including activities which are expected to have beneficial impacts, or where measures may be needed to mitigate possible negative effects.

The functions of impacts/effects monitoring include:

documenting the accuracy and/or adequacy of predicted effects;

providing a foundation for examining theories of causes and for finding explanations which (when supported by sufficient data accuracy/adequacy) can be used to improve decision-making and policy (see also ***research monitoring*** and ***problem identification monitoring*** below);

providing warning flags to concerned parties (communities, agencies, politicians, etc.) of unanticipated problems or altered conditions and trends, or the approach of critical threshold levels for environmental indicators;

serving as the information base and feedback system for decision-making regarding impact control and management.

Research Monitoring: Often interventions may initially be in the form of limited projects or programs to test a development hypothesis or model. Research monitoring helps determine whether hypotheses are correct; to identify reasons for failure; to help identify alternatives and additional opportunities; and to provide lessons from experience which may then be used to refine more effective approaches. For example, efforts to development community-based irrigation or agroforestry management may require that results and environmental impacts be followed closely to ensure that activities are actually leading to sustainable natural resource management, and to suggest more effective approaches.

Mitigation Monitoring: Monitoring to determine the suitability and effectiveness of mitigation plans or programs which are designed to diminish or compensate for adverse environmental effects from implemented activities (For a full definition of mitigation see Section 3.2 below). Mitigation monitoring programs are frequently required for grants prior to their approval, even when an environmental assessment has not been prepared.

Compliance Monitoring: Monitoring whose objective is to ensure that specific conditions or standards are met, e.g. inspection or periodic checks to determine whether levels of pollutant emissions/discharges are within limits specified by permit. This form of monitoring resembles a policing function (See also Section 1.4.1. below).

Monitoring as Postponed Decision-Making: When decisions must be made under conditions of uncertainty (created, for example, by inadequate information, factual or value conflicts, etc.), the monitoring program can serve as a "kind of relational contract where the parties create a structure through which to address problems and make decisions over time" (Rolf, 1986). See the Bingham reading for further detail.

Problem Identification: This type of monitoring is of broader scope and is used to identify the most important issues and constraints requiring additional analysis or interventions. Ecological monitoring by the Sahelian Heads of State, or by the Southern African Development Community's sectoral groups, fall in this category. Efforts to obtain greater understanding of the natural resource base, and of environmental trends in the region and individual countries, are used by Sahelian and SADC officials to prioritize issues and make the case for developing future programs or projects.

Bingham includes in this category ***indices or indicators of environmental quality,*** i.e. the monitoring of environmental change in a broader context. For example, several programs in Canada, the U.S. and OECD countries monitor environmental change at the national level. Indicators of global climate change, alteration in global atmosphere and marine systems fall in this category.

Also, ***baseline data collection*** can be regarded as a form of monitoring. Sadler (1988) and Davies (1989) consider it to be a continuous process which should be refined both during the environmental assessment and as projects and programs are implemented. This form of monitoring helps influence program or project design changes and mid-course corrections, and define appropriate mitigation measures.

More often than not monitoring approaches fall into one or more of these categories with no clear distinction among them, making it difficult to classify a particular monitoring approach as being of any one form. For example, where do the following aspects of monitoring fall:

- measuring and evaluating program/project goals and sub-goals achievement?

- monitoring/assessing economic and social change: e.g. income, quality of life, increase and diversification of export products, etc;

- monitoring/evaluating effects on the environment and natural resource base in order to support sustainable development?

While specific categorization may not be possible, the exercise of trying to do so can be very useful, because it focuses early attention on the rationale for undertaking monitoring activities, and should therefore improve the efficiency and specificity of monitoring plans.

Environmental monitoring is a tool to ensure that activities do not have significant adverse impacts on the environment and/or natural resources. Environmental impacts can be located in the zone of the activity, as well as affect a more extended area, including a country, an entire region, or the global commons.

The integration of monitoring into program and project design/implementation is not intended to prevent use of natural resources, but rather to promote their sustainable utilization.

The IEE or environmental review should include general guidance for long-term program or project environmental monitoring/evaluation. A monitoring plan should use the findings of the baseline data section as the foundation for measurement of progress and unforeseen impacts on a continuous and/or periodic basis. The plan should also include recommended measures needed to collect, manage and analyze data, and to disseminate information generated.

1.4. When is Environmental Monitoring Needed?

For USAID projects, an environmental monitoring plan, like that of the IEE or the EA, should be completed during project design. The monitoring plan should clearly indicate how adverse impacts will be monitored during project implementation. The need for environmental monitoring is more or less based on the severity of expected environmental impacts.

Design of environmental monitoring plans should take into account the types of USAID activities by level of environmental impact significance:

Categorical Exclusion activities. These generally will not require extensive monitoring, evaluation, or mitigation.

Activities with some foreseeable potential adverse impacts on the environment. These could require mitigation measures such as changes in design and implementation, and monitoring to some degree during the life of the activity to make sure that adverse impacts on the environment are minimized.

Activities having the potential for significant negative impacts. These will require: 1) a responsible monitoring program that can be incorporated into the project, and 2) a comprehensive review and a definition of necessary mitigative actions.

Legislation and environmental monitoring

Legal requirements or regulations normally dictate the development of mitigation measures. However, in many African countries, legal requirements do not exist and little monitoring is done. The long term economic returns from environmental monitoring and mitigation are not always recognized and are thus frequently considered an extra burden and expense.

Reg. 16 requires environmental monitoring of USAID programs and projects under paragraph 216.3(a)(8): "to the extent feasible and relevant, projects and programs for which Environmental Impact Statements or Environmental Assessments have been prepared should be designed to include measurement of any changes in environmental quality, positive or negative, during their implementation. This will require recording of baseline data at the start. To the extent that available data permit, originating offices of USAID will formulate systems in collaboration with recipient nations, to monitor such impacts during the life of USAID's involvement. Monitoring implementation of projects, programs and activities **shall take into account environmental impacts to the same extent as other aspects of such projects, programs and activities** [Emphasis added]. If during implementation of any project, program or activity, whether or not an Environmental Assessment or Environmental Impact Statement was originally required, it appears to the Mission Director, or officer responsible for the project, program or activity, that it is having or will have a significant effect on the environment that was not previously studied in an Environmental Assessment or Environmental Impact Statement, the procedures contained in this part shall be followed including, as appropriate, a Threshold Decision, Scoping and an Environmental Assessment or Environmental Impact Statement."

In practice, USAID's Africa Bureau recommends that a monitoring plan and mitigation guidance be provided whenever activities have uncertain forecasted impacts, even for projects, programs or non-project assistance (NPA) which may have been granted a categorical exclusion or negative determination.

Also, monitoring is required in certain other cases, including: "controlled experimentation exclusively for the purpose of research and field evaluation which are confined to small areas and carefully monitored" [216.3(c)(2)(ii)]; and "provisions...for monitoring the use and effectiveness of the pesticide"[216.3(b)(1)(l)].

1.5. Design of an Environmental Monitoring Plan

Environmental monitoring plans differ depending on the severity of project impacts on the environment, and on the kinds of environmental factors that need to be monitored. The design of the plan requires collaboration among all interested parties as well as environmental specialists and **professionals with backgrounds in statistical Monitoring and Evaluation (M&E) design, data collection, processing and analysis.** Design documents should state clearly ***how, and by whom,*** adverse effects on the environment will be mitigated, if, and when, revealed by monitoring activities. Effective monitoring plan development and implementation requires a fully participatory approach, especially in development settings where constraints on financial and technical resources

may require innovative approaches to monitoring involving local communities, farmers, pastoralists, etc. The institution responsible for project implementation will also oversee: 1) monitoring and evaluation of all project activities; and 2) reporting on the environmental monitoring and evaluation plan to the person or institution in charge of the environment (i.e., Ministry of Environment and USAID Mission or Regional Environmental Officer).

1.5.1. What are the environmental factors and indicators to be monitored?

Indicators used for monitoring need to be clearly identified and described during project and monitoring plan design. The monitoring plan identifies and describes the environmental and natural resources parameters to monitor, such as pH, salinity, productivity, etc. It also identifies indicators and proxies to use to measure or estimate changes (presence of plants attached to a specific environment, plants with different tolerances to changes in soil fertility, exotic species, etc.). The selection of parameters to be monitored, as well as associated indicators, depend on the type of project, its activities, and how those activities affect the environment. Examples of indicators for monitoring changes in the environment and natural resources follow.

Table 1. Indicators for Monitoring Changes in the Environment and Natural Resources[3]

INDICATORS	*TYPES OF DATA TO BE COLLECTED*
WATER	
Quantity	*Rainfall amounts, river discharge, ground water depth, aquifer extent, natural storage and drainage parameters.*
Quality	*Chemical, physical and biological characteristics.*
Reliability	*Seasonal, annual, high/low waters. Recharge rates. Availability of substitute resources. Variability of rainfall and climate over time (e.g. lake sedimentation, etc.)*
Accessibility	*Access rights, conflicts.*
SOILS	
Erosion	*Wind and water erosion of arable lands. Gullies? Sheet erosion?*
Productivity	*Soils physical and chemical characteristics. Productivity of agriculture, pasture, forests, etc.*
Land resources and their potential	*Percent of needs satisfied, percent of unsuitable land under production.*
Fallow periods	*Length of fallow period and relation to soil fertility regeneration capacity.*
VEGETATION/FLORA	
Permanent vegetation ratio	*Ratio of permanent vegetation zones versus zones cleared and put under production.*
Composition and density of natural vegetation	*Species composition and density.*
Cleared zones	*Percent tree and shrub cover.*
Productivity	*Productivity (including secondary products).*
Others	*Habitats quality, species diversity, etc. Also: local community access and control over resources.*
FAUNA	
Populations	*Number of species, density.*
Habitat	*Extent (size, surface) and quality*
OTHERS	
Unique zones (special ecosystems)	*Depends on location and zone type. Can be geological, historical, sacred, archeological, or the density, scarcity of species and type, etc.*

[3] Table provided by Idrissa Samba, REDSO/WCA Environmental Advisor

(See also Module 13: Introduction to Environmental Mitigation and Monitoring - Annex 1, *Indicative List of Environmental Factors to be Monitored, Excerpts from Volume II Sectoral Guidelines, World Bank Environmental Assessment SourceBook Electronic version (1991)* and Annex 1 to this module, *Example of an NRM Project Monitoring and Evaluation Plan Outline, Guinea Natural Resources Management Project Monitoring and Evaluation Plan* for additional indicators and types of data to be collected)

1.5.2. What are some of the problems of testing/monitoring in the real world?

Distinguishing normal change or change that would have occurred regardless of project or program interventions is often difficult, especially since biological, physical and human systems vary over both space and time. Bingham (1993) points out that impacts monitoring is not like a classic laboratory experiment, because the possibility of establishing a strict control situation for comparative purposes is usually not possible. In addition to all the biases that may result from poorly designed test models or misuse of statistics, Bingham identifies a host of others which are listed in her paper under Section 5.1.

Efficient monitoring design attempts to eliminate or hold to a minimum these kinds of confounding factors, a not always easy process. Specialized expertise is required, and those embarking on environmental monitoring design are advised to consult approaches from various disciplines, as well as the more general works, e.g., Blalock, or Campbell and Stanley.

Variability can be dealt with in part by selecting a comparative situation, population, etc. which presumably is subjected to the same set of overall non-project (or program) changes, but is not receiving similar project or program related interventions. At the same time, by focusing monitoring on 'representative' situations and model interventions, the financial and human resource requirements for monitoring and evaluation can be more effectively managed without sacrificing comparative results. The key here, however, is to ensure that the sample situations selected are truly "representative"

Often multiple stations or sampling locations are chosen within a target area, as well as in the area selected as the control. Monitoring of change of both the target and control environments and populations prior to the initiation of interventions establishes an initial baseline, but also helps ensure that comparison areas were validly chosen. Useful technical references for ecological monitoring are: Spellerberg (1991) and Cairns (1991).

The special constraints to monitoring of social and economic systems must be recognized. Pre-intervention monitoring is easier for physical and biological systems than for human populations where the anticipation of an intervention can affect perception and behavior, resulting in responses such as land speculation, depletion of resource stocks, or simply resistance to the potential loss of one's land or culture. For more on social impact assessment effects and procedures the reader is referred to Armour (1988) and the 1990 issue of Environmental Impact Assessment Review (10:1/2,

1990).

1.5.3. How to proceed and implement monitoring activities?

An environmental monitoring plan has three major phases: design, implementation, and data analysis/dissemination. Each of these phases requires planned commitments of competent personnel and monitoring equipment as well as allocation of necessary funds and time.

Baseline data should be gathered prior to project or program implementation to serve as a foundation for measuring change. It is recommended that specialists involved in monitoring activities collaborate closely in order to generate the most accurate information possible at least cost.

1.5.4. What level of detail is appropriate for monitoring and data collection? Timing and frequency? How much is too much?

The expense of data collection, processing and analysis grows rapidly with the level of detail. For this reason, it is important early in the design of monitoring plans to establish the ***necessary and sufficient*** level of detail, time and costs involved to achieve monitoring and evaluation purposes. Frequently, analysts overestimate data needs and then gather and attempt to analyze too much data. The amount of time needed for analysis is often grossly underestimated. These problems can be minimized by devoting sufficient thought and effort to selecting the simplest least-cost indicators and methods for measuring change and developing the most efficient monitoring plan necessary for the achievement of monitoring and evaluation objectives.

Frequency of monitoring, data sampling, collection and analysis depends on site conditions and the size and complexity of the project and also affects the cost of implementing the monitoring plan. It is critical to define data needs, timing and frequency of collection in advance: for example, the start and end of the monitoring program, whether collection is to be seasonal, monthly, or weekly, etc. In programming data acquisition, it also important to take into account special conditions in the project area such as the beginning of the rainy season, harvesting periods, etc. Often specific data are needed on those events, and special attention must be devoted to planning and budgeting for this purpose.

1.5.5. Which institution(s) should be responsible for environmental monitoring?

Responsibilities for implementation, data processing and dissemination must be clearly established under the monitoring plan. Which institution will do what? How will these institutions be supported? What human, financial and material resources will be made available and for how long? Who will collect specifically what information? Who will manage it? Are there conflicting responsibilities or interests? Who will provide funding for monitoring and analysis? Is an independent firm to be involved? These questions must be answered to determine who is responsible for what, and where bottle necks may occur.

1.5.6. How are the results from the environmental monitoring activities to be interpreted?

Analysis and interpretation methods need to be defined in monitoring plan development,

such as (i) the ultimate specific purpose(s) for collecting the data; (ii) the meaning contained in the data and information to be collected; (iii) the level of change observed in indicators that trigger a reaction requiring mitigation action; or (iv) the kinds of interpretive expertise, methods and references needed for data collection and analysis. For example, on a given soil (with known basic original parameters), if the root system is reduced and plant leaves turn yellow, the analyst or user of the results of the monitoring plan should have references to know what it mean in terms of the soil quality, and what type of mitigation it calls for.

1.5.7. What use will be made of the data collected and the information generated?

The design of an environmental monitoring plan should take into account the target users and define: (i) what information they will need; (ii) in what format; and (iii) for what use.

To determine how the information generated from the monitoring activities will be used, the following steps need to be followed:

- List all the potential users, and what they need the information for;
- Determine the format most suitable for their use;
- Determine the level of accuracy and reliability required;
- Devise the most suitable reporting format and the dissemination mechanism needed to satisfy potential users.

1.5.8. How will environmental monitoring and evaluation be funded?

An effective monitoring and evaluation plan depends on an adequate and reliable funding. Too often the need for funding requirements for monitoring are ignored in design, and not recognized until after a program or project has been implemented. It frequently takes several years or even decades to measure changes in the environment or natural resource base, while project cycles are governed by the annual budget cycles of governments and donor agencies. Rarely are agencies able to commit funds beyond a five year period. These constraints can place effective long-term monitoring and evaluation in serious jeopardy. In developing a project or program monitoring and evaluation plan it therefore is important to realistically assess the potential for securing adequate and reliable sources of funding, especially when environmental monitoring and evaluation may be needed well beyond a project or program's life of five or ten years.

The notion of sustainability of a monitoring plan may include other considerations such as those described in the Niger Gouré NRM Interventions Project (See Section 3 examples below); building capacity to continue monitoring activities; the need for continuing long-term data and information, etc.

2. Environmental Mitigation of Adverse Impacts

2.1. Definition

Mitigation: The purposeful implementation of decisions or activities designed to reduce the undesirable impacts of a proposed action on the affected environment. Mitigation is a general

concept that includes: a) avoiding undesirable impacts altogether by not taking a particular action; b) minimizing the impacts by limiting the magnitude of the action; c) rectifying impacts by repairing or restoring particular features of the affected environment; d) reducing impacts over time by performing maintenance activities during the life of the action; and e) compensating for impacts by providing additions to or substitutes for the environment affected by the action.

2.2. Why Mitigate Adverse Impacts on the Environment?

A project's mitigation (or environmental management) plan consists of the set of measures to be taken during implementation and operation to eliminate, offset, or reduce adverse environmental impacts to acceptable levels. Also included in the plan are the actions needed to implement them. Mitigation plans are essential elements of projects with significant impacts on the environment. During the preparation of a mitigation plan, project sponsors: (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements.

Effective mitigation reduces or eliminates adverse effects on the environment and natural resources of program and project activities. Mitigation measures should promote sustainable use of natural resources. Once the constraints imposed by the environment are taken into account, opportunities for sustainable development are increased.

A project is said to environmentally sound when: 1) there are no, or limited, adverse impacts on the environment and natural resource base; and/or 2) when all reasonable steps have been taken to minimize adverse impacts and maximize positive impacts.

2.3. At What Phase of the Project Should Mitigation Measures Be Implemented?

Once the different interactions between project activities and the environment and natural resource base have been identified and their extent defined, appropriate actions can be devised and implemented to minimize or eliminate adverse effects and maximize beneficial effects. An ounce of prevention can be worth a pound of cure.

Mitigation of adverse environmental impacts can take place at any time in program or project design or implementation:

- During design, mitigation plans may be incorporated to avoid or minimize impacts (often as a preventive strategy). Incorporating mitigation in design can result in changes in: 1) project or program configuration, content, implementation, timing, technology employed in some activities, material used, etc.; or 2) inclusion of correction, rehabilitation or compensation activities in the design.

- During project or program implementation, evaluation can uncover adverse impacts that may jeopardize activities, the environment or the natural resource base. Corrective measures may then be needed to minimize the adverse effects.

- After a project or program ends, a decision may be made to mitigate adverse effects associated with the activities carried out. Should this occur, the costs of mitigation may become significant, e.g. the toxic or radioactive waste cleanup, desalinization of soils, etc.

Effective mitigation design should not significantly increase project or program costs. Mitigation measures can often be implemented in such a way that their impact on total project costs is minimal. However, if mitigation costs appear too high, it may be an indication that proposed interventions should be rethought or redesigned.

2.4. Funding/Budgeting for Mitigation Activities

Funding of mitigation measures has always been a critical issue. Most of the time funds for implementing mitigation measures are not provided or budgeted, and it is often a last minute chore to find the money necessary to implement mitigation measures. Planners should keep in mind that generally, the later mitigation is considered in the project cycle, the greater the costs may be become.

2.5. Sustainability of Mitigation Activities

Sustainability of mitigation activities depends on: 1) availability of funds; 2) its rank in the priority scale of decision-makers; 3) its effectiveness as a problem solving tool.

2.6. Examples of Mitigative Measures

A particulary useful set of mitigative measures is contained in Annex 3 to this module - Selected mitigation tables from the *World Bank Environmental Assessment Sourcebook, Volume 2* (1991).

Monitoring Plan Sustainability Issues Considered In The Niger Goure NRM Interventions

The Goure project has adopted a participatory approach to development in its fullest sense. As such, even after the project ends, the local population will continue to be involved in identifying needs and in project execution at every level of the development process. This process can be summarized as follows:

1) Identification and analysis of problems, constraints, and potential;

2) Conception of an optimal program of action for the sustainable resolution of NRM problems and development of potential;

3) Mobilization and organization of necessary resources to implement action plan;

4) Implementation of the program activities;

5) Monitoring of impact and specific environmental indicators leading to evaluation and analysis of the program;

6) Feedback from the above analyses for the purpose of refining skills and correcting errors at each level of the development process.

The ultimate success of the project will be measured not so much by the number of trees planted or hectares of dunes stabilized, but on how well the local population has mastered the development process. It is only as the project participants fully comprehend and put into practice this process that sustainability of project impacts and activities will be assured.

It is in this context that the sustainability of the CB-EMEMP must be considered. Responsibility for implementation of the monitoring plan has been placed at the field level, with the bulk of necessary measurements made by project participants. Under this approach the monitoring program becomes part and parcel of the development process to help ensure the sustainability of the M & E plan and process. As project participants become adept at making the quantitative and qualitative measurements required under the plan, their findings can be used to enhance positive impacts and mitigate negative ones, and to build upon positive results.

If the bulk of CB-EMEMP responsibilities are to be shouldered by local communities, the required measurements undertaken must be sufficiently simple and straightforward. If the population is to continue to make these measurements after the project is over, they must recognize utility in doing so. Environmental indicators are those recognized by the local community as critical measurements of environmental quality. Wherever more sophisticated measurements are required, the project will attempt to correlate quantitative measurements made by scientific instruments with simpler qualitative observations made by farmers. For example, soil salinity will be initially measured with an electronic probe, but these measurements will be correlated with the observations that farmers now make that indicate soil salinity (leaf yellowing, salt encrustation, etc.). If sound correlations have been found, the electronic probe can be dispensed with as the primary means of data collection. Finally, farmers are to be trained to make appropriate management decisions based on the findings from their monitoring systems.

Under the Africare proposal the approach to sustainability can be summarized as follows: a) building on locally generated initiatives; b) building on efforts of local leaders and local communities; c) using site specific design; d) promoting technology based on local resources and materials; e) training individuals and communities that have a vested interest in improving management of their natural resources.

3. Environmental Monitoring, Evaluation and Mitigation Plans (EMEMP) and Process

3.1. What Are EMEMPS?

EMEMPs are plans that seek to guide host countries into the business of environmental protection through monitoring and mitigation. **Within USAID's Africa Bureau they refer primarily to Mission program or multiproject environmental monitoring and evaluation and mitigation planning.** They identify problems and/or impacts which are discovered during the process of environmental monitoring; they evaluate these problems and/or impacts; then they go one

step further and propose mitigation actions to responsible people. It is the latter process that differentiates the EMEMP process from ordinary M&E programs, common to all USAID projects and programs.

The suggestion here is that environmental protection cannot be guaranteed by monitoring and evaluation alone, mitigation is the critical 'missing link' that is needed.

3.2. Why Use Them?

EMEMPs have several features that make them an attractive tool in project/program implementation:

1. Environmental protection - EMEMPs are safeguards even in cases where direct, significant negative environmental impacts are not anticipated. They are especially useful in connection with activities where long-term impact potentials and long-term environmental effects might reasonably be expected. A case in point would be technical assistance and/or policy reform in sectors such as agricultural production.

2. Program Impact Monitoring - In light of the Agency's recently articulated major strategic objective regarding the environment, EMEMP's are particularly appropriate as they are intended to become an integral part of Missions' efforts to develop comprehensive program impact monitoring in support of sustainability. They should be linked to and supportive of other Mission monitoring activities.

3. Capacity Building - EMEMPS are also a useful framework for helping strengthen host country environmental monitoring and mitigation capacities and institutions. They encourage a process for effective use of findings in developing mitigation strategies and/or re-orientation of program/project implementation.

3.3. EMEMP Examples

Several EMEMPs are already in operation, the most obvious in connection with agricultural production programs where export crops are featured. For example, USAID/Ghana has a large non-project assistance (NPA) Trade and Investment (TIP) Program to stimulate the production and marketing of nontraditional agricultural exports (NTAEs) including: the growth and export of pineapples; forestry products for furniture; salt mining; and prawn fisheries. Briefly, the EMEMP consisted of a series of 4 concise background environmental reviews (one for each sector) and the formulation of a Plan for monitoring, evaluation and mitigation to be carried out by the host country as long as these sectors will be exploited. The plan incorporates the monitoring of run-off from the irrigated pineapple fields. A similar plan has been designed to monitor run-off from the cut flower industry on Lake Naivasha in Kenya, and USAID/Malawi has instituted an EMEMP to monitor (and mitigate) impacts of watershed run-off associated with small-holder tobacco growers. A review of EMEMP experience in four African Countries (Ghana, Malawi, Uganda and Madagascar) was

recently completed for the Bureau for Africa's Office of Sustainable Development.[4]

3.4. The Future of EMEMPs

Over 25 EMEMPs have been designed and implemented in AFR and more are underway.[5] They fill a need, in that environmental protection is not an easy thing to ensure and mitigation is a difficult concept to build into USAID activities. The EMEMP is one way of doing this while also employing M&E principles easily recognized by USAID field staff. In addition, it offers an 'out' for Missions in that the responsibility for mitigation falls squarely on the shoulders of the responsible organization in the host country.

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[4] Hecht, Joy E., Environmental Monitoring, Evaluation, and Mitigation Plans: A Review of Experiences in Four African Countries, Institute for International Research, Prepared for the Division of Productive Sector Growth and the Environment, Office of Sustainable Development, Bureau for Africa, USAID by Environmental and Natural Resources Policy and Training (EPAT) Project, Winrock International Environmental Alliance, Arlington, Virginia, August 1994, 60pp.

[5] Ibid, p.i.

Important Note: *The special case of water quality monitoring*

Testing and monitoring for water quality has become an issue of increasing importance to USAID and PVOs/NGOs. USAID and other donors, including the World Health Organization, are raising new concerns regarding the frequent occurrence of health-threatening heavy metals like arsenic, and other contaminants in rural and urban public water supplies, including coliform bacteria, nitrates and nitrites. Prior to initiating water development programs, USAID-funded implementors should assess water quality, and take results into account in the design of water development activities. Monitoring also should be done to ensure future quality is maintained. A 1998 USAID official cable (98 STATE 108651) on testing potable water provides "supplemental guidance for conducting USAID's 22 CFR 216 Initial Environmental Examinations (IEE) and Environmental Assessments (EA) when funding activities involving drinking water." Reference to this cable is made in the box below and the full text is also provided for your reference at the end of this note.

This guidance is under development as research continues on arsenic field evaluation and mitigation. PVOs/NGOs and their partners should consider the following questions:

- What should be tested? Where? The answers depend on factors that include, but are not limited to, the hydrogeological conditions of the area, nature of surface and groundwater flow patterns and quantities, or proximity to potential sources of contamination (sometimes many miles from the proposed water development activity).

- How frequently will testing need to be done?

- Will sample surveys suffice? Does every well need to be tested for everything? For example, if wells are all part of one uniform aquifer, in uniform geological formations, would one-shot sampling be sufficient? If the hydrogeology is know to vary, or if it is largely unknown, what should the approach be?

- How will testing be done? Who will do it? How often? How much will it cost? Again these answers are shaped by hydrogeological conditions and proximity to known or potential contamination sources, but they are also determined by the context of geography and available human and financial resources. For example, what are the cost and labor advantages of conducting tests and analyzing samples in the field versus sending samples to laboratories? What are the advantages/disadvantages of kits versus lab work, taking into account factors such as reliability, ease and cost of transport, length of time required to receive and apply analysis results, etc.

Box 4.8 Arsenic Testing in Potable Water

Recent concern over arsenic was sparked by a situation in Southern Bangladesh and West Bengal, India, where very large rural populations have been exposed to elevated levels of arsenic from wells drilled over the last forty years, leading to increased incidences of poisoning. Naturally occurring high levels of arsenic in groundwater have also been identified in Mexico, Romania and several other countries. These occurrences are not associated with mining or industrial sources or with any particular geologic formation, so they would have been impossible to predict. Initial thinking is that these situations may be more likely to occur in areas with thick sediments such as deltas or deserts, or areas with current or former geothermal activity, but there is no reliable prediction model yet.

In general, USAID no longer undertakes large-scale well-drilling programs. Nevetheless, in those cases when USAID does fund provision of potable water supplies, either new ones or restoring old ones, prudent practice would dictate that environmental reviews carried out in accordance with 22 CFR 216 should include testing for arsenic in addition to the usual testing for coliform bacteria and nitrite/nitrate. Tests for additional contaminants should also be performed, as appropriate, when a nearby pollution source (e.g., industry, mining, heavy pesticide or fertilizer use) suggests that additional contaminants may be present.

There is no cause for undue alarm at this time because elevated arsenic concentrations are not anticipated at most locations. This guidance is being issued to avoid potential problems and to resolve actual problems more effectively should they arise.

Should concentrations of arsenic exceeding the current drinking water recommendations be found in a location, a dilemma may arise as to whether to allow people to continue to use polluted traditional water supplies or to use USAID funds to provide water tainted with arsenic. Options will depend upon how the water is used (drinking and cooking, irrigation, livestock watering, or industry), the actual concentration of arsenic in the water, and the duration of the use. Should such a dilemma arise, the Strategic Objective Team in charge should consult the PHN Center in the Global Bureau and other partners as well as the potentially affected populations to find a workable resolution. G/PHN point of contact is: John Austin, at (202) 712-5623.

USAID is working with the U.S. Geological Survey to address this problem. Close coordination is recommended among the field, the responsible Bureau Environmental and Health Officers and the Cooperating organizations (including PL-480 Title II Cooperators) that provide wells, as G/HPN's additional guidance on appropriate sampling and testing for arsenic is being developed. This coordination is also recommended to ensure appropriate analysis of this important issue in an activity's 22 CFR 216 documentation.

The Global Bureau's Centers for Environment and PHN will continue to monitor current research and field evaluations aimed at mitigation of arsenic in water supplies. Your input and ideas on developing guidance that is on the one hand, sensible, and on the other, protective of public health, are welcome. Please send input and ideas to Jim Hester, PPC/ENV, at (202) 712-5176.

(USAID's cable communication Agency-wide, State 108651 16 June 1998)

- Whose water quality standards should be used? The World Health Organization's? The host country's? The U.S. Environmental Protection Agency's? Other?

- If testing reveals water quality is lower than agreed upon standards, what mitigative measures are available?

The preceding questions could be more or less difficult to handle, and answers must typically be developed on a case-by-case basis. There is no one "requirement" for water quality testing—it's a matter of appropriateness. Do what makes sense based on local expertise and realism. Sampling about a half-dozen key parameters at the outset, and twice a year, or more often if called for, may in fact be a significant improvement over past practice and a major step in helping to improve the health and well-being of rural and urban populations. Remember to consult members of the community on their perceived problems with water quality and how the think they might best be solved. For more information on the key contaminants and the health risk they pose; recommended standards; various testing methodologies; technologies and costs; consult the references available through FAM's Food Security Resource Center and listed in Appendix D. Note particularly those published by the World Health Organization (PEEM) and CIDA. Seek advice, when appropriate, from your MEO, REO (if one exists in your region), or your geographic BEO.

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ADM AID FOR USAID DIRECTORS & ENVTRONMENTAL OFFICERS

E.O. 12958: N/A
TAGS:
SUBJECT: ARSENIC TESTING IN POTABLE WATER - IEE/EA NEEDS

1. THIS CABLE IS SUPPLEMENTAL GUIDANCE FOR CONDUCTING
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PAGE 02 STATE 108651 162100Z
USAID'S 22 CFR 216 INITIAL ENVIRONMENTAL EXAMINATIONS (IEE) AND ENVIRONMENTAL ASSESSMENTS (EA) WHEN FUNDING ACTIVITIES INVOLVING DRINKING WATER.

2. USAID RECENTLY BECAME AWARE THAT PEOPLE IN SEVERAL PARTS OF THE WORLD ARE BEING EXPOSED TO HIGH LEVELS OF ARSENIC IN DRINKING WATER FROM GROUND WATER CONTAINING ARSENIC OF NATURAL ORIGIN. ARSENIC CONCENTRATIONS TN THOSE AREAS ARE SIGNIFICANTLY HIGHER THAN MAXIMUM VALUES RECOMMENDED BY ALL MAJOR ENVIRONMENT AND HEALTH ORGANIZATIONS AND AGENCIES. ALTHOUGH THE LEVELS ARE NOT SO HIGH AS TO CAUSE IMMEDIATE EFFECTS, A SEVERE CHRONIC ILLNESS CALLED ARSENICOSIS WILL OCCUR FROM DRINKING SUCH WATER OVER EXTENDED PERIODS OF MONTHS -1-0 YEARS.

3. THIS CONCERN HAS BEEN SPARKED BY RECENT REPORTS FROM BANGLADESH AND WEST

BENGAL, INDIA, WHERE LARGE RURAL POPULATIONS SUFFER FROM ARSENICOSIS. RECENT ANALYSTS INDICATES THAT THE SOURCE IS NATURALLY OCCURRING ARSENIC FOUND IN THE UPPER SEDIMENTS OF THE GREATER GANGES DELTA.

IT IS COMMONLY FOUND AT THE SHALLOW DEPTHS PENETRATED BY VILLAGE TUBE WELLS, THOUSANDS OF WHICH HAVE BEEN PUT IN PLACE IN RECENT DECADES. ALTHOUGH SOME GENERAL WATER QUALITY SURVEYS WERE PERFORMED INITIALLY, ARSENIC WAS NOT EXPECTED AND THE WATER WAS NOT TESTED FOR IT.

4. ARSENIC IS KNOWN TO CONCENTRATE IN HYDROTHERMAL MINERAL DEPOSITS, ESPECIALLY IN GOLD DEPOSITS. IT COMMONLY OCCURS IN HIGH CONCENTRATIONS IN GEOTHERMAL WATERS, ESPECIALLY IN AREAS OF ACTIVE VULCANISM WHERE UNCLASSIFIED

SEDIMENTS ARE UNDERGOING HEATING. IT ALSO CONCENTRATES IN COAL DEPOSITS. SOMETIMES AN ASSOCIATION CAN BE SEEN BETWEEN TECTONIC ACTIVITY AND ARSENIC ENRICHMENT. IN THE GANGES DELTA, AN UNUSUALLY WIDESPREAD OCCURRENCE OF ARSENIC DERIVES FROM EROSION SEDIMENTS OF THE HIMALAYAN UPLIFT AND RELATED MINERALIZATION AND WERE DEPOSITED IN THE DELTA.

5. NATURALLY OCCURRING HIGH-ARSENIC GROUNDWATERS ARE NOT LIMITED TO THIS ONE CASE. THEY HAVE BEEN FOUND CONTAMINATING DRINKING WATER AND CAUSING ARSENICOSIS IN POPULATIONS FROM SEVERAL COUNTRIES AROUND THE WORLD INCLUDING: MEXICO, ROMANIA, ARGENTINA, INNER MONGOLIA, CHINA AND TAIWAN. LIKE BANGLADESH AND WEST BENGAL, THESE OCCURRENCES ARE NOT ASSOCIATED WITH MINING OR OTHER INDUSTRIAL SOURCES AND WERE UNEXPECTED.

6. IN GENERAL, USAID NO LONGER UNDERTAKES LARGE-SCALE WELL-DRILLING PROGRAMS. NEVERTHELESS, IN THOSE CASES WHEN USAID DOES FUND PROVISION OF POTABLE WATER SUPPLIES, EITHER NEW ONES OR RESTORING OLD ONES, PRUDENT PRACTICE WOULD DICTATE THAT ENVIRONMENTAL REVIEWS CARRIED OUT IN ACCORDANCE WITH 22 CFR 216 SHOULD INCLUDE TESTING FOR ARSENIC IN ADDITION TO THE USUAL TESTING FOR COLIFORM BACTERIA AND NITRII'E/NITRATE. TESTS FOR ADDITIONAL CONTAMINANTS SHOULD ALSO BE PERFORMED, AS APPROPRIATE, WHEN A NEARBY POLLUTION SOURCE (E.G., INDUSTRY, MINING, HEAVY PESTICIDE OR FERTILIZER USE) SUGGESTS THAT ADDIT1ONAL CONTAMINANTS MAY BE PRESENT.

7. USAID'S OFFICE OF HEALTH IN THE GLOBAL BUREAU'S CENTER

FOR HEALTH, POPULATION, AND NUTRITION IS IN THE PROCESS OF DEVELOPING PRACTICAL GUIDANCE ON SAMPLING AND TESTING FOR ARSENIC, IT IS EXPLORING A NUMBER OF POSSIBILITIES FOR INITIAL SCREENING AND TESTING THAT MAY TAKE INTO ACCOUNT FACTORS SUCH AS COST, POPULATIONS SERVICED, OR LIKELIHOOD OF PRESENCE OF ARSENIC (BASED ON, FOR EXAMPLE, GEOLOGIC CONDITIONS, PUBLIC HEALTH, OR GROUNDWATER QUALITY DATA). WHEN FINALIZED, THE GUIDANCE WILL DESCRIBE METHODOLOGIES FOR ARSENIC TESTING AND MAKE RECOMMENDATIONS FOR FREQUENCIES FOR SCREENING AND TESTING.

8. THERE IS NO CAUSE FOR UNDUE ALARM AT THIS TIME BECAUSE ELEVATED ARSENIC CONCENTRATIONS ARE NOT ANTICIPATED AT MOST LOCATIONS. THIS GUIDANCE IS BEING ISSUED TO AVOID POTENTIAL PROBLEMS AND TO RESOLVE ACTUAL PROBLEMS MORE EFFECTIVELY SHOULD THEY ARISE.

9. SHOULD CONCENTRATIONS OF ARSENIC EXCEEDING THE CURRENT DRINKING WATER

RECOMMENDATIONS BE FOUND IN A LOCATION, A DILEMMA MAY ARISE AS TO WHETHER TO ALLOW PEOPLE TO CONTINUE TO USE POLLUTED TRADITIONAL WATER SUPPLIES OR TO USE USAID FUNDS TO PROVIDE WATER TAINTED WITH ARSENIC. OPTIONS WILL DEPEND UPON HOW THE WATER IS USED (DRINKING AND COOKING, IRRIGATION, LIVESTOCK WATERING, OR INDUSTRY), THE ACTUAL CONCENTRATION OF ARSENIC IN THE WATER, AND THE DURATION OF THE USE. SHOULD SUCH A DILEMMA ARISE, THE STRATEGIC OBJECTIVE TEAM IN CHARGE SHOULD CONSULT WITH THE PHN CENTER IN THE GLOBAL BUREAU AND OTHER PARTNERS AS WELL AS THE POTENTIALLY AFFECTED POPULATIONS TO FIND A WORKABLE RESOLUTION. G/PHN POINT OF CONTACT IS: JOHN AUSTIN, AT

(202) 712-5763 OR BY AIDNET AT
JOHN H. AUSTIN@G.PHN.HN@&AIDW.

10. USAID IS WORKING WITH THE US GEOLOGICAL SURVEY TO ADDRESS THIS PROBLEM. CLOSE COORDINATION IS RECOMMENDED AMONG THE FIELD, THE RESPONSIBLE BUREAU ENVIRONMENTAL AND HEALTH OFFICERS AND THE COOPERATING ORGANIZATIONS (INCLUDING PL-480 TITLE II COOPERATORS) THAT PROVIDE WELLS, AS G/HPN'S GUIDANCE ON APPROPRIATE SAMPLING AND TESTING FOR ARSENIC IS BEING DEVELOPED. THIS COORDINATION IS ALSO RECOMMENDED TO ENSURE APPROPRIATE ANALYSTS OF THIS IMPORTANT ISSUE IN AN ACTIVTTY'S 22 CFR 216 DOCUMENTATION.

THE GLOBAL BUREAUIS CENTERS FOR ENVIRONMENT AND PHN WILL CONTINUE TO MONITOR CURRENT RESEARCH AND FIELD EVALUATIONS AIMED AT MITIGATION OF ARSENIC IN WATER SUPPLIES. YOUR INPUT AND IDEAS ON DEVELOPING GUIDANCE THAT IS ON THE ONE HAND, SENSIBLE, AND ON THE OTHER, PROTECTIVE OF PUBLIC HEALTH, ARE WELCOME, PLEASE SEND INPUT AND IDEAS TO: JIM HESTER, PPC/ENV, AT (202) 712-5176 OR BY AIDNET AT JAMES HESTER@PPC.ENV@AIDW

11. BUJUMURA MINIMIZE CONSIDERED.
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Role of Monitoring and Auditing in EIA

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WHO Collaborating Centre for environmental and health impact assessment

BETTER ENVIRONMENT Awards for Industry
Technology Transfer Award
Commended 1991

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ROLE OF MONITORING AND AUDITING IN EIA

1. INTRODUCTION

The EIA process need not, indeed should not, stop when the environmental effects of a project or program have been documented or when a decision has been reached. Knowing the consequences of project operation or program implementation is of paramount importance to gauge the efficacy, predictive value and accuracy of impact assessment forecasts and judge the effectiveness of mitigative measures, presumably carried out to reduce predicted adverse consequences or to compensate for unavoidable losses.

The general lack of follow-up, i.e. what really did happen compared to what the environmental impact assessment said would happen, creates a situation in which impact assessors too infrequently learn and impact assessments insufficiently apply the lessons of past experience.

The concept of Total Quality Management (TQM) is commonly applied to manufacturing better products or delivering better services and is increasingly applied to the products of the engineering and environmental professions; finding out why and how mistakes were made or good results were achieved is more than common sense. A TQM postmortem or retrospective analysis provides the means to improve upon results, whether the goal is fewer accidents, a more desirable product or a more effective tool for environmental management and project decision-making.

2. TERMINOLOGY

2.1 Evaluation

Evaluation research has an established history. Typically, the objective is to determine to what extent projects have been successful in meeting their intended goals, e.g. benefit monitoring. Dekker and Leeuw (1989), in their contribution to a special issue of the Impact Assessment Bulletin, review definitions of evaluation from 1955 through 1984 and various evaluation models, in addition to a goal attainment model. Monitoring and auditing in EIA can be construed within this overall framework and should be pursued with reference to or understanding of the research in this field.

Post EIS or EIA evaluation refers to the "generic process of analysis and interpretation and incorporates monitoring, surveillance and audit programmes ... it involves making subjective, policy-oriented judgments about the effectiveness of EIA procedures and results" (Sadler, 1988).

2.2 Monitoring

The key concepts underlying definitions of environmental **monitoring** are that data must be specific, systematically and repetitively collected and organized to achieve some purpose. (For a discussion of purposes, see Section 3.)

The term **monitoring** is defined in the context of environmental impact assessment as "an activity undertaken to provide specific information on the characteristics and functioning of environmental and social variables in space and time" (Bisset and Tomlinson (1988). Davies (1989) refers to monitoring in a similar way as "the systematic collection of data through a series of repetitive measurements." Carley (1986) calls monitoring a process of "continuous assessment" and defines it as the "systematic collection and organization of information..." The terms "surveillance" (repeated measurement of a variable in space and time to detect a trend) or "survey" (variation in space) are frequently used or misused to mean monitoring. While the lack of consistent or common definitions is of concern, the problem of definition is not pursued further here.

2.3 Audit

The term **audit** is more global and encompassing than **monitoring**, which can be used as a tool to accomplish auditing. A conventional use of the term audit for a facility is an "account of the environmental consequences of operational developments, accompanied by an appraisal of the effectiveness of management to ameliorate or prevent harmful impacts" (Bisset, n.d.). The USEPA has defined this kind of auditing as a "systematic, documented, periodic and objective review by regulated entities of facility operations and practices related to meeting environmental requirements" (Allison, 1988).

The EIA audit must be distinguished, however, from corporate or agency internal auditing to determine compliance with regulations or standards at a regulated facility. In the EIA context, an audit is the comparison of predicted environmental impacts with actual impacts.

Neither monitoring nor audits can be discussed fruitfully without reference to their purposes and objectives, which are reviewed next.

3. TYPES AND PURPOSES OF MONITORING

3.1 Baseline Monitoring

Baseline surveys are frequently undertaken to gather data for the EIA. In most instances, the objective is to find out what exists in the environment and how it might be affected. In some cases, these surveys could be or may have been expanded, refined or extended through seasons or years so that they may be adequate to qualify as baseline monitoring.

Baseline monitoring is defined by Davies (1989) as the "measurement of environmental parameters during a representative pre-project period for the purpose of determining the nature and ranges of natural variation and to establish, where appropriate, the nature of change." Many EIAs, however, are not carried out with sufficient time and resources to serve this objective optimally.

Better links among baseline monitoring, impact prediction and the potential requirements of subsequent impact monitoring are needed to ensure feedback in the EIA process, both within a project itself and among projects. Sadler (1988) and Davies (1989) consider baseline monitoring to be a continuous process, refined and refocused during the preparation of an EIA, and continued through proper implementation and operation. This kind of monitoring data can help to influence project design changes and/or to define and refine mitigation.

3.2 Impacts or Effects Monitoring

3.2.1 Documentation of Predictive Accuracy and/or Adequacy

Verifying past impact predictions and improving the accuracy and/or adequacy of future impact predictions by documenting the actual impacts of operating projects is a fundamental objective of "impacts" (Bisset) or "effects" monitoring (Davies, 1989; Sadler, 1991). This objective was enunciated in one of the earliest publications directed to post-EIS monitoring (Marcus, 1979). The point is not necessarily to keep an accuracy score nor to bash EIAs for their inaccuracies of prediction, but to improve the practice of EIA and the knowledge base about how specific kinds of projects affect the environment. "It is this lack of knowledge which, in part, makes impact prediction such a difficult and uncertain task ... It is precisely because of this prevailing degree of uncertainty that many mitigating and monitoring schemes are implemented" (Bisset and Tomlinson, 1988).

The importance of feedback and continuity in the EIA process cannot be overemphasized. A past project's monitoring or audit results can be used to inform the next project, with a consequent improvement not only in accuracy but a more efficient use of resources, which can be better targeted, and a more appropriate selection of methods and techniques.

3.2.2 Policy and Theory Benefits

An especially pertinent role for impacts or effects monitoring is to guide policy-making and, thus, subsequent EIA decision-making. (See Sadler, 1988 and Marshall et al., 1986.)

The objective of accuracy and/or adequacy and better decision-making can be taken one step further. DiSanto and Frideres (1986), in reviewing the work of Munro et al. (1986), decry an apparent preoccupation with methods and emphasize the importance of establishing theoretical statements and directing attention to causes and explanations rather than to effects and predictions.

3.2.3 Warning Functions

Monitoring the effects of activities provides the ability to warn agencies or the public of unanticipated problems, changes in trends or the approach of an impact indicator to a threshold or critical level (Marcus, 1979 and Armour, 1988).

3.2.4 Impact Control and Management

As impacts occur, Marcus (1979) posits, they can be managed and controlled, as long as monitoring data are available to support decision-making. Thus, monitoring information can be used as a feedback tool in managing operations, assessing the usefulness of monitoring techniques or devising different or more refined monitoring programs. This monitoring objective is linked to and overlaps with the objective of monitoring the effectiveness of prescribed mitigation procedures (See 3.3) to reduce or compensate for the predicted adverse effects of projects. (See also Davies, 1989; Carley, 1986; and Sadler, 1988.)

3.3 Mitigation Monitoring

Mitigation monitoring aims to determine the suitability and effectiveness of mitigation programs, designed to diminish or compensate for adverse effects of projects. Regulations of the U.S. Council on Environmental Quality emphasize this type of environmental

monitoring. When mitigation is specified in a Record of Decision pursuant to an EIS, agencies are to adopt a monitoring program (U.S. Council on Environmental Quality, 1978). Monitoring of mitigation programs is often required as a condition for grants, approvals or permits, even when an EIS has not been prepared.

Mitigation in the U.S. is defined as: avoiding impact; minimizing impact by limiting the action; rectifying the impact by repair, rehabilitation, or restoration of the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations; or compensating for the impact by replacing or providing substitute resources or environments.

3.4 Compliance Monitoring

This form of monitoring has as its objective ensuring that specific conditions or standards are met. In its simplest form it might be inspection. Compliance monitoring is often conducted, continually or at specified periods, to check that conditions of a permit specifying limits to the amount or level of a discharge are being met. This type of monitoring focuses on the discharge or the emission itself and not the ambient quality of the environment. Bisset explicitly refers to this type as emissions monitoring.

Compliance monitoring does not require baseline monitoring to which impacts can be compared nor reference or control sites. In general, one might view this monitoring as a "policeman" function (Carley, 1986).

3.5 Monitoring as Postponed Decision-Making

In a discussion of how impact monitoring is negotiated, Rolf (1986) points to the value of a negotiated monitoring program, when decisions must be made under conditions of uncertainty, inadequate or unobtainable information and factual or value conflicts. "A monitoring program can be conceived as a kind of relational contract where the parties create a structure through which to address problems and make decisions over time" (Rolf, 1986). Thus, the way to solve potential problems, rather than the solution itself, is agreed upon.

Additional advantages are inherent in this procedure, as suggested by Rolf (1986). Fairness and equity are enhanced, because participants who would have no role or no major role in making a decision are more easily brought into the monitoring negotiation process. Likewise, he contends that better implementation of monitoring can be achieved, because those who participate in the negotiation have more interest and commitment to it.

Two related roles for monitoring are: 1) countering, in advance, fears that unanticipated problems will occur gradually over time and not be detected; and 2) establishing the basis, or lack thereof, for impact compensation claims (Armour, 1988). Monitoring can provide to affected publics "needed reassurance" and a means of "regaining some measure of control over the quality of their environment" (Armour, 1988).

Proposed monitoring, however, should not legitimize or justify a determination of project acceptability (Carley, 1986). One may conclude that promises or commitments to monitor are no substitute for substantive EIA in the first place.

3.6 Indices or Indicators of Environmental Quality

Monitoring environmental change can occur in a broader context, not directly linked to project or program EIA. Alberti and Parker (1991) briefly review several programs in Canada, the U.S., and OECD countries, which were established to monitor environmental indicators or indices at a national level. (Simply put, an indicator is based on measuring one variable, while an index aggregates several indicators or measure.) The controversy surrounding the utility and credibility of environmental quality measures is beyond the scope of this review, but it should be indicated that they have not yet gained the acceptability of comparable economic indicators, e.g., Gross National Product or Price Indices, or Quality of Life social indicators.

The purposes behind environmental indicators and environmental indices are similar to EIA impact monitoring. One objective is to provide information and feedback to adjust environmental policy. A specific purpose of the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program is to determine whether impacted ecosystems respond to mitigation. If and/or when they are credible, such environmental indicators and indices can be useful in the future by serving as comparisons to equivalent indicators at the project monitoring level and as yardsticks to gauge potential benefits of mitigation plans.

4. AUDITS

4.1 Types and Purposes

Four kinds of environmental audits have been distinguished by Canter (1985).

(i) The draft EIS audit or review is an "independent opinion on the environmental implications of a project based on the EIS at the authorization stage ... to determine 'completeness' in relation to objectives and the terms of reference placed upon it."

(ii) The implementation audit is an enforcement audit undertaken by a regulatory body to verify that mitigation measures and levels of emissions are within limits.

(iii) A performance audit or a regulatory audit, following the categories of Canter (1985), is a means to identify compliance status of facilities and is a tool employed by corporate or agency management.

One form of compliance auditing might, indeed, be to determine whether EIA documentation is being prepared (Sigal and Cada, 1991).

(iv) **Impact prediction audits** have as their primary purpose examination of the accuracy and efficacy of impact assessment predictions in comparison to actual effects that occur.

Audits, as defined in Section 2, employ monitoring, but in EIA have come to refer specifically to Canter's fourth definition: "The organization of monitoring data to establish the record of change associated with a project" (Davies, 1989 from Sadler and Davies, 1988).

A defining feature of an audit is the "independent and objective examination of whether practice complies with expected standards" (Sadler, (1988). The point is not just individual project evaluation; the ultimate goal is to better the science and practice of EIA (Davies, 1989).

In one of the earliest reviews of relatively few existing EIA audits undertaken at the time, Bisset (1980) identified the multiple problems associated with carrying out scientifically acceptable audits. The audits he reviewed concerned physical or biological impacts, which arguably could employ scientific designs and measurement techniques more amenable to monitoring than social or economic impacts. Bisset points out the proverbial "Catch-22" -- the location of stressed, i.e., impacted monitoring stations is based upon EIA predictions, but if the impact predictions were incorrect in terms of locations, then such stations will provide misleading information.

Murdock et al. (1982) assessed a sample (225) of U.S. socio-economic assessments. Because of data deficiencies, only 44 could be assessed quantitatively for the relatively straightforward task of judging how accurate their demographic projections were when compared to the 1980 census. Population projections for 149 various administrative units considered in these 44 were not generally found to be sufficiently accurate for practical use.

Canter (1985) reviewed nine case studies of impact prediction audits, analyzing over 100 projects. He concluded that the methodological difficulties of auditing impact predictions included: the lack of sufficient data, the vagueness of the original predictions and the lack of information about prediction techniques. Most audits were not comprehensive with respect to evaluating physical, biological, cultural and socio-economic categories. Accuracy was, indeed, quite variable.

Bisset and Tomlinson (1988) reviewed a number of the same audits, including one undertaken by the Centre for Environmental Management and Planning. After screening many projects, the anticipated versus actual impacts of two oil terminals, a steelworks and a reservoir were studied in detail. Among the most striking results was that the vast majority of impact predictions (88 percent) could not be audited. There were changes in project design after the impact predictions; the predictions were ambiguous or fuzzy; assumptions upon which predicted impacts were contingent, e.g., weather conditions for an oil spill were not realized; and monitoring data were lacking or insufficient. For the 12 percent of predictions that could be audited, over 50 percent were accurate or at least could not be shown to be inaccurate within the time period that an impact could be expected. It was also found that impacts not addressed in the EIA occurred, particularly secondary impacts.

In reporting on the Canadian experience, Sadler (1988) also describes the record as mixed. The kind and direction of impacts tended to be accurately anticipated in environmental impact studies, while quantitative predictions erred. In addition, his review of Canadian audit and evaluation studies found that procedural effectiveness was deficient -- "... lack of follow-through from EIA and authorizing decisions is evident even at the rudimentary level of surveillance."

Twenty-nine U.S. federally-sponsored projects for which EISs were prepared between 1974-1978 were evaluated by Culhane et al. (1987). Accuracy was not especially high, but neither were EISs especially inaccurate. Inaccuracies tended to be the result of too vague predictions or the differences between actual and predicted impacts were subtle. One of the problems with this evaluation, however, is that interview data, not independent field measurements, were the basis for determining whether predicted impacts had been realized.

The authors of this review audit also challenge the assumption of an EIS as a rational, decision-making model. Perhaps, it is sufficient that the EIS is not used to manipulate data and that impacts of public, rather that scientific interest, are legitimately given attention.

Additional examples of audits can be found in Canter (1985) and Bisset and Tomlinson (1988) and increasingly in EIA professional journals. See, for example: "The Intrinsic Difficulty of Predicting Impacts: Lessons from the James Bay Hydro Project" (Berkes, 1988) concerning predicted and unpredicted impacts on fish stocks, mercury accumulation, caribou migration, wetland ecosystems, roads, hunting territories and access; or Dickman (1991) on "Failure of an Environmental Impact Assessment to Predict the Impact of Mine Tailings on Canada's Most Northerly Hypersaline Lake."

As many of the reviews by Bisset and Tomlinson (1988), Canter (1985), and Bisset (1980) have indicated, baseline monitoring, careful and documented impact predictions, and impact monitoring are essential to effectuate a successful audit. Without such a process, there is no way to advance the art (science) of EIA nor to achieve long term improvement in theory and practice.

5. METHODOLOGICAL ISSUES IN AUDITS AND MONITORING

5.1 Problems of Testing in the Real World

The overall method of auditing is described by Bisset and Tomlinson (1988) and in the works cited by Sadler (1988) and Canter (1985). Questions about the specific methods underlying the audit, however, are fundamentally related to monitoring methods. It is difficult to generalize about the appropriateness of methods in disciplines/subject matter so vastly different as water quality, aquatic ecology, terrestrial fauna and flora, soil erosion and sedimentation, land use, land tenure, population, employment, fiscal and tax matters, community cohesion or cultural change.

For impact monitoring specifically, the question is similar to the one faced for impact prediction: how does one distinguish normal change or change that would have occurred without the project from change occurring as a result of the project? Biological and physical systems as well as human ones are subject to variability spatially and over time.

Some instructive issues can, however, be identified. Impacts monitoring is not at all equivalent to a classic laboratory experiment, because there is no strict control situation to which impacts of the project situation can be compared. In addition to all the other biases that can result from illy designed schemes or the misuse of statistics, consider these.

(i) Before and after comparisons of the pre- and post project situation suffer from the problem of history, i.e., events occurring between the measurements, such as a major flood or earthquake or project design changes.

(ii) Maturation processes occurring within a population, such as getting older or wiser, can intervene.

(iii) Effects of the monitoring itself can cause different results.

(iv) Effects can occur as a result of the measuring instruments or the measurers using the instrument, e.g., differences among observers or samplers when personnel change over a period of time and reinterpret protocols or, worse yet, have no strict protocols to follow.

(v) Mortality can take its toll, e.g., differential loss of the population from the comparison or from the test situation but not attributable to the project.

(vi) Interaction effects among monitoring methods, choices of sites and other factors can jeopardize one's ability to generalize about the situation based on the samples taken.

(vii) Choices regarding units of analysis can lead to different results, e.g., correlated statistics for large aggregates like census tracts or regions produce different results than when individuals are the units of analysis.

In general, the aim of monitoring design is to reduce or eliminate confounding factors, not always easy to do when operating in the messy nature of reality as opposed to the laboratory. Individuals embarking upon the design of monitoring programs are urged not simply to consult the approaches recommended by various disciplines, but more general works, e.g., Blalock or Campbell and Stanley.

One typical way of dealing with variability is to select a comparison, or reference, site, population or situation, one presumably subjected to all the overall non-project related changes but not experiencing the effects of the project. In addition, a representative project-affected situation must be selected, with emphasis on the word "representative."

Multiple stations or sampling locations are often chosen within the "experiment" or treatment area, i.e., the project, and the "control" or reference area, as one would expect variation within each area. Monitoring of both areas prior to the construction or operation of a project is also recommended to establish that the comparison areas are validly chosen. Some useful sources for ecological monitoring are: Spellerberg (1991) and Cairns (1991).

A review and evaluation of socio-economic impact monitoring systems was conducted by Leistritz and Chase (1982), based on the literature and ten monitoring systems implemented for projects in the late 1970s. Monitoring focused on indicators providing data on work force characteristics, community service systems, and fiscal impacts, such as property valuation or public finance. This review stressed the importance of:

(i) selecting key indicators, while considering costs of data collection and processing, monitoring frequency, and utility of already existing mechanisms/reporting processes;

(ii) procedures to update impact projections as projects change;

(iii) reporting procedures in a form that can be used by decision-makers; and

(iv) the role of monitoring as a management tool to revise mitigation strategies and plans.

Monitoring of social and economic systems has some special constraints. Pre-project monitoring is more easily accomplished for biological or physical systems than for human ones in which the anticipatory or planning phases of the project can affect perception and behavior, e.g., land speculation or fear about loss of the familiar place. In the context of social impacts, Armour (1988) raises another important issue apart from the methodological: might it be "more productive to conceptualize monitoring less in scientific terms and view it more as sociopolitical process ... collective reality testing?" For a review of social impact assessment procedures with case studies of third world settings and an analysis of differing institutional constraints, see the 1990 special issue of the Environmental Impact Assessment Review (10: 1/2, 1990).

Methodological problems entailed in social, emphasizing sociocultural or sociopsychological, impact monitoring are amply reviewed by Armour (1988), who asks a set of questions relevant to all monitoring programs.

(i) What are the key factors to monitor?

(ii) What is the baseline condition?

(iii) How can cause-effect be demonstrated, particularly when there are cumulative impacts?

5.2 A General Framework for Post-EIA Monitoring

While each monitoring program must be tailored to its specific objectives and, hopefully, to advancing the accuracy and utility of impact predictions, the overall framework for devising a monitoring system developed by Marcus (1979) and reviewed and expanded by Canter and Fairchild (1986) is a helpful tool. Charts and tables from Marcus (1979) are reproduced at the conclusion of this paper for the convenience of readers. Two phases of making plans for a monitoring system are distinguished:

(i) Developing a monitoring system; and

(ii) Implementing and operating the system.

Central to the developmental phase of the framework are not only consideration of objectives and data requirements, but also a feasibility evaluation of institutional, cost, funding, personnel and time constraints. Important premises underlying this framework are: the use of routine monitoring data already collected to reduce costs; and the need for intergovernmental coordination. Canter and Fairchild (1986) demonstrate the use of a weighting technique to allocate limited budgets among monitoring indicators, based on the relative importance of each indicator and the relative cost of collecting data for each.

The second phase of a monitoring program entails its implementation. Central to this phase are not simply the collection and analysis of data, but its evaluation and interpretation, a critical point stressed in nearly all EIA monitoring discussions. Some practical problems of implementation pointed out by Canter and Fairchild (1986) were pointedly experienced in the case study presented in Section 7. These are: the importance of quality control in storing and retrieving data; contradictory, incompatible or inconsistent sources; and the communications gap between technical specialists and computer specialists. To these dilemmas, this author adds: the importance of performing pilot studies; training and monitoring the monitors in following established protocols; and re-examining protocols periodically.

6. THE MONITORING AUDIENCE/CLIENTELE

The clientele or audience for a monitoring program is to some extent defined by its objectives (see Section 3). An explicit discussion of the potential audience or clientele is, however, warranted. More often than not there are multiple recipients and potential beneficiaries, other than the targeted audience. The possibilities are:

(i) EIA scientists and practitioners, who can advance EIA theory and practice;

(ii) Affected community groups or individuals, who can be reassured or not about the realization of impacts or who can use monitoring information to help justify additional mitigation or compensation;

(iii) Policy-makers and decision-makers, both inside and outside the affected community, who can effectuate changes specific to the monitoring situation, or apply lessons learned to future situations or to policy changes;

(iv) Project developers, whether agencies or corporations, who can respond to problems based on monitoring results, modify future courses of action on similar projects, or justify their activities;

(v) Regulators, who must demonstrate compliance or who may be able to utilize monitoring information to modify permit conditions on the specific project or a future project; and

(vi) Lobby and special interest groups, NGOs, and others, who may use the results of monitoring to support advocacy positions.

While the intent of monitoring may not include the needs of all these groups, the evaluator or party responsible for presenting monitoring results needs to be mindful of potential use of data by many different groups with different agenda.

Alberti, M. and J.D. Parker: 1991, "Indices of Environmental Quality, The Search for Credible Measures," Environmental Impact Assessment Review 11, 93 -101.

Allison, R. : 1988, "Some Perspectives on Environmental Auditing," The Environmental Professional 10, 185-188.

Andrews, R.L. : 1988, "Review of Forecasts and Environmental Decisionmaking: The Content and Predictive Accuracy of Environmental Impact Statements," Environmental Impact Assessment Review 8, 267-269.

Armour, A. : 1988, "Methodological Problems in Social Impact Monitoring," Environmental Impact Assessment Review 8:249-269.

Berger, J.J. : 1991, "A Generic Framework for Evaluating Complex Restoration and Conservation Projects," The Environmental Professional 13, 254-262.

Berkes, F. : 1988, " The Intrinsic Difficulty of Predicting Impacts: Lessons from the James Bay Hydro Project," Environmental Impact Assessment Review 8, 201-220.

Bisset, R. : 1980, "Problems and Issues in the Implementation of EIA Audits," Environmental Impact Assessment Review 1, 379-396.

Bisset, R. : n.d., "Role of Monitoring and Auditing in EIA."

Bisset R. and P. Tomlinson: 1988, "Monitoring and Auditing of Impacts; in P. Wathern (ed.), Environmental Impact Assessment: Theory and Practice, Unwin Hyman, London, pp. 117-128.

Blalock, H. : 1964, Causal Inferences in Nonexperimental Research, University of North Carolina, USA.

Cairns, J. : 1991, "The Status of Theoretical and Applied Science of Restoration Ecology," The Environmental Professional 13, 186-194.

Campbell, D.T. and J.C. Stanley: 1963. Experimental and Quasi-Experimental Designs for Research, Rand McNally, Chicago.

Canter, L.W. : 1985, "Impact Prediction Auditing," The Environmental Professional 7, 255-264.

Canter, L.W. and D.M. Fairchild: 1986, "Post-EIS Environmental Monitoring," Impact Assessment Bulletin 4, 265-285.

Carley, M.J. : 1986. "From Assessment to Monitoring: Making Our Activities Relevant to the Policy Process," Impact Assessment Bulletin 4, 286-303.

Culhane, P.J., H.P. Riesema, and J.A. Beecher: 1987, Forecasts and Environmental Decisionmaking: The Content and Predictive Accuracy of Environmental Impact Statements, Westview Press, Boulder, CO.

Davies, M.H. : 1989, "The Role of Auditing and Monitoring in EIA," Paper presented at 10th International Seminar on Environmental Impact Assessment and Management, University of Aberdeen, Scotland.

Dekker, P.J. and F.L. Leeuw: 1989, "Program Evaluation and Effectiveness Auditing: Definitions, Models, Practice," Impact Assessment Bulletin 7, 113-133.

Dickman, M. : 1991, "Failure of an Environmental Impact Assessment to Predict the Impact of mine Tailings on Canada's Most Northerly Hypersaline Lake," Environmental Impact Assessment Review 11, 171-180.

DiSanto, J.E. and J.S. Frideres: 1986, "Importance of Theory to the Practice of Impact Assessment," Impact Assessment Bulletin 4, 3-17.

Feldman, D.L. : 1989, "Review of Forecasts and Environmental Decisionmaking: The Content and Predictive Accuracy of Environmental Impact Statements," The Environmental Professional 11, 72-73.

Fuggle, R.F. : 1990, "Integrated Environmental Management: An Appropriate Approach to Environmental Concerns in Developing Countries," Impact Assessment Bulletin 8, 31-46.

Leistritz, F.L. and R.A. Chase: 1982, "Socioeconomic Impact Monitoring Systems: A Review and Evaluation," Journal of Environmental Management 15, 333-349.

Marshall, D., B. Sadler, J. Secter, and J. Wiebe: 1986, "Environmental Management and Impact Assessment: Some Lessons and Guidance from Canadian and International Experience," Impact Assessment Bulletin 4, 239-260.

Marcus, L.G. : 1979, "A Methodology for Post-EIS (Environmental Impact Statement) Monitoring," Geological Survey Circular 782, U.S. Geological Survey, Washington, D. C.

Munro, D.A., T.J. Bryant and A. Matte-Baker: 1986. Learning from Experience: A State of the Art Review and an Evaluation of Environmental Impact Assessment Audits, Canadian Environmental Assessment Research Council, Quebec, Canada.

Murdock, S.H., F.L. Leistriz, R.R. Hamm and S. Hwang: 1982, "An Assessment of Socioeconomic Assessments: Utility, Accuracy, and Policy Considerations," Environmental Impact Assessment Review 3, 333-350.

Rolf, C.A. : 1986, "Negotiating a Monitoring Program," Impact Assessment Bulletin 4, 99 -109.

Sadler, B. : 1991, Guidelines for Monitoring and Audit, Paper presented at 12th international Seminar on Environmental Assessment and Management, University of Aberdeen, Scotland.

Sadler, B. : 1988, "The Evaluation of Assessment: Post-EIS Research and Process Development," in P. Wathern (ed.), Environmental Impact Assessment: Theory and Practice, Unwin-Hyman, London, pp. 129-142.

Sadler, B. and M.H. Davies: 1988, Environmental Monitoring and Audit. Guidelines for Post-Project Analysis of Development Impacts and Assessment Methodology, Report prepared for Environment Canada, Canada.

Sigal, L. and G. Cada: 1991, "NEPA Compliance Auditing," The Environmental Professional 13, 174-177.

Spellerberg, I. : 1991, Monitoring Ecological Change, Cambridge University Press, Cambridge, U.K.

TAMS Consultants, Inc. : 1991, Biological Monitoring Program: Harmon Meadow Eastern Brackish Marsh, Hudson County, NJ, Hartz Mountain Industries, TAMS Consultants, Inc. New York, New York.

U.S. Agency for International Development: 1987, Guidelines for Data Collection, Monitoring and Evaluation Plans for A.I.D. - Assisted Projects, A.I.D. Program Design and Evaluation Methodology Report No. 9., USAID, Washington, DC.

U.S. Council on Environmental Quality: 1978, "Regulations on Implementing National Environmental Policy Act Procedures," 40 CFR 1500 - 1508, Washington, D.C.

TABLE 8.—*Explanation of flow chart of monitoring methodology: Phase I. Development of a Monitoring System*

[See plate 1 in pocket]

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
1. Define action	To determine type, scope, level, location, and timing of action(s) causing impacts.	1. Determine probable level of resource development, project market demands, formulate development schedule. 2. Describe action by its activity components. (Understanding of the specific activities is needed for impact prediction and for impact modification.) 3. Determine activities schedule. (Timing and duration of activities affects timing of impacts.) 4. Determine location of action.	Development level schedule, see figure 2.
2. Predict impacts	To determine type, magnitude, timing, and location of impacts resulting from the action.	1. Prepare environmental impact statement. (EIS identifies impacts associated with each aspect of the environment and the activities causing the impact.) Predict impact magnitude, timing, and area to be affected.	EIS description of impacts; see table 1 and figure 1. Map delimiting boundaries of study area and identifying location of activities and probable impact areas.
3. Identify and define major impacts	To identify impacts that should be monitored.	1. Identify impacts to be monitored on the basis of impact significance described in the EIS.	List of impacts to be monitored or activity/impact matrix with impacts requiring monitoring identified. See tables 5 and 6.

From Marcus (1979).

TABLE 8.—*Explanation of flow chart of monitoring methodology: Phase I. Development of a Monitoring System*—Continued

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
4. Obtain participation of agencies	To obtain participation of agencies in development of a monitoring system.	1. Contact all agencies having pertinent program responsibilities in area to be impacted. 2. Set up interagency meetings.	Interagency participation in the development of a monitoring system.
5. Identify agencies' authority for controlling or mitigating impacts	To identify agency potential for responding to impacts through their decisionmaking, planning, regulation, and enforcement authority.	1. Identify agencies' major areas of environmental concern. Determine for what aspects of the environment and for what type of impacts the agencies are responsible. (This focuses common areas of concern among agencies.)	List of agencies' areas of concern.
		2. Identify individual agency basis of authority to control impacts through decisionmaking, planning, regulation, and enforcement. 3. Identify additional agency authority necessary to integrate and coordinate the monitoring system.	List of potential agency decisionmaking, planning, regulation, and enforcement responses to impacts.
6. Define monitoring objectives	To define monitoring objectives.	1. Define monitoring objectives in terms of major potential impacts and in terms of agency authority. (The scope of the monitoring objectives determines the scope of the monitoring system. A general objective espoused by the author is that monitoring should be restricted to data collection that provides only that information necessary for carrying out impact reduction measures. Many of the	Statement of objectives of monitoring system.

From Marcus (1979).

TABLE 8.—*Explanation of flow chart of monitoring methodology: Phase I. Development of a Monitoring System*—Continued

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
6. Define monitoring objectives—Continued		within the jurisdiction of a particular agency. However, agencies presently may have no authority for ameliorating some impacts. For such instances, agencies must determine whether their objectives will include monitoring some impacts that do not fall under the purview of their agency. Monitoring of such impacts may justify creation of appropriate control mechanisms in the future. However, agencies must not require a needlessly complex data collection effort.)	
7. Determine data requirements	To determine data needs for achieving monitoring objectives. (Reiterations of this element may be necessary, based on revision of monitoring objectives, testing, and evaluation of data usefulness. See feedback loops on plate 1, in pocket.)	1. Reevaluate impacts on the basis of monitoring objectives; eliminate overlap in monitoring objectives and monitoring effort. (Some activities result in related environmental impacts. For example, ore extraction causes land surface disturbance, soil loss, and increased sediment yield. It may be sufficient to monitor only one of these impacts. 2. Select impact indicator. (This is the parameter that must be monitored to assess the magnitude of an impact. Several parameters may be indicative of a particular impact. Any impact indicator should be selected on the basis of	Descriptive list or table of monitoring requirements for each selected impact, including impact indicator, frequency and timing of collection, location of monitoring sites or areas, method of collection, and format.

From Marcus (1979).

TABLE 8.—*Explanation of flow chart of monitoring methodology: Phase I. Development of a Monitoring System*—Continued

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
7. Determine data requirements—Continued		its utility for decisionmaking, planning, regulation and enforcement. However, it may be necessary to use an alternative indicator if the necessary data are already being collected or the cost of monitoring the preferred parameter is high.) 3. Determine frequency and timing of data collection. (Frequency of data collection should be the minimum necessary for trend analysis, enforcement of regulations, and correlation of cause and effects. For some parameters the timing of data collection may be more important than the frequency level; for example, collection of water-quality data during a major runoff event is more important than a precise data collection frequency. Timing of data collection should relate to the timing of activities causing the impact. Different phases of an action may produce different impacts that persist after an activity ceases.) 4. Determine monitoring sites or collection areas. (These should be based on the location of the activities causing the impacts, predictions of areas most likely to be affected, and locations where inte-	

From Marcus (1979).

TABLE 8.—*Explanation of flow chart of monitoring methodology: Phase I. Development of a Monitoring System*—Continued

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
7. Determine data requirements—Continued		grated measurements would assist in gaining comprehensive understanding.) 5. Determine method of data collection. (Data can be collected in several ways. For example, vegetative-cover data can be collected by field collection methods or by remote-sensing techniques. Some factors to consider when selecting method of collection are: degree of accuracy, level of detail or scale, agency capability to use method, cost, and how well the method represents resultant impacts.) 6. Determine data type and storage format. (Data format possibilities include statistical tables, charts, graphs, summaries, maps, map overlays, computer printouts, and graphics. Criteria for selecting suitable format include: easy and convenient access to data by all users, intelligibility, interrelatability among formats, and ease of updating.) 7. Determine data analysis method.	
8. Review data requirements in terms of monitoring objectives	To ascertain that data needs defined in work element 7 will fulfill monitoring objectives.	1. Review data needs for conformance with monitoring objectives. 2. Revise data needs as necessary to meet monitoring objectives.	Revised list of data requirements.

From Marcus (1979).

TABLE 8.—*Explanation of flow chart of monitoring methodology: Phase I. Development of a Monitoring System*—Continued

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
9. Determine data availability	To determine extent to which data needs can be met under existing agency programs, and to define data gaps.	1. Identify what requirements are being met under existing programs, including frequency and timing of data collection, data collection location, accuracy, and method of collection.	Table relating data availability to data requirements and defining data gaps.
10. Conduct feasibility evaluation	To determine if proposed monitoring system is feasible within institutional, cost, funding, personnel, and time constraints.	1. Determine cost, personnel, and time requirements for obtaining data. 2. Determine agencies' capability for providing data. 3. Determine whether proposed monitoring system is feasible. If so, work element 11 has been achieved. If not, work elements 1 through 10 must be repeated at a reduced level. (There are several potential approaches for reducing the monitoring system to a feasible level: the scope of monitoring objectives can be reduced; alternative impact indicators can be selected; the frequency of data collection can be reduced; and alternative methods of data collection can be used.)	Description of cost, personnel, and time requirements for obtaining data.

From Marcus (1979).

TABLE 8.—*Explanation of flow chart of monitoring methodology: Phase I. Development of a Monitoring System*—Continued

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
11. Define monitoring system. (This is a decision point. At this point participating agencies have decided what objectives the monitoring system will achieve, what impacts will be monitored, and what data will be collected. The next phase is implementation and operation of the monitoring system.)			

From Marcus (1979).

TABLE 9.—*Explanation of flow chart of monitoring methodology: Phase II. Implementation and Operation of a Monitoring System*—Continued

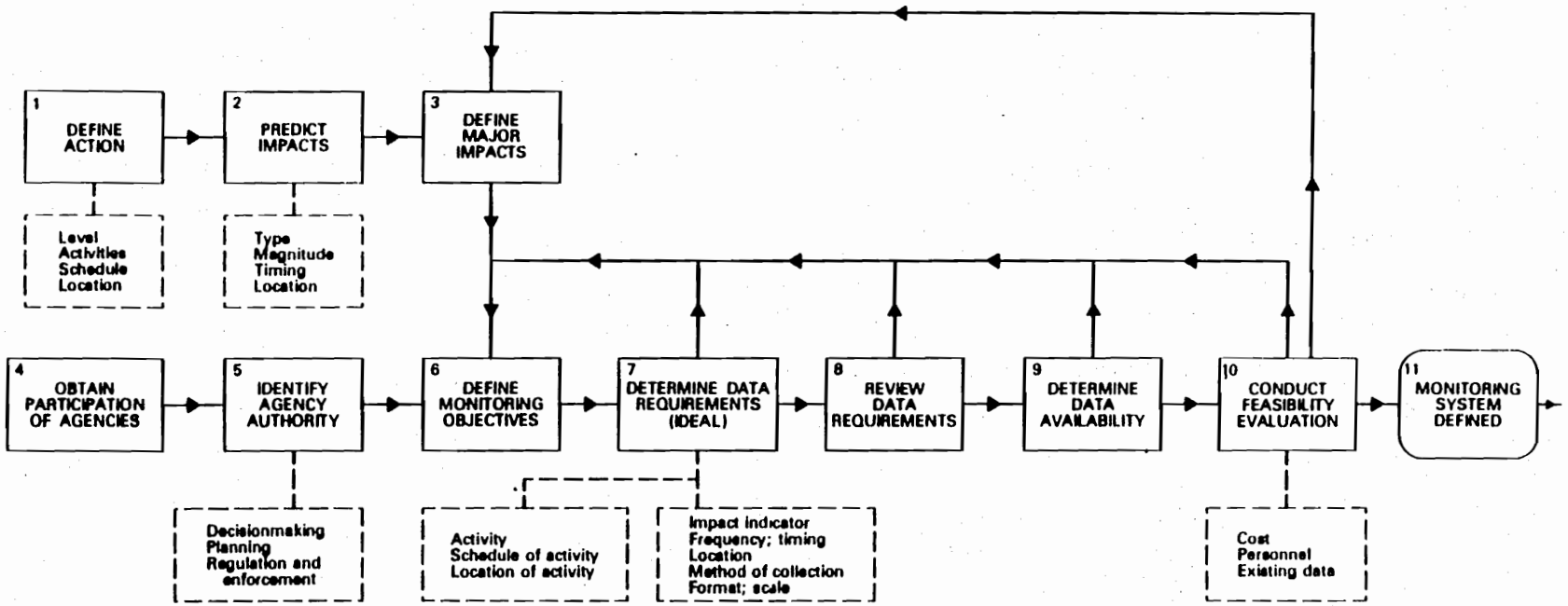
Work element	Objectives	Tasks necessary to achieve objectives	Products or results
12. Implement monitoring system—Continued		system; and assisting agencies obtain funding for data collection and for carrying out mitigating measures as needed.) 4. Prepare formal written agreement of agency responsibilities; obtain approval. 5. Obtain needed funding.	Formal agreement among participating agencies establishing monitoring system. Funding arrangement for operation of the monitoring system.
13. Collect data	To collect data required for defined monitoring objectives.	1. Collect data and submit results.	Data formatted for integrated storage/retrieval.
14. Analyze data	To determine the level, location, and duration of activities and impacts.	1. Determine activity and impact levels. 2. Define location of activities and impacts. 3. Determine duration of activities and impacts. 4. Correlate activity and impact data.	Analytical report of relationship of activities to impacts.
15. Evaluate impacts	To evaluate the significance of impact levels.	1. Identify impact trends; identify rate of change. (The rate at which an impact is increasing is significant because of the need to respond to impact trends in a timely fashion before critical impact levels are reached.) 2. Identify impacts that have reached critical impact levels. (Critical impact levels requiring immediate notification of participants should be set for each impact being monitored.) 3. Identify impacts that have exceeded legal limits.	Report(s) describing impact trends, critical level impacts, impacts not in conformance with regulations and standards, and successful mitigating measures.

From Marcus (1979).

TABLE 9.—*Explanation of flow chart of monitoring methodology: Phase II. Implementation and Operation of a Monitoring System*—Continued

Work element	Objectives	Tasks necessary to achieve objectives	Products or results
15. Evaluate impacts—Continued		4. Evaluate effectiveness of mitigating measures.	
16. Response by regulatory or responsible agencies	To use agencies' decision-making, planning, regulation, and enforcement authorities to reduce and prevent impacts.	1. Plan responses to impact trends. (Responses to unacceptable impacts can be directed at the activity causing the impact or at the impact itself. For example, surface mining causes destruction of wildlife habitat. Wildlife habitat destruction can be mitigated by: (1) stopping or reducing the activity, e.g., reducing the area of land surface disturbance or converting from surface to underground mining, or (2) modifying the impact, e.g., developing wildlife habitat areas to replace destroyed habitat.)	Plans for responding to impact trends.
		2. Respond to critical impact levels: stop or modify activities causing impact; treat impact.	Implementation of actions that reduce impact levels.
		3. Respond to nonconformance with regulations and standards through enforcement and prosecution. Develop additional regulations, standards, and legal authority as needed.	Enforcement of regulations and standards; establishment of additional legal constraints.
		4. Respond to evaluations of mitigating measures: revise, terminate, or add mitigating measures as appropriate.	Effective mitigating measures.
17. Document changes	To maintain record of (1) impact levels that result from projects and (2) effectiveness of mitigating measures in reducing impact levels.	1. Prepare report.	Annual summary report.
End products:	Input to future EIS; reduction, control of impacts.		

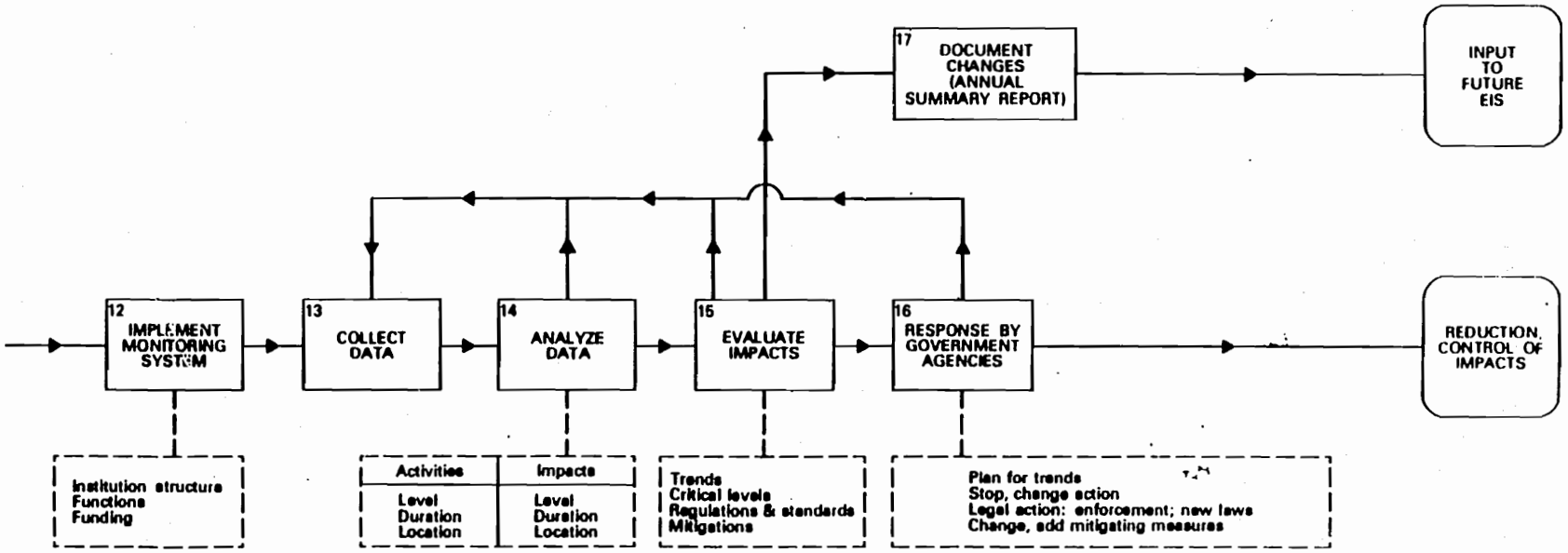
From Marcus (1979).



MONITORING METHODOLOGY FLOW CHART: PHASE I. DEVELOPMENT OF A MONITORING SYSTEM

Flow chart should be used with explanation provided in table 8. The solid numbered boxes correspond to the work elements listed in the table. Dashed boxes are annotations. The rounded box represents a decision point.

From Marcus (1979).



MONITORING METHODOLOGY FLOW CHART: PHASE II. IMPLEMENTATION AND OPERATION OF A MONITORING SYSTEM

Flow chart should be used with explanation provided in table 9. The solid numbered boxes correspond to the work elements listed in the table. Dashed boxes are annotations. The rounded boxes represent end points.

From Marcus (1979).

Annex 1

INDICATIVE LIST OF ENVIRONMENTAL FACTORS TO BE MONITORED
Excerpts from Volume II Sectoral Guidelines World Bank Environmental Assessment SourceBook Electronic Version[1]

Monitoring Related To Dams and Water Retention Facilities

Factors to be monitored for dams and water retention facilities should include:

- rainfall
- stored water volume in the reservoir
- annual volume of sediment transported into reservoir
- water quality at dam discharge and at various points along the river (such as, salinity, pH, temperature, electrical conductivity, turbidity, dissolved oxygen, suspended solids, phosphates, nitrates)
- hydrogen sulfide and methane generation behind dam
- limnological sampling of microflora, microfauna, aquatic weeds and benthic organisms
- fisheries assessment surveys (species, populations. etc.) in the river and reservoir
- wildlife (species, distribution, numbers)
- vegetation changes (cover, species composition, growth rates, biomass) in the upper watershed, reservoir drawdown zone, and downstream areas
- increases in erosion in the watershed
- impacts on wildlands, species or plant communities of special ecological significance
- public health and disease vectors
- in and out-migration of people to area
- changes in economic and social status of resettlement populations and people remaining in the river basin

Monitoring Related to Fisheries Activities

Factors to be monitored for fisheries activities include:

The following excerpts were derived from a search on the *keyword*: 'monitoring' under the electronic version of the *World Bank Environmental Sourcebook: Volume II Sectoral Guidelines*. 1991.

SRCBOOK.* August 21, 1996

Capture Fisheries

- water quality (including pollution and oil spills)
- fish stocks (population size and structure)
- fish landings
- conformance by fishermen to regulations on equipment use, fishing areas, catch, fishing seasons
- presence of any discarded materials causing "ghost-fishing"
- effects of land use or water management on water quality and fishery resources
- condition of non-fish species, especially indicator species (those most susceptible to changes in water quality)
- contamination of fish or shellfish or presence of conditions which could lead to contamination (e.g., red tide, oil spills)
- condition of coastal zone habitats (mangroves, sea grass beds, coral reefs)

Culture Fisheries

- water quality in fish ponds or water bodies containing traps, nets or attachment substrates for nonmotile organisms
- water quality of fish pond effluent
- water quality and quantity of fish pond receiving waters
- hydrologic effects of fish ponds
- effect of aquaculture on local capture fisheries (population size and structure, health condition)
- presence of fish diseases or parasites
- contamination of fish or shellfish
- increase in water-borne or water-related disease vectors or human disease attributable to fish pond establishment

Fish processing

- water quality of influent to and effluent from fish processing plants
- changes in commercial and non-commercial (especially indicator) species down-stream of processing plants

Monitoring for Planning for Floodplain Management

Factors which influence the quantity of water entering and being withdrawn from the river, the land's capacity to absorb floodwater, and the potential damage from floods must be monitored in order to carry out proper planning for floodplain management. Direct and indirect impacts of flood control works should also be closely followed. Data to be collected in routine monitoring should include:

- quantity, intensity, timing and geographical distribution of rainfall

- storm patterns
- soil moisture conditions at various times of the year
- stream discharge (including records of annual peak discharge)
- storage, diversion and regulation of stream flows
- changes in drainage and other factors that affect stormwater runoff
- sediment content of the river water
- sedimentation problems in downstream areas
- changes in the river course and riverbed
- demographic changes in the floodplain and watershed areas
- rural and urban land uses (controlled and uncontrolled land use change on the floodplain and watersheds of the river)
- socioeconomic impacts resulting from the project (including changes to pre-project agricultural, pastoral, fishing practices)
- effects of flood control measures on riverine, estuaries or near-shore marine fisheries
- effects of flood control measures on floodplain vegetation
- effects of flood control measures on wildlands, wildlife habitats and wildlife populations

Monitoring Forestry Projects

Monitoring in forestry projects is extremely important to determine that management plans are being followed and that the forest stand treatments are achieving the desired results.

The following factors should be monitored for logging:

- loggers, harvesters and road builders adhere to conditions set forth in their contracts designed to minimize environmental impacts
- harvesting and transportation do not create unanticipated environmental problems (monitoring of soil erosion, soil fertility, stream water quality, groundwater level, vegetation and wildlife changes)
- changes in species and site conditions are identified and stand treatment prescriptions are altered as appropriate
- only designated areas are accessed and only the specified species and volumes are harvested
- natural regeneration after harvesting occurs as predicted (rate of cover restoration, rate of regeneration of various species)
- objectives of the overall development project are being met and infrastructure to regulate and manage the project is adequate
- no unpredicted socioeconomic impacts occur and if so adequate steps are taken to mitigate them, and that a mechanism exists for community organizations to monitor and evaluate the project and voice their concerns on a regular basis
- financial distributions are legal and according to contracts and these are adjusted in the event that social services are over-burdened or costs exceed predicted values

The following factors should be monitored under reforestation and plantation:

- environmental impacts of site preparation and replanting quality of planting stock
- growth rates of the plantation
- weed problems
- presence of pests and disease
- management treatments: if being done properly and according to schedule
- protection of the stands
- market trends
- distribution of revenues and benefits from the plantations
- changes in costs and benefits as conditions change
- recalculation of costs and benefits as conditions change
- pressure on agriculture, land tenure, natural forests
- environmental impacts of harvesting
- long-term viability of the plantation from ecological, economic and managerial standpoints

Monitoring Irrigation Projects

Factors to be monitored for an irrigation system should include:

- climate (wind, temperature, rainfall, etc.)
- stream discharge above the irrigation project and below at various points
- nutrient content of discharge water
- flow and water levels at critical points in the irrigation system
- water table elevations in project area and downstream
- water quality of project inflows and return flows
- quality of groundwater in project area
- water salinity levels in coastal wells
- physical and chemical properties of soil in irrigation area
- agricultural acreage in production
- cropping intensity
- crop yield per unit of land and water
- erosion/sedimentation rates in project area
- relation between water demand and supply of users (equitability of distribution)
- condition of distribution and drainage canals (siltation, presence of weeds, condition of linings)
- upstream watershed management (agricultural extent and practices, industrial activity)
- incidence of disease and presence of disease vectors
- health condition of project populations
- changes in natural vegetation in the project area and on the floodplain downstream
- changes in wildlife populations in the project area and on the floodplain downstream
- fish population and species

Monitoring Livestock Projects

Factors to be monitored in a livestock project should include:

- range condition (assessment of present state of health of the range in relation to its potential)
- range trend (direction of change of range condition)
- availability of and access to natural fodder and forage, cultivated fodder, and imported feedstuffs (in stallfed animals)
- numbers and types of animals
- seasonal distribution and movement of animals
- condition of the livestock (weight, presence of disease, other health indices)
- condition of the soil (i.e., signs of increased erosion, compaction, decreased fertility, etc.)
- water points (location, condition, and intensity of use, and condition of vegetation around the water points)
- market conditions (changes in price, development of alternative markets, etc.)
- changes in economic indices of livestock producers (e.g., income levels and health)
- changes in social organization
- external land use changes and demographic changes which have impacts on the range resource and livestock producers
- changes in wildlife populations and habitat due to livestock production

Monitoring Road Construction

Monitoring of the impacts of road construction will consist of looking at the following:

- the "performance" of the installation after construction
- erosion during and after construction
- the installation of erosion control and drainage works to ensure that it is adequately done
- verification that proper waste disposal at the construction is carried out (cut and fill material, used oil, human waste, trash, debris, etc.).

Monitoring Tourism Development[1]

Monitoring plans should include baseline data and periodic review of objectives to determine if plans are being realized. Typical profiles can be developed for protected and ecologically sensitive areas such as beaches, wetlands, reefs; water quality and sediment loading in all water bodies; erosion and sedimentation impacts associated with infrastructure development such as roads, ports, harbors, marinas, hotels, shopping centers and the like; impacts associated with recreational

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World Bank Environmental Assessment Sourcebook: Volume II - Sectoral Guidelines. 1991 , p..227, para. 21.

activities such as reef diving, spear fishing, use of all-terrain vehicles, and access to areas previously denied; degree of staging/phasing of development and any observed impacts; demands on transportation and other infrastructure such as water supply, wastewater treatment and solid waste disposal capacity, and the observed system responses; effects on local and regional society and economy.

Annex 2

EXAMPLE OF AN NRM PROJECT MONITORING AND EVALUATION PLAN OUTLINE
GUINEA NATURAL RESOURCES MANAGEMENT PROJECT MONITORING AND EVALUATION PLAN [1]

1. EXECUTIVE SUMMARY

2. PROJECT BACKGROUND
- 2.1. General Description of the GNRM Project
- 2.2. Description of the Three Target Watersheds

3. PROJECT MONITORING AND EVALUATION
- 3.1. M&E Objectives
- 3.2. M&E and the NRM Analytical Framework

4. BASELINE DATA
- 4.1. Categories of Baseline Data
  - 4.1.1. Demographic data
    - Total population of each watershed
      - Population of each village
      - Number of households in each village
      - Disaggregate by gender
      - Disaggregate by age
      - Disaggregate by educational level
    - Seasonal migration of population
  - 4.1.2. Updated maps of villages
    - Names and distances between all villages
    - Total surface area of each target watershed
    - Location of all project interventions
  - 4.1.3. Socioeconomic data
    - Proxies for household income/expenditures
      - Household inventories (radio, stove, cooking materials, agricultural tools, bicycles, etc.)
      - Type of housing construction
      - Number of grain storage facilities
      - Number of livestock
      - Marketed farm production
      - Expenditures on social events
  - 4.1.4. Current and targeted locations of all project interventions
    - Names of villages and families participating in each type of project activity
    - Number of new adopters and size of fields, enterprises

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1 Source: Son Nguyen, AID Guinea, A/CONF.151/26 (Vol. III), English

- Number of beneficiaries/intervention

4.1.5. Enterprises

- Numbers and types of small enterprises and project-supported enterprises per village
- Type of products sold and prices
- Household-level information on occupation of family members

4.1.6. Land use/tenure

- Woodland vs crop land
- Classified forest location, size
- Tenant vs land owners (gender rights to land
- Resource user groups and functions (number of trees planted, where)
- Household use of wood for fire

4.1.7. Agricultural Practices

- Number and types of interventions practiced
- Types and sizes of fields (tapades, external, low land)
- Types of crops, field size and yields (by gender)
- Types and number of livestock
- Marketed production of each crop/livestock (by gender)
- Market prices of agricultural goods
- Grain storage facilities
- Period of food shortage

4.1.8. Climatic data

- Monthly rainfall and number of days of precipitation
- Monthly temperature fluctuations
- Humidity

4.1.9. Natural resource endowment

- Soil fertility (organic matter, N, P, K/ Ca, Mg, pH, soil texture and structure, moisture content, water erosion)
- Number of spring and water flow
- Water quality (physical and chemical properties, biological contamination)
- Fallow period/length
- Natural vegetation (ratio of areas of natural vegetation over total area; percentage of trees/shrubs cover of total cultivated area)
- Wildlife (list and numbers of permanent and migratory species occurring, mapping of habitats)

4.2. Baseline Data Collection Procedures

4.2.1. Secondary data sources

4.2.2. Household surveys

4.2.2.1. Sample selection

4.2.2.2. Questionnaire

4.2.2.3. Timing of household surveys

4.3. Reporting Responsibilities

4.4. Establishment of a Data Base

5. PROGRESS INDICATORS

5.1. Categories of Progress Indicators

5.1.1. Primary Progress Indicators

- Types and number of training sessions, number of participants attending, and locations
- Extension activities in villages, number of participants, and locations
- Tables of all monthly interventions by locations

5.1.2. Secondary Progress Indicators

- Number (by gender) of people participating in each intervention
- Number of villagers (by gender) adopting each intervention
- Surface area covered by each agricultural intervention
- Quantity produced/marketed and value sold/traded by project supported enterprises
- Number of resource user groups (RUG) still functioning vs total number of RUGs formed
- Number of live trees vs total number of trees planted (survival rate)
- Total area protected by fire breaks established
- Number of capped springs and wells maintained by RUGs vs the number of sites completed
- Number of flood control canals maintained by RUGs vs the number of sites completed

5.2. Progress Indicator Collection Procedures

5.2.1. Project technicians' records

5.2.2. Field visits

5.2.3. Interviews of participating villagers

5.3. Reporting Responsibilities and Frequency

5.4. Database Maintenance

6. IMPACT INDICATORS

6.1. Categories of Impact Data

6.1.1. Biophysical Impact Indicators

- Changes in soil fertility
- Changes in water flow
- Changes in water quality
- Changes in vegetative cover
- Changes in wildlife population and habitat

6.1.2. Socioeconomic Indicators

- Changes in land use and tenure
- Changes in agricultural productivity and marketing
- Changes in household incomes and expenditures

6.2. Collection Procedures

6.2.1. Socioeconomic surveys

6.2.2. Field surveys

6.2.3. Soil and water analysis

6.3. Reporting Responsibilities and Frequency

6.4. Database Maintenance

7. USE OF M&E FINDINGS

- 7.1. Improvement of Project Performance
- 7.2. Project Reorientation and/or Redesign
- 7.3. Mitigation of Negative Environmental Impacts
- 7.4. Design of Future Projects

8. IMPLEMENTATION PLAN

- 8.1. Financing and Budgeting
- 8.2. Responsibilities
  - 8.2.1. Management Consultants
  - 8.2.2. Chemonics
  - 8.2.3. Farmers
  - 8.2.4. GOG/MARA/DNFC
  - 8.2.5. USAID
- 8.3. Calendar of Activities

9. ISSUES

- 9.1. Sustainability
- 9.2. Establishment of a National M&E System

Annex 3

EXCERPTS FROM THE ELECTRONIC COPY OF THE WORLD BANK ENVIRONMENTAL ASSESSMENT SOURCEBOOK ON ENVIRONMENTAL MITIGATION[1]

Environmental Mitigation or Environmental Management Plan

1. A project's mitigation or environmental management plan consists of the set of measures to be taken during implementation and operation to eliminate, offset, or reduce adverse environmental impacts to acceptable levels. Also included in the plan are the actions needed to implement them. Mitigation plans are essential elements of category A projects (see Annex E). Mitigation plans alone suffice for many category B projects. During the preparation of a mitigation plan, project sponsors and their EA design team (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements.

2. A mitigation or management plan should include the following items:

(a) identification and summary of all the significant adverse environmental impacts that are anticipated;

(b) description and technical details for each mitigation measure, including the type of impact to which it relates and the conditions under which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate;

(c) institutional arrangements -- the assignment of the various responsibilities for carrying out the mitigatory measures (e.g., responsibilities which involve operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training);

(d) implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans;

(e) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) provide information on the progress and results of mitigation; and

(f) integration into the total project cost tables of the cost estimates and sources of funds

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Produced from the *World Bank Environmental Sourcebook* Electronic Copy (1991), by using the *keyword*: 'mitigation.'

for both the initial investment and the recurring expenses for implementing the mitigation plan.

3. To strengthen environmental management capability in the agencies responsible for implementation, most mitigation plans cover one or more of the additional topics identified below:

a) technical assistance programs;

(b) staff development;

(c) procurement of equipment and supplies, and;

(d) organizational changes.

4. The borrower's decision to proceed with a project, and the Bank's decision to support it, will be in part predicated on the expectation that the mitigation plan will be executed effectively. Consequently, it is important to integrate the plan into the project's overall planning, design, budget, and implementation. Such integration should be achieved by establishing the mitigation plan as a component of the project. This precaution ensures that the plan will receive funding and supervision along with the other investment components.

5. Specific links should exist for (a) funding, (b) management and training (strengthening local capabilities), and (c) monitoring. The purpose of the first link is to ensure that the proposed actions are adequately financed. The second link helps embed in the overall management plan the training, technical assistance, staffing, and other institutional strengthening needed to implement the mitigatory measures. The third link is necessary to provide a critical path for implementation and to enable the sponsors and the Bank to evaluate the success of mitigation as a part of project supervision and as a means for improving future projects. These linkages may be part of the conditionality in Loan Agreements or in the Minutes of Negotiations.

Annex 4

WORLD BANK TECHNICAL PAPER NUMBER 140

Environmental Assessment Sourcebook

Volume II
Sectoral Guidelines

Environment Department

The World Bank
Washington, D.C.

Table 8.1. Agroindustry

Potential Negative Impacts	Mitigating Measures
Direct: Site Selection	
1. Siting of plant or facility complex on/near sensitive habitats.	1. • Location of plant in rural area away from estuaries, wetlands, or other sensitive or ecologically important habitats, or in industrial estate to minimize or concentrate the stress on local environment and services. • Involvement of natural resource agencies in review of siting alternatives.
2. Siting of agroindustry along water courses leading to their eventual degradation.	2. • Site selection examining alternatives which minimize environmental effects and not preclude beneficial use of the water body using the following siting guidelines: • on a watercourse having a maximum dilution and waste absorbing capacity • in an area where wastewater can be reused with minimal treatment for agricultural or industrial purposes • within a municipality which is able to accept the plant wastes in their sewage treatment system
3. Siting of agroindustry so that air pollution problems are aggravated.	3. Location of plant at a high elevation above local topography, in an area not subject to air inversions, and where prevailing winds are away from populated areas.
Direct: Agricultural Practices	
4. Environmental deterioration (erosion, contamination of water and soil, loss of soil fertility, disruption of wildlife habitat, etc.) from intensification of agricultural land use.	4. Control of agricultural inputs and cropping/grazing practices to minimize environmental problems.

Table 8.1. Agroindustry (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Plant Operation	
5. Aggravation of solid waste problems in the area.	5. • For facilities producing large volumes of waste, incorporation of the following guidelines in site selection: • plot size sufficient to provide a landfill or on-site disposal • proximity to a suitable disposal site • convenient for public/private contractors to collect and haul solid wastes for final disposal
6. • Water pollution from discharge of liquid effluents. • Plant: TSS; temperature; pH • Materials storage piles runoff: TSS; pH	6. Laboratory analysis of liquid effluent (including cooling water runoff from waste piles) in O/G, TDS, TSS, BOD, COD and in-situ temperature monitoring. <u>All plants, or as indicated by agroindustry type</u> • No cooling water discharge; if recycling not feasible, discharge cooling water only if receiving water temperature does not rise >3°C. • Maintain pH level of effluent discharge between 6.0 and 9.0. • Control effluent to EPA specified limitation (40 CFR 405-409;432) for specific process. • Land application of waste effluents where appropriate; the "Industrial Hazard Management" section should be consulted for guidelines regarding industrial hazardous materials.
7. Particulate emissions to the atmosphere from all plant operations.	7. Control of particulates by fabric filter collectors or electrostatic precipitators.

Table 8.1. Agroindustry (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Plant Operation (continued)	
8. Gaseous and odor emissions to the atmosphere from processing operations.	8. Control by natural scrubbing action of alkaline materials; an analysis of raw materials during feasibility stage of project can determine levels of sulfur to properly design emission control equipment.
9. Accidental release of potentially hazardous solvents, acidic and alkaline materials.	9. Maintenance of storage and disposal areas to prevent accidental release; provide spill mitigation equipment.
Indirect	
10. • Occupational health effects on workers due to fugitive dust, materials handling, noise, or other process operations. • Accidents occur at higher than normal frequency because of level of knowledge and skill.	10. • Development of a Safety and Health Program in the facility designed to identify, evaluate, and control safety and health hazards at a specific level of detail to address the hazards to worker health and safety and procedures for employee protection, including any or all of the following: • site characterization and analysis • site control • training • medical surveillance • engineering controls, work practices and personal protective equipment • monitoring • information programs • handling raw and process materials • decontamination procedures • emergency response • illumination • regular safety meetings • sanitation at permanent and temporary facilities

Table 8.1. Agroindustry (continued)

Potential Negative Impacts	Mitigating Measures
Indirect (continued)	
11. Regional solid waste problem exacerbated by inadequate on-site storage.	11. Plan for adequate on-site disposal areas assuming screening for hazardous characteristics of the leachate is known.
12. Transit patterns disrupted, noise and congestion created, and pedestrian hazards aggravated by heavy trucks transporting raw materials and products to/from facility.	12. Site selection can mitigate some of these problems, but special transportation sector studies should be prepared during project feasibility to select best routes to reduce impacts; transporter regulation and development of emergency contingency plans to minimize risk of accidents.
13. Disease transmission from inadequate waste disposal.	13. Develop specifications for product preparation and/or processing, and waste disposal processes; monitor fecal coliform or other bacteria; and require documentation of waste disposal site monitoring.

Table 8.1. Agroindustry (continued)

Potential Negative Impacts	Mitigating Measures

The following guidelines are World Bank guidelines. If they cannot be achieved, the appraisal and/or supervisory mission should fully document the reasons for deviations. Where local regulations differ from those below, the stricter regulations should prevail.

Leather Tanning and Finishing

Waste constituents:

Washing and soaking	BOD_5, TSS
Degreasing	BOD_5, TSS, O/G
Dehairing	BOD_5, TSS, pH, sulfides, nitrogen
Bating	Ammonia nitrogen
Pickling	Acids, salt
Tanning	Chromium, vegetable tannins
Retanning, coloring	Color, oil
Finishing	none

Leather Tanning and Finishing

EPA Effluent Guidelines and Standards or use the following general guidelines.

Constituent	A	B	C	D	E	F
BOD_5	2.8	3.2	2.6	1.0	3.2	1.4
TSS	3.0	3.6	2.8	1.2	3.6	1.6
O/G	1.1	1.3	1.0	0.48	1.3	0.68
Sulfides	0.010	0.012	0.010	0.004	0.012	0.006
Tot. Cr.	0.10	0.12	0.10	0.04	0.12	0.06
TKN	0.54	0.64	0.50	0.20	0.62	0.28
pH		6.0 to 9.0				
Fecal Col.		Not over 400 per 100 ml				

Plant Categories by Primary Process

A: Beamhouse - pulp hair; tanning-chrome; finishing
B: Beamhouse - save hair; tanning-chrome; finishing
C: Beamhouse - save hair; tanning-vegetable; finishing
D: Beamhouse - hair previously removed; tanned previously; finishing
E: Beamhouse - hair previously removed or retained; tanning-chrome; finishing
F: Beamhouse - pulp or save; tanning-chrome or no tanning; no finishing

Table 8.1. Agroindustry (continued)

Potential Negative Impacts	Mitigating Measures
<u>Palm Oil Mills</u> Waste streams are acidic and have high TSS, O/G, and BOD_5.	<u>Palm Oil Mill Effluent Control</u> Limitations for liquid effluent include: pH 6 to 9 BOD <100 mg/l COD <1000 mg/l TSS <500 mg/l It is feasible to achieve 100 percent reduction of pollutant and waste effluent discharged to surface waters by one of the following: • spray irrigation • land application • evaporation ponds • discharge to municipal sewage treatment systems
<u>Slaughterhouses</u> Most important liquid effluent parameters are: BOD_5, TSS, O/G, pH, and fecal coliform organisms.	<u>Slaughterhouse Maximum Daily Effluent Limitations</u> Plant Type / BOD (a) / TSS (b) / O/G / pH simple / 0.12 / 0.20 / 0.06 / 6-9 complex / 0.21 / 0.25 / 0.08 / 6-9 a) per kg Live wt killed b) per megagram MPN fecal coliform count <400 per 100 ml

Table 8.1. Agroindustry (continued)

Potential Negative Impacts	Mitigating Measures
<u>Wool Scouring</u>	
Raw waste contains significant quantities of O/G whose biodegradability constituents a special problem.	Grease recovery step is necessary to decrease potential pollution from O/G.
Sulfur is brought in with wool, as well as phenolic and other organic compounds; this could be discharged to receiving waters.	Liquid Effluent Guidelines: Mg = megagram; mg = milligram BOD_5 5 Kg/Mg product TSS 4 Kg/Mg product COD 20 Kg/Mg product O/G 7.2 mg/l Total Chromium 0.1 mg/l Phenol 0.1 mg/l Sulfide 0.2 mg/l Pesticides 0.01 mg/l

Table 8.2. Dams and Reservoirs

Potential Negative Impacts	Mitigating Measures
Direct	
1. • Negative environmental effects of construction: • air and water pollution from construction and waste disposal • soil erosion • destruction of vegetation, sanitary and health problems from construction camps	1. • Measures to minimize impacts: • air and water pollution control • careful location of camps, buildings, borrow pits, quarries, spoil and disposal sites • precautions to minimize erosion • land reclamation
2. Dislocation of people living in inundation zone.	2. Relocation of people to suitable area, provision of compensation in kind for resources lost, provision of adequate health services, infrastructure, and employment opportunities.
3. Loss of land (agricultural, forest, range, wetlands) by inundation to form reservoir.	3. Siting of dam to decrease losses; decrease size of dam and reservoir; protect equal areas in region to offset losses.
4. Loss of historic, cultural or aesthetic features by inundation.	4. Siting of dam or decrease of reservoir size to avoid loss; salvage or protection of cultural properties.
5. Loss of wildlands and wildlife habitat.	5. Siting of dam or decrease of reservoir size to avoid/minimize loss; establishment of compensatory parks or reserved areas; animal rescue and relocation.
6. Proliferation of aquatic weeds in reservoir and downstream impairing dam discharge, irrigation systems, navigation and fisheries and increasing water loss through transpiration.	6. Clearance of woody vegetation from inundation zone prior to flooding (nutrient removal); provide weed control measures; harvest of weeds for compost, fodder or biogas; regulation of water discharge and manipulation of water levels to discourage weed growth.

Table 8.2. Dams and Reservoirs (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
7. Deterioration of water quality in reservoir.	7. • Clearance of woody vegetation from inundation zone prior to flooding. • Control of land uses, wastewater discharges, and agricultural chemical use in watershed. • Limit retention time of water in reservoir. • Provision for multi-level releases to avoid discharge of anoxic water.
8. Sedimentation of reservoir and loss of storage capacity.	8. • Control of land use in watershed (especially prevention of conversion of forests to agriculture). • Reforestation and/or soil conservation activities in watersheds (limited affect). • Hydraulic removal of sediments (flushing, sluicing, release of density currents).
9. Formation of sediment deposits at reservoir entrance creating backwater effect and flooding and waterlogging upstream.	9. Sediment flushing, sluicing.
10. Scouring of riverbed below dam.	10. Design of trap efficiency and sediment release (e.g., sediment flushing, sluicing) to increase salt content of released water.
11. Decrease in floodplain (recession) agriculture.	11. Regulation of dam releases to partially replicate natural flooding regime.

Table 8.2. Dams and Reservoirs (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
12. Salinization of floodplain lands.	12. Regulation of flow to minimize effect.
13. Salt water intrusion in estuary and upstream.	13. Maintenance of at least minimum flow to prevent intrusion.
14. Disruption of riverine fisheries due to changes in flow, blocking of fish migration, and changes in water quality and limnology.	14. Maintenance of at least minimum flow for fisheries; provision of fish ladders and other means of passage; provide protection of spawning grounds; aquaculture and development of reservoir fisheries in compensation.
15. Snagging of fishing nets in submerged vegetation in reservoir.	15. Selective clearance of vegetation before flooding.
16. Increase of water-related diseases.	16. • Design and operation of dam to decrease habitat for vector. • Vector control. • Disease prophylaxis and treatment.
17. Conflicting demands for water use.	17. Planning and management of dam in context of regional development plans; equitable allocations of water between large and small holders and between geographic regions of valley.
18. Social disruption and decrease in standard of living of resettled people.	18. Maintenance of standard of living by ensuring access to resources at least equalling those lost; provision of health and social services.

Table 8.2. Dams and Reservoirs (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
19. Environmental degradation from increased pressure on land.	19. • Choice of resettlement site to avoid surpassing carrying capacity of the land. • Increase of productivity or improve management of land (agricultural, range, forestry improvements) to accommodate higher population.
20. Disruption/destruction of tribal/indigenous groups.	20. Avoid dislocation of unacculturated people; where not possible, relocate in area allowing them to retain lifestyle and customs.
21. Increase in humidity and fog locally, creating favorable habitat for insect disease vectors (mosquitos, tsetse).	21. Vector control.
Indirect	
22. Uncontrolled migration of people into the area, made possible by access roads and transmission lines.	22. Limitation of access, provision of rural development and health services to try to minimize impact.

Table 8.2. Dams and Reservoirs (continued)

Potential Negative Impacts	Mitigating Measures
Indirect (continued)	
23. Environmental problems arising from development made possible by dam (irrigated agriculture, industries, municipal growth).	23. Basin-wide integrated planning to avoid overuse, misuse, and conflicting uses of water and land resources.
External	
24. Poor land use practices in catchment areas above reservoir resulting in increased siltation and changes in water quality.	24. Land use planning efforts which include watershed areas above dam.

Table 8.3. Fisheries

Potential Negative Impacts	Mitigating Measures
Direct Impacts: Capture Fisheries	
1. Overexploitation of fisheries stock and long-term degradation of the resource base.	1. • Fisheries management for optimum sustained yield: • restricted harvests (minimum size limits, catch quotas, seasonal closures) • gear restrictions (trawl bans, specified net mesh sizes) • closure of areas (permanent reserves, periodic closures) • limited entry systems (licensing, exclusive access) • prohibited practices (use of explosives, drift nets) • consideration of sustainable traditional fishery practices and incorporation to extent possible in modern fisheries management systems
2. Capture of non-target species and habitat damage through use of certain equipment and fishing practices.	2. • Limitation or prohibition of use of such equipment and fishing practices. • Testing and pilot scale use prior to large scale introduction of new technologies. • Expanded use of fish by development of new products and markets.
3. Pollution from oil and fuel spills and leakage, and from bilge flushing.	3. • Public education programs on proper fuel and oil handling and bilge waste disposal. • Provision of storage and handling facilities, bilge evacuation and disposal services. • See "Inland Navigation" and "Port and Harbor Facilities" sections in Chapter 9.

Table 8.3. Fisheries (continued)

Potential Negative Impacts	Mitigating Measures
Direct Impacts: Capture Fisheries (continued)	
4. Diver and anchor damage.	4. • Public education programs for fishermen on effects of damage and ways to avoid it. • Installation of mooring buoys. • Designation of anchoring locations.
5. "Ghost-fishing" and navigational hazards from abandoned or lost fishing nets and traps.	5. Public education programs for fishermen on hazards of abandoning gear.
6. Use of explosives and poison.	6. Prohibition of practices and enforcement of regulations.
7. Introduction of exotics leading to degradation of native stocks.	7. Prohibition of exotics introduction.
Direct: Culture Fisheries	
8. Clearing/conversion of coastal wetlands for construction of ponds.	8. • Prohibition of ponds in area of particular ecological significance. • Limitation of area converted to ponds. • Intensified management in existing and new ponds to discourage "shifting aquaculture" and low-input, extensive aquaculture which converts large areas.

Table 8.3. Fisheries (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Culture Fisheries (continued)	
9. Erosion and siltation problems arising in construction phase.	9. • Restriction of clearance to area needed for ponds. • Pond construction during dry seasons. • Stabilization of exposed soil with grasses or other ground covering.
10. Competition of ponds for water and land resources demanded by other users.	10. • Assessment of existing traditional land and water use and agricultural, industrial and municipal demands. • Planning, management and continuing negotiations to reach acceptable distribution of resources. • Siting of pond to avoid disruption of traditional uses of water for washing and drinking. • Coordination of aquaculture ponds with other activities to double-up on water use (e.g., pond water reused for irrigation).
11. Loss of productivity or formation of toxic conditions in ponds from high temperatures, low oxygen and waste accumulation.	11. Adequate pond water exchange and frequent pond flushing.
12. Acidification of pond water due to hydrogen sulfide formation.	12. • Siting in areas not susceptible to acidification (avoid waterlogged soils high in pyrite and organic matter). • Adequate pond water exchange and flushing.

Table 8.3. Fisheries (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Culture Fisheries (continued)	
13. Local depletion of larval and juvenile organisms for pond stocking.	13. Production of larvae and juveniles in nursery.
14. Water pollution from pond effluent (nutrient-rich and with varying chemical content depending on intensity of pond management).	14. • Release into water body with adequate dilution and dispersal capability. • Dilution prior to release. • Timing of release with period of high water. • Shorter retention time of water in pond: more frequent pond water exchange and flushing. • Treatment of water prior to release.
15. Introduction of exotics with subsequent damage to native stocks by competition, predation, spread of disease and parasites.	15. • Avoidance of exotic introductions except where adequate knowledge of biology and life history of species indicates low risk of negative impacts and where adequate safeguards against escape are taken. • Regular monitoring for disease and parasites; if present and spreading, elimination of infected populations. • Consideration of using sterile hybrids.

Table 8.3. Fisheries (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Culture Fisheries (continued)	
16. Spread of disease in aquaculture stocks and into natural stocks when stocking becomes too dense.	16. • Monitoring of disease incidence. • Limitation of numbers when disease is positively correlated with fish densities. • If disease spreads, elimination of diseased individuals.
17. Concentration of pens, pilings, and rafts in natural (non-pond) water bodies to extent that navigation is hampered, water circulation is restricted, water quality is decreased, and capture fisheries precluded.	17. Regulation of aquaculture activity to limit it to acceptable intensity.
External Impacts: Capture Fisheries and Culture Fisheries	
18. Dams which alter water quality and stream flows and disrupt riverine and floodplain fisheries.	18. • Establishment of reservoir fishery. Water release management to minimize damage to fisheries (see "Dams and Reservoirs" section).
19. Irrigation schemes which alter water quality and quantity.	19. • Development of fishery activities in conjunction with irrigation systems (e.g., use of pond water for irrigation, traps and nets in irrigation canals). • Management of irrigation schemes to minimize damage to fisheries (see "Irrigation and Drainage" section).

Table 8.3. Fisheries (continued)

Potential Negative Impacts	Mitigating Measures
External Impacts: Capture Fisheries and Culture Fisheries (continued)	
20. Land use and agricultural practices in watersheds affecting sediment content and water quality.	20. • Integrated watershed planning and management. • Close coordination between fisheries and government agencies responsible for resource management in watersheds to alert them to impacts on fisheries.
21. Flood control measures damaging to water quantity and quality and aquatic habitats.	21. See "Flood Protection" section.
22. Pollution from industrial effluent, sewage and agrochemicals affecting fish survival and tainting fish.	22. See "Wastewater Collection, Treatment, Reuse, and Disposal Systems" section in Chapter 9; see also the sections on "Plant Siting and Industrial Estate Management" and "Industrial Hazard Management" in Chapter 10.
23. Air pollution and acid rain affecting fish survival.	23. See "Atmospheric Pollution" section in Chapter 2.
24. Coastal development involving dredging, filling, destruction of mangrove swamps, construction and infrastructure development.	24. See "Coastal Zone Management" section; "Port and Harbor Facilities" projects are discussed in Chapter 9.
25. Oil pollution from coastal and inland navigation, and spills from drilling, transport operations, and oil tankers (cleaning of tanks).	25. See the following sections in Chapter 9: "Inland Navigation" and "Port and Harbor Facilities"; "Oil and Gas Development--Offshore" and "Oil and Gas Development--Onshore" are examined in Chapter 10.
26. Water-based tourism development which conflicts with fishing activities.	26. See "Tourism Development" section in Chapter 9.

Table 8.3. Fisheries (continued)

Potential Negative Impacts	Mitigating Measures
Indirect Impacts: Capture Fisheries and Culture Fisheries	
27. Creation or expansion of port areas, shore facilities and infrastructure (roads, water, power) for processing and transport of fish products.	27. See "Plant Siting and Industrial Estate Management"; "Coastal Zone Management"; and "Port and Harbor Facilities."
28. Pollution from effluent discharged from industrial fish processing plants.	28. • Discharge into waters with adequate dilution and dispersal capabilities. • Water quality monitoring for suspended solids, oil and grease, dissolved oxygen, nitrogen and coliform. • Reduction of wastes by recycling into usable products, reduction of water use. • Treatment of waste prior to release.

Table 8.4. Flood Protection

Potential Negative Impacts	Mitigating Measures
Direct	
1. Flooding of lesser magnitude, but greater duration of floodplain downstream due to dam releases.	1. Adaptation by changes in agricultural practices.
2. Potential for structural failure and floodwaters higher than capacity of control structures/measures, leading to increased risk to life and property because local pre-project adaptations are relaxed or abandoned or increased development on the floodplain has occurred post-project.	2. Implementation of non-structural measures to prevent increased flood risk, and of a flood warning system.
3. Cycle of enrichment and groundwater recharge in floodplain soils broken.	3. Where dams are present, partial mitigation of effect by regulation of discharge to imitate natural flooding in a controlled way.
4. Resettlement of populations and other negative socioeconomic effects on populations and communities affected by the project.	4. • Identification of at-risk population groups or groups who may be adversely affected by flood control measures. • Incorporation of their interests and protection into project planning and cost analysis to minimize losses or provide in-kind compensation for losses.
5. Adverse effects on fisheries and other aquatic resources by disruption of migratory routes, deterioration of habitat and changes in water quality (e.g., sediment load), leading to reduced productivity of riverine, coastal and marine fisheries.	5. • Installation of fish passageways. Protection of reproductive sites for fish. • Incorporation of fishery management, including hatchery and restocking programs.

Table 8.4. Flood Protection (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
6. • Negative impacts of channelization measures: • disruption of fish habitat by elimination of pools, riffles and channel irregularities • increased water temperature by removal of vegetation on banks and in stream • increased erosion and sedimentation problems • bed and bank erosion • downstream flooding and sedimentation	6. • Careful selection of engineering options at planning stage. • Limitation of degree of channel modification or maintenance. • Mitigating measures after construction phase. • Minimize reduction of channel length and preserve some meanders. • Limit excavation and fill. • Limit destruction of bank and streamside vegetation. • Replant/reseed banks. • Excavate only one and not both banks, etc. (See Brookes 1988.)
7. Adverse effects of construction.	7. • Minimization of effects by avoiding impediments to natural drainage, uncontrolled run-off and soil erosion, and air pollution. • Provision for adequate filling of borrow areas, control of land clearing, and disposal of spoil. • Limitation of access of vehicles to stream bank.

Table 8.4. Flood Protection (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
8. Reduction of floodplain grazing, both through ecological changes on the floodplain and intensified development (e.g., irrigated agriculture).	8. • Production of fodder crops and usage of byproducts of irrigated food crops and development of alternative water sources. • Integration of existing rangeland use (e.g., semi-nomadic herding) with planned developments, to ensure substantial grazing and watering possibilities in valley during dry season.
9. Reduction of recession agriculture.	9. Maintenance of natural flooding regime to extent possible in most productive lands (and intensification of production) by maintaining water courses free of flood control structures or installing structures to enable semi-controlled flooding.
10. Obstacles (levees, dikes, etc.) to wildlife passage.	10. Construction of bridges or special crossing places.
11. Loss of wildlands and wildlife habitat.	11. Identification of critical habitats and planning of flood control measures to minimize effects; where habitats or species are dependent on natural flooding regime, minimize disruption of flow in that area to extent possible.
12. Flooding problems created downstream.	12. • Protection of natural overflow areas downstream. • Creation of overflow basins.

Table 8.4. Flood Protection (continued)

Potential Negative Impacts	Mitigating Measures
Indirect	
13. Improved accessibility, development opportunities in floodplain, and sense of security after flood control measures taken, leading to influx of people with associated agricultural development, deforestation, wildlife poaching, infrastructure development, etc.	13. • Limitation of access, if possible. • Planning for anticipated influx and implementation of companion rural development activities. • Introduction of non-structural control measures.
14. Increased fertilizer use on agricultural fields to compensate for loss of fertility, leading to water pollution and dependence on imported supplies.	14. • Optimal timing and rate of application. • Use of nitrogen fixing cover crops. • Use of organic instead of chemical fertilizers.

Table 8.5. Natural Forest Management

Potential Negative Impacts	Mitigating Measures
Direct: Logging	
1. • Soils • Erosion: disturbance of the forest understory and soil, increasing susceptibility to water erosion. • Slope stability: roadcuts across sloping terrain and clearing of vegetation on the slopes resulting in landslips and landslides. • Nutrient loss: loss of nutrients from timber harvesting and increased leaching; exposed, disturbed soils where vegetation has been removed. • Temperature: dramatic increase in temperature after removal of forest canopy, killing soil organisms or drying the soil to extent that regeneration is hindered. • Structure: compaction and loss of organic matter altering soil structure, and reducing infiltration, water holding capacity, aeration and root penetration; laterization.	1. • Avoid logging in the rainy season and establish criteria for logging on slopes and near water; and clearly mark areas that should not be harvested. • Supervise logging to reduce damage and encourage rapid regeneration. • Use low impact harvesting equipment and methods and minimize skid trail distances. • Locate log landing in well drained, easily accessible areas downslope so a straight skid road can be followed. • Restore land by grading and reseeding disturbed areas, including guidelines, locating them away from slopes and water and keeping them well maintained. • No whole-tree harvest in areas of low nutrient levels, leaving all but boles on the site.
2. • Vegetation • Species composition: species diversity decreased by selectively harvesting the best stems of valuable species. Soil conditions and light regimes created by various harvesting methods influencing regeneration dynamics of forest stands.	2. • Collect information or sponsor research on plant community dynamics, regeneration biology and silviculture of forest type. • Consider (and perhaps research) various regeneration and harvesting methods.

Table 8.5. Natural Forest Management (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Logging	
2. • Vegetation (continued)	
• Weeds: opening of the forest canopy resulting invasion of weeds, impeding natural regeneration and reforestation efforts. • Slash: logging debris as a fire hazard and impediment to regeneration. • Blow downs: increased danger due to opening up patches by logging.	• Collect information or sponsor research on plant community dynamics, regeneration biology and silviculture of forest type. • Consider (and perhaps research) various regeneration and harvesting methods. • Choose silvicultural system that will ensure regeneration and sustainable production and minimize damage (leave adequate number and quality of seed trees, selective harvest, small cuts to avoid large gaps). • Establish preserves/parks of ecologically significant forest areas, ensuring that area is large enough to maintain biological diversity, ecological processes and cultural assets.
3. • Wildlife	3. • Maintain inventory of and collection of research results on species present in the area.
• Fisheries: sedimentation, nutrient loading, changes in streamflow and water temperature caused by logging causing dramatic changes to fish populations. • Wildlife habitat: disruption of habitat, loss of tree species on which wildlife species depend, and disturbing migratory routes of wildlife leading to depletion of wildlife. • Presence of machines and people: disturbance of wildlife through logging and transport activities. • Poaching: increased poaching of wildlife due to influx of people resulting directly and indirectly from forestry activities.	• Plan harvesting intensity, methods and timing based on this information. • In particular, ascertain presence of or migratory use by endangered species through contact with wildlife professionals in government, NGOs and universities.

Table 8.5. Natural Forest Management (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Logging (continued)	
4. • Air	4. • Reduce burning.
• Dust: logging activities and timber transportation on dirt roads generating large amounts of dust in dry season or semi-arid zones.	• Avoid creating large tracts of open land.
	• Limit operations when dust and fire are a problem and plan transportation routes to avoid population centers.
5. • Water	5. • Maintain vegetation as buffer zones adjacent to every body of water.
• Extremes of flow: soil infiltration and water holding capacity of harvested areas reduced such that water runoff is much more pronounced, aggravating flooding when rains come and low flow during dry season.	• Assess impact of forestry on sediment and nutrient loading on stream flow and methods used to reduce impact.
• Groundwater recharge: rain water recharge of aquifers reduced due to increased runoff.	• Provide adequate waste disposal facilities.
• Ponding and stagnation: land form changes, water course obstruction and soil compaction causing localized ponding and stagnation. Increased sedimentation altering natural aquatic biology and water course features.	• Procedure for use and storage of chemicals, oil and fuel to minimize potential for pollution.
• Increased temperature: opening of the forest canopy adjacent to water body increasing water temperature, which alter aquatic biology and water chemistry.	
• Contamination: water pollution from petroleum products, herbicides and organic waste associated with forestry operations. Turbidity due to increased sediment loading altering sunlight penetration, affecting aquatic plants and damaging fish species.	

Table 8.5. Natural Forest Management (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Logging (continued)	
6. • Social and Cultural • Local economic and social customs: impacts on labor market and labor availability for food production, a shift to more cash-based economy, alteration of daily living patterns and political power structure changes are common. • Land tenure and traditional forest uses: hunting, gathering and traditional exploitation of forest resources disrupted; limitation of access of resources by local populations. • Overloading of infrastructure and social services (e.g., housing, education and health services) by in-migration of forest workers and spontaneous settlers and social problems such as an increase in crime, alcoholism, disease and violence.	6. • Incorporate local communities in planning and execution of project. • Develop local infrastructure to handle increase in population (i.e., waste disposal, school, health care and law enforcement). • Protect significant cultural landmarks and traditional land and resource use patterns. • Establish clear, long-term jurisdiction over the forest emphasizing local involvement in decision making. • Involve local leaders in protection to avoid illegal harvesting or settlement. • Monitor and control disease.
Indirect: General	
7. • Increased access: roads opening forest areas causing uncontrolled population in-migration with subsequent problems.	7. See "Rural Roads" section.
Indirect: Road Construction and Transport	
8. • Direct impacts (e.g., increased soil erosion and sedimentation of surface water) and indirect impacts of road construction (see "Rural Roads" section).	8. Align route, drainage works, etc. (See No. 7.)

Table 8.5. Natural Forest Management (continued)

Potential Negative Impacts	Mitigating Measures
Indirect: Road Construction and Transport (continued)	
9. • Degradation of existing public roads by heavy timber loads.	9. • Restrict load size. • Use road taxes to upgrade road.
External	
10. Cattle-ranching operations that clear forests for pasture.	10. See "Livestock and Rangeland Management" section.
11. Conversion to commercial agriculture (rubber, oil palm, coffee, rice, etc.).	

Table 8.6. Plantation Development/Reforestation

Potential Negative Impacts	Mitigating Measures
Direct: Site Preparation	
1. Soil erosion from clearing site.	1. • Reestablishment of forest cover as soon as possible after clearing. • Use of fast growing, intermediate tree crops or mulching of exposed soils. • No clearing on steep, unstable slopes or highly erosive soils. • Limitation of plantation size or stand sizes. • Limitation of site preparation to dry season.
2. Soil compaction and puddling by machinery.	2. • Limitation of use of machinery. • Manual site preparation.
3. • Loss of organic matter and nutrients by removal of vegetation and leaching. • Development of hardpans and laterization.	3. • Rapid replanting. • Cover crops. • Mulching.
4. Where burning is involved, air pollution from smoke.	4. • Limitation of use of fire and size of burn where possible. • Burning in wet season.

Table 8.6. Plantation Development/Reforestation (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Plantation Management and Harvesting	
5. Soil erosion from harvesting.	5. • Replanting as soon as possible after cut. • Avoidance of clear cutting; practice of "small coupe logging" (characterized by checkerboard pattern of alternating small cuts with unlogged areas). • Limitation of harvesting to dry season or season of low rainfall. • Planning of felling to minimize log skidding and avoidance of skidding logs parallel to slope. • Stabilize skid trails as soon as possible after use. • Use of animals instead of skidders for extraction.
6. Loss of nutrients from the system by thinning and clear cutting and by whole-tree harvest.	6. • Logging debris left on ground after harvesting and removal of boles only (no whole-tree harvesting). • Planting of cover crops between rotations; addition of fertilizer to compensate for nutrients loss.
7. Use of fertilizer, pesticides and herbicides having negative impacts on-site and on quality of local water bodies.	7. • Limitation of potential of pest and disease infestations by choice of resistant species. • Choice of chemicals with least potential negative impacts. • Controlled use of chemicals.

Table 8.6. Plantation Development/Reforestation (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Plantation Management and Harvesting (continued)	
8. Chemical and biological changes in the soil as litter becomes dominated by one or a few species and decomposition dynamics are altered.	8. Limitation of size of stands and interspersal with stands of native vegetation.
9. • Direct damage in harvesting operations by dragging and skidding logs causing compaction. • Localized soil erosion and unequal distribution of debris and organic matter over the site.	9. • Use of manual methods or animal power for clearing forest instead of mechanical means. • In short rotation plantations plan use of same tracks and loading areas in harvesting operations to protect as much of site as possible.
10. In semi-arid zones depletion of soil moisture and lowering of water table in plantation area.	10. • Choice of low water demanding species. • Water catchment and conservation techniques to minimize runoff and evaporation losses and maximize infiltration.
11. Build up of organic matter under plantations posing a fire hazard.	11. Periodic clearing or burning to keep volume low.
12. Increased sedimentation of streams.	12. • Buffer zones of undisturbed forest 20-40 m wide along streams. • Avoidance of earthfill dams across streams as crossings. • Sediment traps in streams. • Avoidance of skidding trees in stream.

Table 8.6. Plantation Development/Reforestation (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Plantation Management and Harvesting (continued)	
13. Increased organic matter entering surface waters in form of leaf litter and logging debris or from logs transported on river leading to decrease in water quality and perhaps eutrophication, and navigational hazards.	13. • Buffer zones along streams. • Spaced transport of logs in river over time.
14. Soil erosion from logging roads.	14. • Siting of roads on ridge tops or valley bottoms and avoidance of steep grades on hillsides. • Engineering to ensure proper drainage or provision of drainage measures. • Stabilization of road cuts with mulch, wood chips, etc. • Minimized use of borrow pits or stabilization after use. • Proper road maintenance. • Use of rivers for log transport (see also "Rural Roads" section).
Displacement of Other Ecosystems	
15. Loss of habitat and decreased biological diversity by replacement of natural forest by plantations with limited number of species and increased uniformity of forest structure.	15. • Protection of natural forest area with particularly high or unique biological diversity. • Limitation of plantation establishment to degraded sites or sites of low diversity.

Table 8.6. Plantation Development/Reforestation (continued)

Potential Negative Impacts	Mitigating Measures
Displacement of Other Ecosystems (continued)	
	• Increase in number of species planted and avoidance of monocultures over large area.
	• Restriction of size of individual stands and mixing of stands of various age classes.
	• Conservation of islands of untouched forest or natural vegetation.
	• Separation of stands by belts of native vegetation and use of native species as plantation species.
16. Increased potential for massive loss by pests or pathogens (through simplification of natural ecosystem, provision of abundant food for pest, increased pest habitat, absence of natural controls (e.g., in the case of introduced exotic tree species).	16. • Use of native species.
	• Choice of species and provenances with pest or disease resistance.
	• Rotation length to minimize susceptibility (e.g., cutting before trees are overmature).
	• Thinning and other stand improvement measures to remove dead and diseased material, and wood residues which act as centers for infection.
	• Direct pest or disease control.
17. Loss of forest products from native species.	17. Careful evaluation of local use of forest products to accommodate continued use and determine feasibility of developing local industries based on these goods.

Table 8.6. Plantation Development/Reforestation (continued)

Potential Negative Impacts	Mitigating Measures
Displacement of Other Ecosystems (continued)	
18. Spread of plantation species outside of plantation becoming a nuisance, competing with native species and becoming weeds in agricultural fields.	18. Species choice to avoid ones that will grow out of control from desired site.
Socioeconomic Impacts	
19. Social impacts from influx of people from outside, both wage earners and spontaneous setters, induced by road building into remote areas (direct and indirect impacts).	19. See the following sections: "New Land Settlement"; "Indigenous Peoples"; and "Induced Development."
20. Problems related to land tenure and land and resource use rights leading to unequitable sharing of costs and benefits of the project.	20. • Genuine integration of local communities and peoples in project planning and implementation. • Pre-project socioeconomic surveys and assessments and land and resource use studies. • Provision of alternatives which fairly compensate local people who incur losses.

Table 8.7. Irrigation and Drainage

Potential Negative Impacts	Mitigating Measures
Direct	
1. Soil erosion (furrow, surface).	1. • Proper design and layout of furrows or field avoiding too steep a gradient. • Land leveling. • Design of terraces on hillside minimizing surface erosion hazard.
2. Soil erosion (with sprinkler irrigation on hilly area).	2. Design of sprinkler system minimizing erosion hazard assuring infiltration rate exceeds application rate of the sprinklers.
3. Waterlogging of soils.	3. • Regulation of water application to avoid overwatering (including controlled turn-out to allow cutting off water supply to irrigation ditches). • Installation and maintenance of adequate drainage system. • Use of lined canals or pipes to prevent seepage. • Use of sprinkler or drip irrigation.
4. Salinization of soils.	4. • Measures to avoid waterlogging: • leaching of salts by flushing soils periodically • cultivation of crops with salinity tolerance

Table 8.7. Irrigation and Drainage (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
5. Scouring of canals.	5. Design of canal system to minimize risk and use of lined canals.
6. Clogging of canals by sediments.	6. • Measures to minimize erosion on fields. • Design and management of canals to minimize sedimentation. • Provision of access to canals for removal of weeds and sediments.
7. Leaching of nutrients from soils.	7. • Avoidance of overwatering. • Replacement of nutrients by fertilizers or crop rotations.
8. Algal blooms and weed proliferation.	8. Reduction of input to and release of nutrients (nitrogen and phosphorous) from fields.
9. Clogging of canals by weeds.	9. • Design and management of canals to minimize weed growth. • Provision of access to canals for treatment or removal of weeds.
10. Deterioration of river water quality below irrigation project and contamination of local ground water (higher salinity, nutrients, agrochemicals) affecting fisheries and downstream users.	10. • Improved water management; improved agricultural practices and control of inputs (particularly biocides and chemical fertilizers). • Imposition of water quality criteria.

Table 8.7. Irrigation and Drainage (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
11. Sea water intrusion into downstream freshwater systems.	11. • Reduction of takeoff to maintain adequate downstream flow. • Recharge of coastal aquifers through injection wells.
12. Reduction of downstream flows affecting flood plain use, flood plain ecology, riverine and estuarine fisheries, users of water, dilution of pollutants.	12. • Relocation or redesign of project. • Regulation of takeoff to mitigate effects. • Compensatory measures where possible.
13. Encroachment on swamps and other ecologically sensitive areas.	13. Siting of projects to avoid or minimize encroachment on critical areas.
14. Alteration or destruction of wildlife habitat or impediment to movement of wildlife.	14. • Siting of project to minimize loss or avoid encroachment on most sensitive or critical areas. • Establishment of compensatory parks or reserved areas. • Animal rescue and relocation. • Provision of corridors for movement.
15. Impediment to movement of livestock and humans.	15. Provision of passageways.

Table 8.7. Irrigation and Drainage (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
16. Threat to historic, cultural or aesthetic features.	16. • Siting of project to prevent loss. • Salvage or protection of cultural sites.
17. Alteration or loss of flood plain vegetation and disturbance of coastal ecosystems (e.g., mangroves).	17. • Siting of project to less vulnerable area. • Limitation and regulation of water take-off to minimize problems to extent possible.
18. Dislocation of populations and communities.	18. • Siting of project to minimize effect. • Resettlement scheme ensuring at least equal standard of living.
19. Introduction or increase in incidence of water-borne or water-related disease (schistosomiasis, malaria, onchocerciasis, etc.).	19. • Prevention measures: • use of lined canals or pipes to discourage vectors • avoidance of stagnant or slowly moving water • use of straight or slightly curving canals • installation of gates at canal ends to allow complete flushing • filling or draining of borrow pits along canals and roads • disease prophylaxis • disease treatment

Table 8.7. Irrigation and Drainage (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
20. Disease and health problems from use of wastewater in irrigation.	20. • Wastewater treatment (e.g., settling ponds) prior to use. • Establishment and enforcement standards for wastewater use.
21. Conflicts over water supply and inequalities in water distribution throughout service area.	21. Means to ensure equitable distribution among users and monitor to assure adherence.
22. Overpumping of groundwater.	22. Limitation of withdrawal so that it does not exceed "safe yield" (recharge rate).
Indirect	
23. Increased pollution and health hazards from downstream industrial and municipal pollutants caused by decreased flow (decreased dilution) of river water.	23. • Control of waste sources downstream. • Reduction of water take-off.
External	
24. Water quality deteriorated or made unusable by upstream land use and pollutants discharge.	24. • Control of land use in watershed areas. • Control of pollution sources. • Water treatment prior to use.

Table 8.8. Livestock and Rangeland Management

Potential Negative Impacts	Mitigating Measures
Direct	
1. Degradation of vegetation resources due to overgrazing.	1. • Limitation of animal numbers. • Control of length of grazing time on particular areas. • Mixing of livestock species to maximize use of vegetation resource. • Reseeding and fodder production. • Cut-and-carry. • Strategic placement of water points and salt.
2. • Increased soil erosion due to clearing of vegetation and trampling. • Increased saltation of surface waters.	2. • Restriction of livestock access to unstable areas (e.g., stoop slopes). • Soil erosion control measures (e.g., reforestation, reseeding of grasses, land preparation, terracing).
3. • Deterioration of soil fertility and physical characteristics through: • removal of vegetation • increased erosion • soil compaction	3. Same as 1 and 2.
4. Increased rapid runoff due to vegetation clearing and soil compaction (decreased infiltration capacity).	4. • Water conservation measures and water spreading. • Same as 1 and 2.

Table 8.8. Livestock and Rangeland Management (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
5. • Degradation of vegetation and soil around water points. • Overtapping of groundwater. • Lowering of watertable and degradation of vegetation locally by drilling and use of boreholes.	5. • Development of many small-capacity water sources. • Strategic placement of water points. • Control of use of water points (animal numbers and time of year). • Closure of permanent water sources when temporary pools and streams are available. • Limitation of well capacity by choice of technologies (e.g., handpumps or buckets instead of motor pumps).
6. • Displacement or reduction of wildlife populations by reduction of habitat. • Disruption of migratory routes. • Competition for food and water resources. • Introduction of diseases. • Impacts of burning. • Increased poaching and killing of wildlife considered as pests or predators to livestock.	6. • Planning and implementation of range management strategies (choice of species, livestock numbers, grazing areas) that minimize negative impacts on wildlife. • Establishment of compensatory wildlife refugees. • Investigation of management of wildlife ranching which will help protect wildlife resources.

Table 8.8. Livestock and Rangeland Management (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
7. Pollution environmental disruption and health hazards from disease and pest control measures.	7. • Choice of chemical that is species-specific, short residence time (active period), and has low impact on other biologic resources. • Protective measures for field workers. • Spraying methods and timing to minimize potential of water pollution. • Selection of disease-resistant livestock breed.
8. Reduction of genetic variability due to selective breeding.	8. Conservation of genetic diversity in-site (protection of wild relatives in natural habitat, maintaining variability within populations by breeding) and ex-situ (e.g., preservation of genetic material in "banks").
9. Negative effects of uncontrolled burning for brush control on soil and vegetation (deterioration of soil fertility and soil structure, altered wildlife habitat, destruction of vegetation).	9. Implementation of well-planned and controlled burning programs.
10. Conversion of moist tropical lowland forests for livestock production resulting in long-term environmental degradation and unsustainable production.	10. Avoidance of clearing such forests for livestock production.

Table 8.9. Rural Roads

Potential Negative Impacts	Mitigating Measures
Direct: During Construction	
1. Erosion from fresh road cuts and fills and temporary sedimentation of natural drainage ways.	1. • Limitation of earth moving to dry periods. • Protection of most susceptible soil surfaces with mulch. • Protection of drainage channels with berms, straw or fabric barriers. • Installation of sedimentation basins, seeding or planting of erodible surfaces as soon as possible.
2. Ground and water contamination by oil, grease, and fuel in equipment yards.	2. • Collection and recycling of lubricants. • Precautions to avoid accidental spills.
3. Creation of stagnant water bodies in borrow pits, quarries, etc. suited to mosquito breeding and other disease vectors.	3. Assessment of vector ecology in work areas and employment of measures (e.g., improved landscaping, filling or drainage) to avoid creating habitats.
4. Environmental and social disruption by construction camps.	4. Careful siting, construction and management of construction camps.
Direct: Permanent	
5. Destruction of buildings, vegetation and soil in the right of-way, borrow pit sites, waste dumps, and equipment yards.	5. • Alternative alignments. • Harvest and utilization of public domain forest resources prior to construction.

Table 8.9. Rural Roads (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Permanent (continued)	
	• Compensation given to private landowners.
	• Restoration of sites to original condition to extent possible through reclamation measures.
6. Interruption of subsoil and overland drainage patterns (in areas of cuts and fills).	6. Installation of adequate drainage works.
7. Landslides, slumps, slips and other mass movements in road cuts.	7. • Route alignment to avoid inherently unstable areas.
	• Design of drainage works to minimize changes in surface flows and adequate to local conditions, according to prior surveys.
	• Stabilization of road cuts with structures (concrete walls, dry wall masonry, gabions, etc.).
8. Erosion of lands below the roadbed receiving concentrated outflow carried by covered or open drains.	8. • Increase in number of drain outlets.
	• Drain outlets placed so as to avoid cascade effect.
	• Lining of receiving surface with stones, concrete.
9. Increased suspended sediment in streams affected by road cut erosion, decline in water quality and increased sedimentation downstream.	9. • Establishment of vegetative cover on erodible surfaces as soon as possible.
	• Establishment of retention ponds to reduce sediment load before water enters stream.

Table 8.9. Rural Roads (continued)

Potential Negative Impacts	Mitigating Measures
Direct: Permanent (continued)	
10. Marred landscape (scars from road cuts, induced landslides and slumps, etc.).	10. • Tourist site access roads planned with regard for visual aesthetics. • Grade limitations to avoid cutting and filling where scenery would be spoiled. • Maintenance and/or restoration of roadside vegetation.
11. Health hazards and interference of plant growth adjacent to road by dust raised and blown by vehicles.	11. Dust control by application of water or chemicals.
12. Contamination of ground and surface waters by herbicides for vegetation control and chemicals (e.g., calcium chloride) for dust control.	12. • Reduction of use. • Alternative (non-chemical) methods of control.
13. Accident risks associated with vehicular traffic and transport, that may result in spills of toxic materials (see "Hazardous Materials Management" section), injuries or loss of life (see "Public Health and Safety" section).	13. • Regulation of transport of toxic materials to minimize danger. • Prohibition of toxic waste transport through ecologically sensitive area.
14. Creation of a new pathway for disease vectors affecting humans and animals.	14. Establishment of plant and animal sanitation service and related checkpoints.
15. Disruption/destruction of wildlife through interruption of migratory routes, disturbance of wildlife habitats, and noise related problems.	15. Siting to minimize impacts.

Table 8.9. Rural Roads (continued)

Potential Negative Impacts	Mitigating Measures
Indirect	
16. Unplanned or illegal timber cutting.	16. See "Natural Forest Management" section.
17. Unplanned or illegal land clearing.	17. See "New Land Settlement" section.
18. Long-term or semi-permanent destruction of soils in cleared areas not suited for agriculture.	18. See 17 above.
19. Planned development and illegal invasion of homelands of indigenous peoples by squatters and poachers causing serious social and economic disruption.	19. See "Indigenous Peoples" section.
20. Destruction or damage of terrestrial wildlife habitats, biological resources or ecosystems that should be preserved by induced development.	20. See "Biological Diversity" and "Wildlands" sections.
21. Damaging alteration of wetland ecosystems traversed by causeways.	21. See "Wetlands" section.
22. Excessive and/or destructive development of coastal areas or other use of coral for cement and landfill, destroying parts of reef uniquely endowed recreational environments made accessible by roads.	22. See "Tourism Development" section.

Table 9.7. Tourism Development

Potential Negative Impacts	Mitigating Measures
Direct	
1. • Beach mining of sand for construction.	1. • Control of construction contractor.
• Destruction of reef for aggregate materials used in construction.	• Submission of plans in accordance with local ordinances on beach sand mining.
2. Destruction of wetlands, forests, other unique/sensitive habitats or cultural, historical and archaeologically important sites.	2. • Areas considered for development should have zoning plans to account for natural geographic and socioeconomic condition.
	• Base development phase on an inventory of resources.
3. Erosion resulting from uncontrolled clearing, infrastructure construction such as roads and marinas.	3. Develop erosion and sediment control plans.
4. Loss of "free" environmental services from natural systems and degradation of air, water, land resources.	4. • Carrying capacity should be defined so that target tourist population can be sustained without overburdening existing infrastructure and resources.
	• Include improvements in project design.
5. • Water pollution from inappropriate sewage or solid waste disposal. • marine effluent disposal • residential sewage disposal • marinas • infiltration to groundwater	5. • Allowance made for use of existing municipal or regional collection and disposal system or construction of on-site sewage treatment plant.
	• Liquid waste should not be discharged onto beaches, coral reefs, or other sensitive areas.
	• Verify local capacity to monitor and enforce pollution regulations.

Table 9.7. Tourism Development (continued)

Potential Negative Impacts	Mitigating Measures
Direct (continued)	
6. Solid and liquid waste disposal creates nuisance conditions adjacent to amenities.	6. • Appropriate waste disposal options required to manage potential problem. • Landfill versus incineration alternatives, as well as waste minimization will be considered.
7. • Access problems created: • traffic congestion • noise • minor and localized air pollution • people density greater than services available	7. Access problems minimized by integrated planning to reduce traffic and pedestrian congestion, noise.
8. Sea turtle nesting affected (special case).	8. • Beach monitoring for turtle protection coupled with beach zoning and development guideline to preserve the natural beach environment from the primary dune seaward. • Restricting night activities on nesting beaches during egg-laying and incubation periods.
9. Displacement of human population.	9. • Plan and implement program of compensation and resettlement. • See Chapter 3 for discussion of involuntary resettlement concerns.

Table 9.7. Tourism Development (continued)

Potential Negative Impacts	Mitigating Measures
Indirect	
1. Conflicts with other resource use such as fisheries, agriculture.	1. • Conceive tourism development in framework of national, regional, local socioeconomic development plans to integrate new objectives into development strategies. • Identify zones most suitable for tourism.
2. • Stress to capacity to manage the "tourist or related environment." • legislation and polling constraints • agency support lacking • staffing and financial resources to mitigate impacts absent/reduced • inadequate training in environmental management	2. • Comprehensive legislative action frequently required to address direct and indirect impacts and their monitoring and evaluation. • Staffing and equipment support must be budgeted, including whatever training necessary to mitigate impacts and monitor the "environmental protection plan" or other mitigation plan.
3. Multiplier effect on other industries causes increased stress on natural resources or services (craft market, vendor, taxi driver, suppliers, farmers/fishermen).	3. • Provide adequate infrastructure and services support to meet physical, social and economic needs of the region. • Recognize that "overbuilding" may be a persistent problem.
4. Congestion, overcrowding.	4. Design (urban areas and transport networks, etc.) according to carrying capacity of natural setting.
5. Natural hazards peculiar to developed site such as coastal storms, flooding, landslides, earthquakes, hurricanes, volcanos, may stress infrastructure and reduce long-term benefits.	5. Design facilities to: (a) meet best possible specifications for natural hazard amelioration; (b) take advantage of natural resources such as wetlands ability to buffer storms or absorb treated wastewater (see "Natural Hazards" section).

Annex 5

Mitigation Strategy by Activity Phase

Phase / Mitigation Strategy	*Planning/Design*	*Construction*	*Operation*	*Decommissioning*
Avoid Impact				
Minimize or Diminish Effect				
Rectify by Repair or Rehabilitation				
Reduce or Eliminate over Time				
Provide Compensation				
Other				

14. Field Trip Presentation and Working Group Preparations

Description/Objectives

The field trip will provide you with hands-on experience with preliminary environmental assessment skills. The purpose of the field trip presentation is:

Field Trip Preparations

The purpose of the field trip presentation is

- to provide you with some background on the field sites and proposed activities that will be reviewed;
- to explain how the field trip will be organized, and
- to brief you on what you should seek to accomplish. The day following the field trip, you will prepare draft Environmental Reviews in working groups and present these in a general session. After discussion and review, you will then have the opportunity to suggest alternatives for mitigation, monitoring and evaluation.

Working Group Preparations

Subsequent to the field trip presentations, you will break into working groups consisting of your case site field teams. As a group you should review the following instructions for preparation of the case study:

Preparatory Working Group Session (Day Prior to Field Trip)

- Review all documents in the field trip instruction package;
- Brainstorm on the most important issues to review during the field trip. Use a flip chart to list likely "hot topics".
- Decide on the assessment tools to use during the field trip. Review available checklists, lists of indicators, matrices, and other aids to determine which are most useful and appropriate for the field site under consideration. Develop, as a group, a matrix of issues and activities tailored to the field site, to ensure all important issues are covered.
- List resource persons and institutions that would ideally be contacted based on their technical and scientific capabilities, and experience. Be inclusive at this stage. You will obviously only have the opportunity to meet with those individuals at the course or field site, but a fuller list will help in brainstorming, and the list of contacts to made will be included in the final presentation.
- Develop an outline for the draft Environmental Review.
- Divide up responsibilities among members of the group in terms of who will be responsible for investigating which issues, contacting which individuals, presenting findings, etc. Appoint a team leader responsible for overall coordination.
- Seek out resource persons, facilitators, and other participants who have expertise in areas relevant to the field site for ideas on what to look for at the field site or suggestions on other sources of expertise.

Field Trip Reminders

Bring:

- Checklists
- Maps
- Environmental Screening Form
- *Environmental Guidelines for Small-Scale Activities in Africa*
- Site Descriptions from the Sourcebook

Use Your Eyes and Ears at Site to Acquire Data for:

- The Environmental Screening Form
- Environmental Review
- Development of Mitigation and Monitoring Plans

Site visit duties:

- Make sure you have read the case site description for your visit and that you reread their instructions once you are in the field.
- Select a Team Leader/Chairperson
- Select a Rapporteur (Rapporteur read Module 1)
- Assign roles as desired (i.e., continue with activities and roles as defined during the preparatory working groups described on the previous page)
- Distribute Lists and Duties
- Seek out opinions and concerns from as many individuals at the field site as possible
- Solicit ideas for environmental mitigation efforts from local residents

Working Group Instructions for Drafting the Environmental Review

The morning after the field trip, group leaders and rapporteurs with convene their respective working group teams (8-12 persons) to work on the preparation of a draft Environmental Review for each field case study visited. This exercise should begin with a discussion from each participant of their site observations, based on their assigned responsibilities from the original working group session held on Day 2 prior to the field trip. After individual observations have been presented, group leaders should encourage open discussion of the proposed activity or project, overall impressions of soundness, environmental constraints and opportunities for mitigation, and possible design alternatives, if appropriate. The working group should then proceed to preparing the draft Environmental Review, employing all the tools from the field visit. The draft Environmental Reviews are to be summarized in a general session by the workgroup rapporteurs in 5-10 minute presentations.

This session should help you gain experience in actual field environmental review and in the use of the various tools (checklists, matrices, expertise, test equipment, etc.) applied in the Environmental Review process. A workgroup flip chart summary is expected from this session including: (i) a brief description of the proposed intervention; (ii) an outline draft Environmental Review; (iii) a description of the USAID

approval process for the intervention under review; (iv) suggestions for further analysis; and (v) additional expertise which may be required for fuller environmental review (including institutions or individuals who might be utilized).

Background Documents for Field Trip

Available background documents for the overall project and proposed activities at the field trip site

Sectoral Sections from *Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Humanitarian and Development Activities,* USAID, AFR/SD/PSGE, 1996.

Checklists provided in earlier module (10).

ENVIRONMENTAL SCREENING/REPORT FORM FOR NGO/PVO ACTIVITIES

BACKGROUND

USAID, as a "re-engineered, learning institution," has introduced major changes in its new operations systems, with a strengthened focus on results (not activities), greater accountability and empowerment, teamwork, participation and customer orientation. For example, projects are replaced with "results packages" provide USAID operating units and collaborators the flexibility they need to adapt to changes during implementation. The underlying rationale is to focus on results, while still managing inputs and monitoring outputs properly, and to give those responsible (including the host country partners) for achieving results the flexibility to change approaches and tactics as situations change or lessons are learned.

USAID's Africa Bureau Environmental Office, in conjunction with the Regional Environmental Offices, has been developing an initiative for environmental management capacity building. This initiative is intended to support USAID/AFR Missions, their implementing agents and collaborators. An important rationale for this initiative is that Africa Bureau environmental and legal staff anticipate providing significantly enhanced responsibility to carry out environmental reviews to those USAID Mission programs whose designers and/or implementors have successfully completed an Environmental Assessment course and/or participated in related capacity-building activities. Relevant agency experience has shown that such enhanced Mission authority can greatly facilitate field-level program activity design and implementation. These NGO Environmental Guidelines are consistent with USAID's new precepts of flexibility.

The present Environmental Screening and Reporting Form (ESF) is designed to be consistent with the Initial Environmental Examination process, and to assist USAID Missions and their implementing partners design and implement activities in an environmentally sound manner in accordance with all salient agency policies and procedures. Use of the ESF will greatly reduce the need for review and approval of NGO activities at the regional or Washington levels.

INTRODUCTION TO USE OF THIS FORM

This form is to be utilized to screen USAID-funded activities, including grantees of the PVO umbrella projects, and proposals submitted for consideration for funding under other USAID programs including grants management units, where USAID has approved through an Initial Environmental Examination that this process be put in place. This is a *generic* form , illustrative only, and its final contents are to be refined and jointly determined among the affected partners -- NGO, USAID, host country agencies, etc. To the extent possible, the form should reflect host government environmental policies and procedures, e.g., accounting for existing designated protected areas.

Typically, two broad categories of projects will be funded: (a) those designed to strengthen local institutional capacities to manage the natural resource base and (b) those designed to support the development of appropriate infrastructure needed for sustainable natural resource management. Activities could include training, technical assistance and other institutional support, income-generating activities through the exploitation of natural resources in a self-sustaining and environmentally sound manner or development of physical infrastructure to further natural resource management at the district level. Under other components of USAID-funded programs, training, technical assistance, research, studies, and information-related activities and other types of activities can be funded.

This form is intended to be adaptable to unique circumstances. In using this form, adjustments as needed can be made in consultation with the Regional and Bureau Environmental Offices. It is strongly advised that the Mission Environmental Officer make on-site visits prior to finalization of the ESF, and that the ESF be rational and fully defensible and without ambiguity as to how the conclusion was reached that the activity(ies) will have no significant impact.

ENVIRONMENTAL SCREENING/REPORT FORM FOR NGO/PVO ACTIVITIES

Grantee: _____

Grant/Sub-grant: _____

Activity Name: _____

Duration (proposed start and completion dates): _____

Geographic Location: _____

Activity Description (paragraph(s) describing purpose/outputs and potential environmental impacts): [add space as needed]

Determine the Nature of the Activity

a. **Environmental Review Report Needed.** Does the activity include funds to support any physical natural resource management activities, or any community and rural development services, infrastructure, public facilities or road rehabilitation? Does it involve development of income-generating or resource management systems, or certain kinds of applied ecological or natural resources research? It will likely require an Environmental Review of the kind described in Step 4 of this form. Determine under which Category the activity falls to establish the need for the Environmental Review.

b. **No Further Environmental Review Required.** Is the activity exclusively to provide technical assistance, training, institutional strengthening, or research, education, studies or other information analysis, awareness-building or dissemination activities *with no foreseeable negative impact on the biophysical environment*? This probably qualifies as a Category 1 activity -- no further environmental review or action may be necessary. Complete form to establish this circumstance.

c. **Emergency Circumstances Apply.** Does the activity involve an emergency circumstance (e.g. drought)? Under specific conditions, the activity may be *exempt* from further environmental review. Must be determined by Bureau Environmental Officer with input from Regional and Mission Environmental Officers. Sound environmental implementation principles are to be applied to any urgent programs. Note that exemptions *cannot* be applied in the case of assistance for use or procurement of *pesticides*.

d. **Multiple Categories.** Many activities will have components or sub-activities in more than one category. Simply mark all that apply. The form will guide you to the appropriate next steps.

Step 1. Determine Category of Activity:

- **Africa Bureau *Category 1* -- no further environmental review needed:**

  ▸ ***Does the activity involve (mark yes where applicable):***

_____ Provision of education, technical assistance, or training. Does *not* qualify for "Category 1" if such programs include activities directly affecting the environment.

_____ Community awareness initiatives.

_____ Controlled experimentation exclusively for the purpose of research and field evaluation confined to small areas (normally under 4 ha., i.e., 10 acres) and carefully monitored (when no protected or other sensitive environmental areas could be affected).

_____ Technical studies and analyses and other information generation activities not involving intrusive sampling of endangered species or critical habitats.

_____ Document or information transfers.

_____ Nutrition, health care or family planning. Such programs do *not* qualify for "Category 1" if (a) some included activities could directly affect the environment (construction, water supply systems, etc.) or (b) biohazardous (esp. HIV/AIDS) waste is handled or blood is tested.

_____ Rehabilitation of water points for domestic household use, shallow, hand-dug wells or small water storage devices (when no protected or other sensitive environmental areas could be affected). *Pursuant toUSAID guidance on water quality, testing required for arsenic, nitrates, nitrites and coliform.*

_____ Construction or repair of facilities if total surface area to be disturbed is under 10,000 sq. ft. (approx. 1,000 sq. m.) (*and* when *no* protected or other sensitive environmental areas could be affected).

_____ Support for intermediate credit arrangements (when *no* significant biophysical environmental impact can reasonably be expected).

_____ Programs of maternal and child feeding conducted under Title II of Public Law 480.

_____ Food for development programs under Title III of P.L. 480, when <u>no</u> on-the-ground biophysical interventions are likely.

_____ Studies or programs intended to develop the capability of recipients to engage in development planning. Do *not* mark "yes" if these involve activities directly affecting the environment.

- **Africa Bureau *Category 2* -- Negative environmental impacts possible, environmental review required (specific conditions, including monitoring, may be applied):**

Note: The Environmental Review (Step 4 below) must address why there will be no potential adverse impacts on protected areas, endangered or threatened species or their critical habitat; or relatively undegraded forest, i.e., justify your conclusion that the proposed Category 2 activities do not belong in Category 3 or 4. Even for activities designed to protect or restore natural resources, the potential for environmental harm exists (e.g., re-introduction of species, controlled burning, fencing, wildlife water points, spontaneous human population shifts in response to activities undertaken, etc.). *If you do not find an exact match listed here for the activity you are undertaking, and it is not in Category 1, 3 or 4, then use the last item in Category 2 to describe the activity and treat it as Category 2 for purposes of environmental review.*

▸ ***Does the activity involve (mark yes, where applicable):***

_____ Small-scale agriculture, NRM, sanitation, etc. (*list and scale to be defined mutually among the appropriate partners* -- NGO, donor, host country agencies, REDSO, etc.).

_____ Controlled experimentation exclusively for the purpose of research and field evaluation *(areas of 4 ha. or more,* i.e., 10 acres) and carefully monitored, when neither protected or other sensitive environmental areas could be adversely affected nor threatened and endangered species and their habitat jeopardized.

_____ Small-scale construction or rehabilitation of facilities or structures in which the surface area to be disturbed exceeds 10,000 sq. ft and funding level is not in excess of $200,000 and where no protected or other sensitive environmental areas could be affected.

_____ Minor construction or rehabilitation of rural roads less than ca. 10 km (with no change in alignment or right of way), with ecologically sensitive areas at least 100 m away from the road and not affected by construction or changes in drainage; likewise, no protected areas or relatively undegraded forest should be within 5 km of the road.

_____ Nutrition, health care or family planning, *if* (a) some included activities could directly affect the environment (construction, water supply systems, etc.) or (b) biohazardous (esp. HIV/AIDS) *waste is handled or blood is tested.*

_____ Construction or rehabilitation of small-scale water points or water storage devices for domestic or non-domestic use, not covered in Category 1, when neither protected or other sensitive. environmental areas could be adversely affected nor endangered and threatened species jeopardized. *Pursuant toUSAID guidance on water quality. testing required for arsenic, nitrates. nitrites and*

coliform.

_____ Quantity imports of commodities such as fertilizers.

_____ Food for Development programs under Title II or III, involving known biophysical interventions with potential to cause environmental harm (e.g., roads, bore holes).

_____ Support for intermediate credit institutions when indirect environmental harm conceivably could result .

_____ Institutional support grants to NGOs/PVOs when the activities of the organizations are known and raise the likelihood of some environmental impact.

_____ Technical studies and analyses and other information generation activities that could involve intrusive sampling, including aerial surveys, of endangered species or critical habitats.

_____ Small-scale use of USEPA-registered least-toxic *general-use pesticides*, limited to NGO-supervised use by farmers, demonstration, training and education, or emergency assistance. Environmental review must be carried out consistent with USAID Pesticide Procedures as required in Reg. 16 [22 CFR 216.3(b)(1)].

_____ Other activities not in Category 1 and not in Category 3 or 4. Specify:

_____

_____

▸ ***Were the following used by the PVO/NGO in designing the above Category 2 activities (yes, no, N/A)?***

_____ *USAID/AFR's Environmental Guidelines for NGO and PVO Use in Africa*

_____ Any applicable Programmatic Environmental Assessments: _____

Other: _____

- **Africa Bureau *Category 3* -- Significant environmental impacts likely. Environmental review required, and Environmental Assessment likely to be required:**

▸ ***Does the activity involve (mark yes where applicable):***

_____ River basin or new lands development

_____ Planned resettlement of human populations

_____ Penetration road building, or rehabilitation of roads (primary, secondary, some tertiary) over 10 km length, and any roads which may pass through or near relatively undegraded forest lands or other sensitive ecological areas

_____ Substantial piped water supply and sewerage construction

_____ Major bore hole or water point construction

_____ Large-scale irrigation

_____ Water management structures such as dams and impoundments

_____ Drainage of wetlands or other permanently flooded areas

_____ Large-scale agricultural mechanization

_____ Agricultural land leveling

_____ Procurement or use of restricted use pesticides, or wide-area application in non-emergency conditions under non-supervised conditions

_____ Light industrial plant production or processing (sawmill operation, agro-industrial processing of forestry products)

_____ Potential to significantly degrade protected areas, such as introduction of exotic plants or animals

_____ Potential to jeopardize threatened & endangered species or adversely modify their habitat (esp. wetlands, tropical forests)

The above Category 3 activities are consistent with USAID criteria for activities that normally require a USAID-specific document with a defined format and procedure, called the Environmental Assessment (EA). It is recognized

that some of these categories are ambiguous. Mark "yes" if they apply, and show in the Environmental Review (Step 4) the extent and magnitude of activities and their impacts, so that USAID and its partners can determine if an EA is necessary or not.

- **Africa Bureau *Category 4* -- Activities not fundable or fundable only when specifically defined findings to avoid or mitigate the impacts are made, based on an Environmental Assessment[1]:**

  ▸ ***Does the activity involve (mark yes where applicable):***

_____ Actions determined likely to significantly degrade protected areas, such as introduction of exotic plants or animals
_____ Actions determined likely to jeopardize threatened & endangered species or adversely modify their habitat (esp. wetlands, tropical forests)[2]
_____ Conversion of forest lands to rearing of livestock
_____ Planned colonization of forest lands
_____ Procurement or use of timber harvesting equipment
_____ Commercial extraction of timber
_____ Construction of dams or other water control structures which flood relatively undegraded forest lands
_____ Construction, upgrading or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands.

Step 2. **Summarize and Itemize Activities.** List activities by all categories to which *Yes* was answered.

Categories of activities as determined below (add entries as required):

Activity/Sub-Activity	Funding:	Category

[1] Per Foreign Assistance Act Sect. 118 & 119 relating to overseas assistance affecting Tropical Forestry and Biodiversity

[2] Per USAID Environmental Procedures, § 22 CFR 216.5, on Endangered Species

Step 3. Determine Need to Prepare Environmental Review.

If all activities are in Category 1, sign and date the form. For any activities in Category 2 and 3, prepare an Environmental Review Report assessing all of these activities' impacts. For Category 3 activities, further documentation would be required, once USAID has confirmed the applicability of Category 3, based on the Review. If Category 4 is possible, consult USAID before proceeding with the Environmental Review to determine if activities can be funded and/or whether required EA findings could be made.

For all Category 2 and 3 activities, proceed to Step 4 to prepare Environmental Review.

Step 4. Prepare Environmental Review

Suggested Format for Environmental Review

The Environmental Review should be about 5-8 pages long (more if required) and consist of following sections:

1. **Background, Rationale and Outputs/Results Expected** -- summarize and cross-reference proposal if this review is contained therein.

2. **Activity Description** -- Succinctly describe location, siting, surroundings (include a map, even a sketch map). Provide both quantitative and qualitative information about actions needed during construction, how intervention will operate and any ancillary development activities that are required to build or operate the primary activity (e.g., road to a facility, need to quarry or excavate borrow material, need to lay utility pipes to connect with energy, water source or disposal point or any other activity needed to accomplish the primary one but in a different location). If various alternatives have been considered and rejected because the proposed activity is considered more environmentally sound, explain these.

3. **Environmental Situation** -- Affected environment, including essential baseline information available for all affected locations and sites, both primary and ancillary activities.

4. **Evaluation of Activities and Issues with Respect to Environmental Impact Potential** -- Include impacts that could occur before construction starts, during construction and during operation, as well as any problems that might arise with restoring or reusing the site, if the facility or activity were completed or ceased to exist. Explain direct, indirect, induced and cumulative effects on various components of the environment (e.g., air, water, geology, soils, vegetation, wildlife, aquatic resources, historic, archaeological or other cultural resources, people and their communities, land use, traffic, waste disposal, water supply, energy, etc.). Indicate positive impacts and how the natural resources base will be sustainably improved.

5. **Environmental Mitigation Actions** (including **monitoring and evaluation**) -- For example, indicate means taken to avoid, reduce or compensate for impacts, such as restoration of borrow or quarry areas, replanting of vegetation, compensation for any relocation of homes and residents. Indicate how mitigative measures will be monitored to ensure that they accomplish their intended result or what monitoring might be needed for impacts that one is uncertain about.

6. **Other Information** (as appropriate) -- where possible, include photos of the site and surroundings; list the names of any reference materials or individuals consulted.

Note: Specific plans for monitoring of key environmental indicators and mitigation of impacts during activity implementation are especially important; these must be addressed in the review. Information on monitoring results and mitigation of impacts are to be included in all progress reports. Important information and a criterion for evaluation of environmental soundness is showing how the activity is part of or guided by an integrated, community-based resource and land use plan or planning and management framework that considers the appropriate use of multiple resources.

List of Approvals

Drafted by: _____ Date: _____

Reviewed by: _____ Date: _____

PVO/NGO Director (if different from above) _____ Date: _____

Clearances:

USAID Project Manager or Designee: _____ Date: _____

MEO: _____ Date: _____
OR
USAID Mission Director: _____ Date: _____

Indicate here recommendation that an Environmental Assessment (EA) be prepared, if any activities are classified in Category 3 or 4, OR explain why an EA is thought not to be required.

All activities designated Category 3 or 4 **must be referred** to the REDSO/ESA REO/REA and BEO and, in some cases, the RLA. The MEO should also refer any questionable Category 2 activities.

REDSO REO/REA, RLA and BEO Referrals (if appropriate, list names and dates):

esfmst7b
Modified from esfmast7 in 9/98

Guides for an Environmental Analysis

Getting Started with Case Study IEE Preparation

Think of your working group as a multi-disciplinary team, with each of you contributing different kinds of expertise. Consider members of other working groups and the facilitators as potential expert consultants from whom you can draw information and advice.

Remember also that this is an exercise. You won't know all the answers to the questions you generate. In some cases, you may have to take an educated guess or make an assumption. Or you may note the kind of additional research that would be needed.

On the day of the field trip, you will have appointed a *field trip* leader. Now that you are preparing the environmental review, re-elect or choose a new *report* team leader for your group. You may want to consider choosing a different person to make the presentation or have two people share making the presentation to the whole group.

Review what you learned and share your observations in discussion.

Budget your time so that you limit and allocate time (you may want to appoint a timekeeper) to each of the **first four** items of the environmental analysis described here. In your time budget, include time to prepare the flip charts or acetates for presentation. You should be preparing flip charts as you discuss each component of the environmental analysis, but they may get messy and need to be redone or simplified.

The preparation of mitigative measures and monitoring (Item 5) is another exercise for which you will have additional time. You will likely consider mitigation and monitoring while you are thinking about preparation of the sections of the IEE, so ask someone to keep notes that you will use later. It is possible, however, that concerns about mitigation or costs thereof might mean you want to redesign the activity. If that is the case, do so as part of Item 1 and 2, described on the following pages. The same instructions about timekeeping will apply to the mitigation and monitoring exercise. We urge you in that exercise also to consider choosing a different team leader and different presenter(s), so that several individuals have the opportunity to be team leaders and presenters.

1. Background, Rationale and Output/Results Expected

State why the proposed activity is desired.

List the results: Distinguish between the physical reality (a school or a well is constructed) and the ultimate result (potable water or education).

Is there some important history to the activity (fish farming was tried before, but it failed, because... or the community being assisted was relocated because of another project, etc.)?

- Is the activity a rehabilitation of a previous investment (e.g,., terraces)? It may be important to know why the rehabilitation is proposed. Was this rehabilitation expected and planned for in the original plan or design? Was the prior design incorrect or inappropriate? Was maintenance neglected or improperly carried out? If faulty design or lack of maintenance is provoking the rehabilitation, how will these problems be avoided in the rehabilitation activity?

Why is activity "x" the best or the most feasible way to accomplish the goal? For example, if increased income is the ultimate goal, why is small-scale irrigation (or aquaculture or micro-enterprise) the chosen activity? What other planned or potentially necessary activities are linked to the activity under consideration? The planned intervention may be necessary to accomplish the goal, but is it sufficient? For example, if vegetable production were to increase, is the road adequate to handle transport to market?

What would happen if the no action alternative were chosen? The answer is not that things remain the same.

2. Activity Description

Make a sketch map (schematic) of the site's relationship to the region or setting and a map showing important features of the site, which can be used as part of your presentation.

Find the appropriate section in *Environmental Guidelines for Small-Scale Activities in Africa* or other reference material and read about the kind of project you have. Several -sector descriptions may apply.

Fill out the chart on the next page, if it is convenient, using the questions listed below as a way to generate discussion. Or, discuss the questions and note locations for activities.

- What actions will be taken during the *planning and design* phase? For example, do samples need to be taken to do siting, does there need to be an engineering survey? Is the proposed activity one that would prompt people to move to or away from the site in anticipation of the activity happening? While planning and design work does not usually affect the environment or human behavior, sometimes it does. Or, sometimes a decision made in this phase is in effect not reversible. If your activity has such characteristics, note how and why.

- What actions will be taken during *construction*? Is a construction camp needed? Where does the labor come from? Does an access or haul road need to be constructed? Is quarrying needed to obtain construction materials or is a borrow pit for earth fill needed? What other construction materials are needed (wood, bricks, etc.) and where do they come from? If earth or vegetation is removed during construction, what will be done with the material removed? Do utility pipes need to be laid? What social impacts may result during this phase?

- What actions occur during *operation*? What inputs are needed? What raw materials, water or energy sources? Where do they come from? What products are created and where do they go (export, autoconsumption)? Are waste products created and how are they disposed of ? Is traffic generated? What routine maintenance and repair activities need to be done and what inputs, material, labor, transport and the like are needed? What social impacts may result during this phase?

- Is *decommissioning* pertinent? If the activity were to cease (no longer needed or no longer funded) or has completed its useful life (reservoirs silt up, mines are exhausted, etc.), does it just disappear? What is left behind and what characteristics do the "leftovers" have?

Are there **alternatives** to the activity proposed and have they been evaluated? If so indicate why the particular activity was chosen. If no alternatives have been considered, are there any and what are they?

List Activities	Locations (list where activities occur -- from site or component to the region, nation or larger, as appropriate)				
Planning/Design					
Construction					
Operation					
Decommissioning					

3. Environmental Situation

- Describe location:
  Political/administrative unit (taxing or lack thereof or other social and political characteristics may be relevant);
  Physical and ecological setting (mountains, floodplain, coastal zone, desert; arid, humid, seasonal variations, drought cycles or the like);
  Features of the specific site (steep, flat, vegetated how, and so on).)

Remember you need to know something about all the locations you listed for each activity for Section 2 above. Thus, if a project requires an access road or a utility line to a site or a borrow pit, relocation of families to another place, off-site disposal of waste, etc., there may be more than one location involved.

- Go to Table 7A-1 *Major Categories in a Baseline Study* (in your sourcebook) and determine what features might be important to describe or about which to acquire data. Or go to the listing on page 9A-22 and note those categories. Determine key characteristics and key data needs.

- What else is happening in the locations or area where your project is? Are roads being built or rehabilitated? Are there other projects operating or about to start-up? Has this area been identified as a growth area? Are there plans for power development or extension of electricity that does not now exist? Are there resources, such as minerals or biological resources, that will likely be exploited in the foreseeable future?

- What is the future no action alternative (the baseline situation in the future, as it will be shaped by trends, growth, further degradation, improvement in water quality or air quality as regulations are developed and enforced, normal environmental change or the like)? If no clear trends exist, you may have to consider the existing situation to be the best approximation you have of the future. For example, if one is building a road through a forested area that has already been targeted for cutting and for development in the next four years, how much does it matter that the road building will result in loss of vegetation?

Remember: You are not writing an environmental encyclopedia! Be guided by your national environmental policy or Environmental Action Plan and by the special or unusual characteristics of the locations affected. For example, in one country, genetic diversity and maintenance thereof in indigenous crop varieties is considered important; in another, preventing land degradation or soil erosion may have special value. Consider what is ecologically or culturally unique, unusual or sensitive. Consider what regulations or laws might apply. For example, are there special prohibitions on building in or filling of wetlands?

4. Activities and Issues With Respect to Environmental Impacts

- Consider using the "project impact matrix" contained toward the end of Module 10 in your sourcebook as a means of organizing the team's thoughts or draw up your own matrix with key activities by project phase and key environmental components. Look again at the *Environmental Guidelines for Small-Scale Activities in Africa* or other references. Consult some of the checklists in your sourcebook to trigger ideas about impacts.

- Go back to the chart or the list that you made for Section 2 of the Environmental Review and bear in mind the characteristics of the environment you noted in Section 3.

- For each activity or action you listed for Section 2, determine how this activity would or could affect some environmental component, e.g., aquatic ecology, soils, topography, water quality, flora and fauna, etc. You probably won't have time to consider all the direct, indirect/induced, and cumulative impacts of every possible action as it affects every component of the environment. Thus, you should choose the top four or five of those that seem most critical or important and focus on these. If you have additional time remaining, you can tackle the other, less critical issues.

  Determine direct impacts first, e.g., clearing land means loss of vegetation. A new or improved road means there will be traffic or additional traffic that did not exist previously.

  Consider the implications of each direct impact to arrive at indirect or induced development impacts. Use the literature available; for example, look at the network charts in Module 10 to see how one can link direct impacts, to secondary, tertiary, etc. impacts. For example, does development of a site mean that more people will be attracted to an area, resulting in population growth or will the clearing be so extensive or in such a sensitive zone that a habitat will be destroyed?

  Go to the list in Module 7 Section 3, subsection Predict Potential Impacts (page 7A-8) and use some of these impact descriptors, e.g. magnitude, direction, extent, etc.

  Consider what you said about the **future no action alternative**. **Compare** the expected impacts to that, not just the current baseline situation.

  Use your previous determination of other activities taking place in your project area to identify what types of cumulative impacts might occur.

- Judge the significance of the impacts. You may utilize the list in Module 7, Section 3, subsection *Determine Significance of Impacts* (page 7A-9) to assist you. Remember, however, that unless there are specific laws, regulations or policies that say "x" is significant or standards exist that are not to be contravened, significance is a matter of judgment.

5. Environmental Mitigation Actions (including monitoring and evaluation)

You will likely consider mitigation and monitoring while you are thinking about Items 1 through 4 of the Environmental Review, so ask someone to keep notes that you will use later. It is possible, however, that concerns about mitigation or costs thereof might mean you want to redesign the activity. If that is the case, do so as part of Item 1 and 2, described on the following pages.

Mitigation

- Select, for the purposes of the course exercise, three critical impacts that need to be mitigated. In a real situation, you need to consider all impacts that need to be mitigated.

- Use the attached chart, if you wish, to organize and present your recommendations.

- How costly are the mitigative measures relative to project cost? If they are more than one to ten percent of the cost, perhaps, you should recommend re-design.

- Who will be responsible for design, implementation and monitoring the effectiveness of your proposed mitigative measures?

Monitoring

- Select two or three priority impacts/issues, for the purpose of the course exercise, to monitor. In a real situation, you would select as many items to monitor as were necessary. Note: Impacts to be mitigated are not necessarily those most important to monitor. You could well want to monitor a situation, because it was not clear if mitigation was needed or because there was no appropriate mitigative measure. Determine the indicator you will use. There may be several impacts to monitor and several indicators for each, but try to minimize the number of indicators in order to be cost-effective.

- For the selected monitoring indicators:

  Why did you choose them?

  Will comparisons be made to the baseline situation, a control site or situation or both?

  How often (frequency) will the indicators be monitored?

  Who will be responsible for doing the monitoring?

  What will be an approximate cost (person-days per month or year, if you can estimate that) for each indicator?

  Could the indicators be derived from data already being collected **or** could they contribute to a regional, national or other monitoring effort?

  How will the results be used and with whom will results be shared, either for information purposes or because action needs to be taken?

Mitigation Strategy by Activity Phase

Phase Mitigation Strategy	*Planning/Design*	*Construction*	*Operation*	*Decommissioning*
Avoid Impact				
Minimize or Diminish Effect				
Rectify by Repair or Rehabilitation				
Reduce or Eliminate over Time				
Provide Compensation				
Other				

ECOLOGICAL/ENVIRONMENTAL SETTING OF THE TARANGIRE ECOSYSTEM

By

Raphael B.B. Mwalyosi

INTRODUCTION

Many changes have taken place in Tanzania during the last one and a half decades. Among these changes is the programme of economic reform and liberalization which is attracting a host of new investments in this country. Among these include tourism infrastructural development in and around protected areas. If Tanzania is to maximize the benefits from such developments, and avoid incurring unforeseen costs, then careful consideration of their social and environmental implications is required. Decisions on development activities can only be sound and rational if they are made with the full understanding of their environmental impacts, and that any negative impacts are avoided or reduced through mitigation measures

Ecological/environmental setting of Tarangire National Park (TNP) refers to the natural physical characteristics which can change as a result of development activities. These include topographic and landform features, climate, as well as the flora and fauna of the area. This paper addresses some of the key ecological/environmental parameters that must be considered before any development activity is undertaken in and around TNP.

GEOGRAPHICAL LOCATION

The Tarangire Ecosystem covers some 35,000 sq km of land, surrounded by the Serengeti National Park, Mts. Meru and Kilimanjaro and some ecosystems to the south of which the boundaries are unclear (Figure 1).The area lies partly within Mbulu, Karatu, Monduli, Ngorongoro, Babati, and Simajiro Districts of Arusha Region. Also, a small portion of Kondoa District of Dodoma Region falls into the basin.

PHYSIOGRAPHY

Regional planners have designated geographical areas as land planning units (Dunford et al, 1983). These are described in Table 1. The table also shows the current land-use of the area. The area arises from about 1,000m in the south-west to 2,660 meters in the north-east. About 75% of the area is flat, 25% is rolling to moderately dissected, and 3% is hilly country.

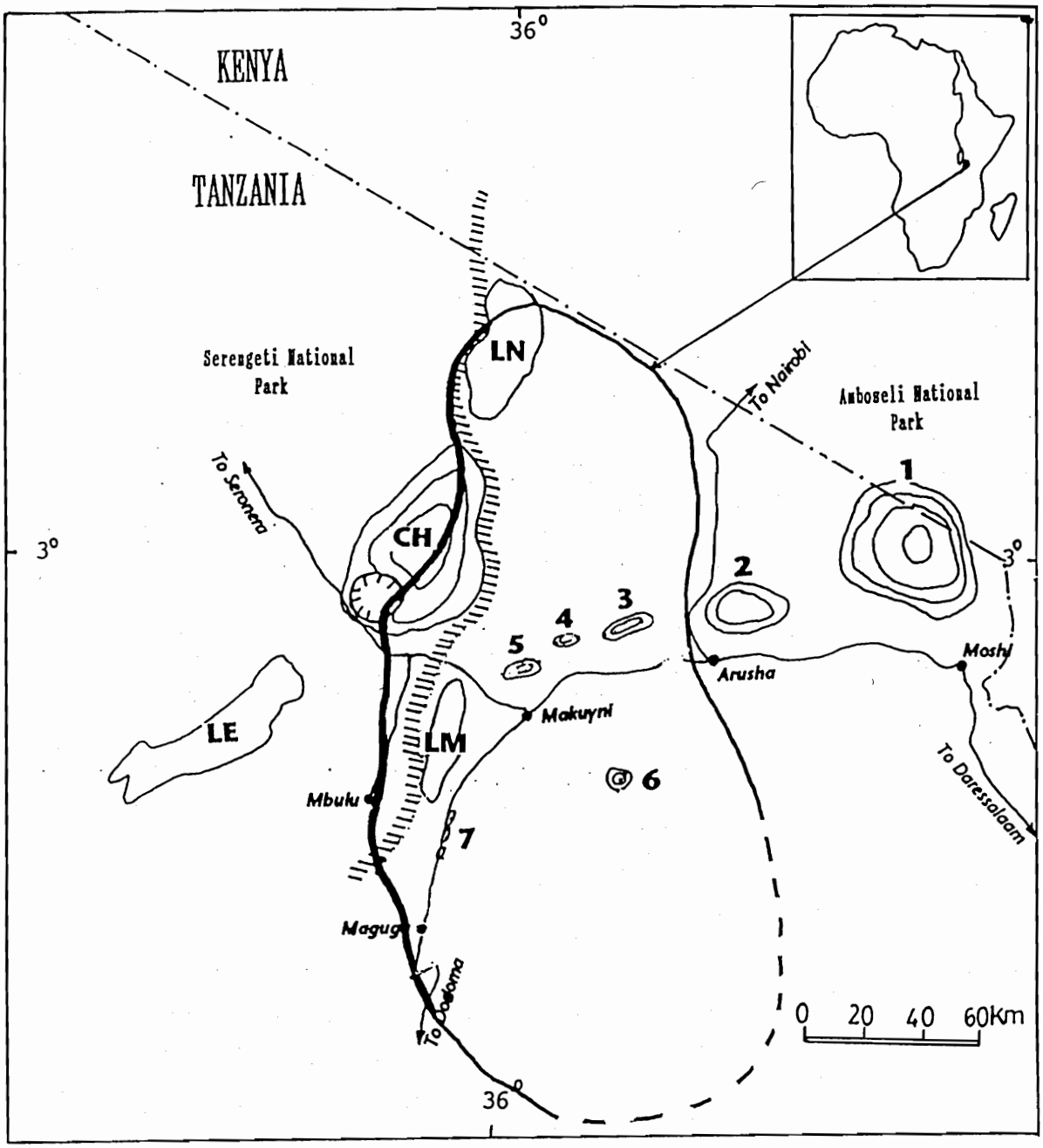


Fig. 1. Sketch Map Showing the Maasai Ecosystem (Redrawn from Prins, 1987)

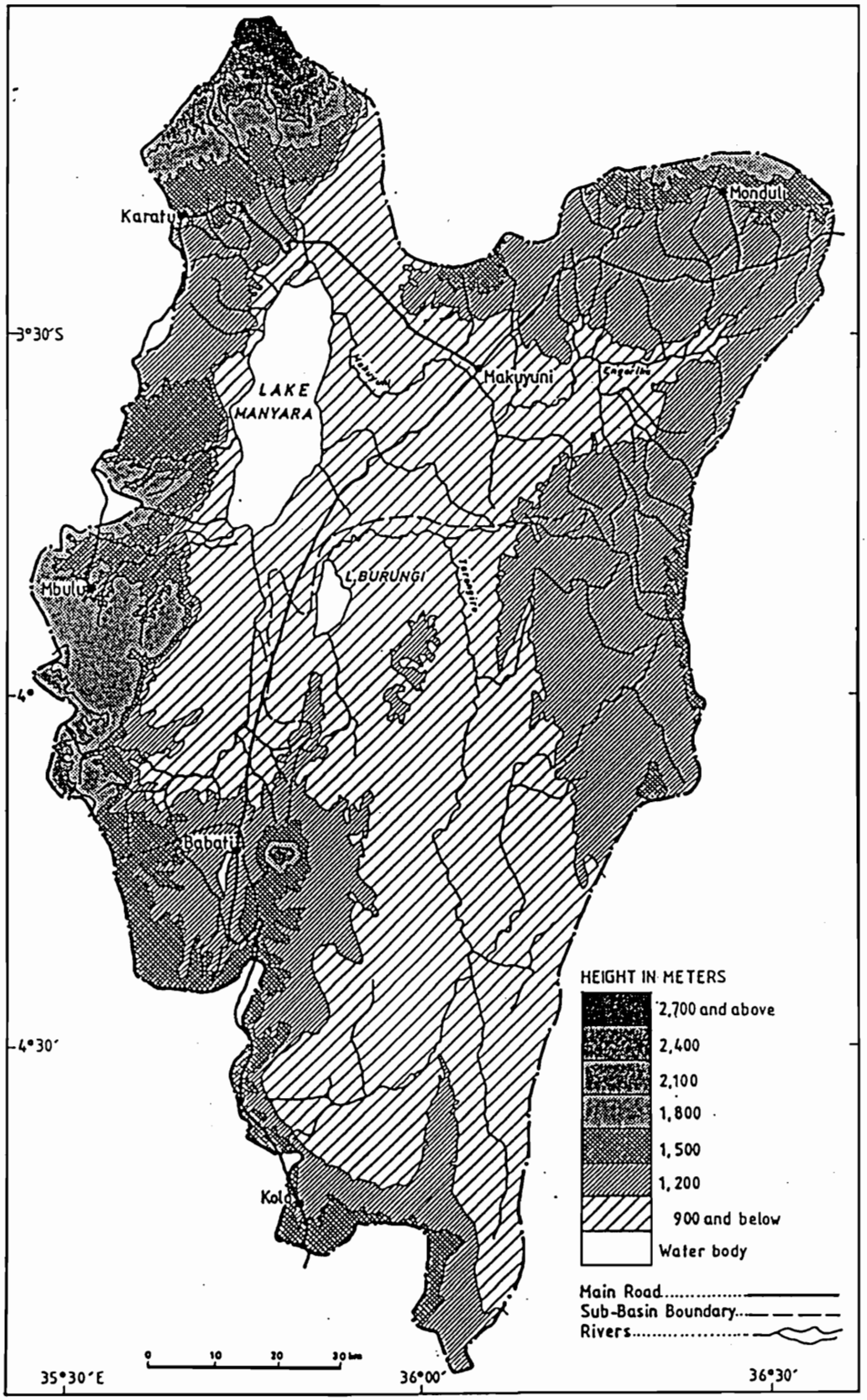
International Boundary	—·—·—	Mount Kilimanjaro	1
Masai Ecosystem Boundary	———	Mount Meru	2
Unclear Boundary	— — —	Mount Mondull	3
Rift Escarpment	\\\\\\	Mount Burko	4
Crater Highlands	CH	Mount Lossiminguri	5
Lake Eyasi	LE	Mount Lolkisale	6
Lake Manyara	LM	The "Pyramid" Hills	7
Lake Natron	LN	Major Roads	⟶

Table 1

The Land Planning Units of The Study Area

Zone	Physiography	Current Land Use
Rift Valley Plains	Flatland/undulating plains, elevation 1000-1150 m; soils: brown-grey/brown clays; vegetation: grassland, wetland moderately bushed grassland.	Subsistence pastoralism, ranching; wildlife conservation; subsistence dryland/irrigated farming; fuelwood collecting; small scale fishing.
Kiru Valley	Flatland/undulating plains, elevation 1000-1150 m; soils: grey-grey brown clays; vegetation: grassland, wetland, moderately dense woodland.	Dryland, irrigated subsistence/commercial estate farming; subsistence pastoralism; small scale fishing; mining; fuelwood collecting.
Makuyuni Area	Rolling/moderately dissecte lands, elevation 1070-1370 m; soils: brown clays; vegetation: bushed grassland.	Commercial dryland estate farming, subsistence farming; subsistence pastoralism, ranching; wildlife conservation; millitary activity; fuelwood collecting.
Ardai Plains	Flatland/rolling to moderately dissected, elevation 1070-1370 m; soils: brown clays; vegetation: open grassland.	Subsistence pastoralism; subsistence/commercial estate farming; wildlife conservation; millitary activity; fuelwood collecting.
Lolkisale Area	Flatland/rolling to moderately dissected, elevation 1330-1500 m; soils: grey-brown/red-brown/brown clays; vegetation: wooded/bushed grassland.	Wildlife conservation; subsistence pastoralism; commercial estate farming; fuelwood collecting.
Lossiminguri Monduli Mountains	Hilly/strongly undulating to rolling, elevation 1070-2660 m; soils: brown/grey-brown/red-brown clay/loams; vegetatio: broad leafed upland forest.	Forest reserve; subsistence pastoralism; subsistence/commercial estate farming; fuelwood collecting.

Topography of the Study Area



The Tarangire ecosystem is drained by rivers which eventually empty their water into Lakes Manyara and Burungi. Most of the wetlands are fed by some of the rivers draining into these two lakes. Makuyuni River is seasonal and drains the eastern part of the Lake Manyara Basin. Permanent and seasonal streams like Msasa, Ndala, and Endabash drain the western part. The most important perennial rivers are Mto wa Mbu, Simba and Kirurumo, which originate from the highlands to the northwest of the basin and enter the lake on the northern part. The south- western part of the lake is fed by Dudumera, Kirongozi and Kou Rivers.

Lake Babati often empties its water into Lake Manyara through the Kirongozi River. Also, Lake Burungi empties its water into Lake Manyara during extremely wet years like 1997/98. Lake Burungi is mainly fed by the Tarangire River, which drains parts of Babati, Kondoa and Simanjiro Districts. The river is fed by both surface runoff and groundwater recharge.

SOILS

There are four major soil groups in the basin; vertisols, calcimorphic, eutrophic and ferruginous tropical soils (Anderson and Talbot, 1965 cited in URT, 1994). Vertisols are largely topomorphic in origin, having developed in alluvium which was deposited under swamp conditions associated with the last major pluvial periods of Pleistocene. They are mostly found in mbuga areas where they are often referred to as mbuga soils. The most extensive areas covered by mbuga soils are the plains east of the rift escarpment which include the southern parts of Tarangire NP. Vertisols are very dark brown to black throughout the soil profile. They have a very high content of swelling clays. During dry conditions these soils are extremely hard, compact and difficult to till. When wet, the soils swell and may damage plant roots.

Calcimorphic soils are also found extensively in the plains, but in very limited and localized developments on the Mbulu Highlands. They are freely drained and sometimes are associated with hard pan developed in the soil profile. Although most of the calcimorphic soils are clay rich, the strong flocculating of calcium tends to produce stable, small granular aggregation. Despite the high stability of the aggregates themselves, their sizes are such that they are easily erodible by water and wind.

Eutrophic brown soils are well drained, well developed and slightly leached. They are typically developed in inland areas where rainfall varies between 700 and 1,000 mm per year. They are relatively extensive on the upper footslopes of Mount Monduli and Mbulu uplands, where they are associated with mbuga soils in depressions. These soils are relatively fertile but also highly erodible.

Ferruginous tropical soils are characterized by strong red coloring, deep development and rather poor differentiation of horizons. Such soils are very intensively weathered and composed of high proportion of clay. These soils are highly erodible and many of them are deeply truncated on sloping sites. Where the upper horizons have not been lost by erosion, organic carbon content is usually high, the soils are darker, and aggregates are more porous and resistant to erosion. These soils are found extensively on Mbulu Highlands where degraded forms of these soils cover most of the slopes, and between the Marang and Northern Highlands Forest Reserves.

CLIMATE

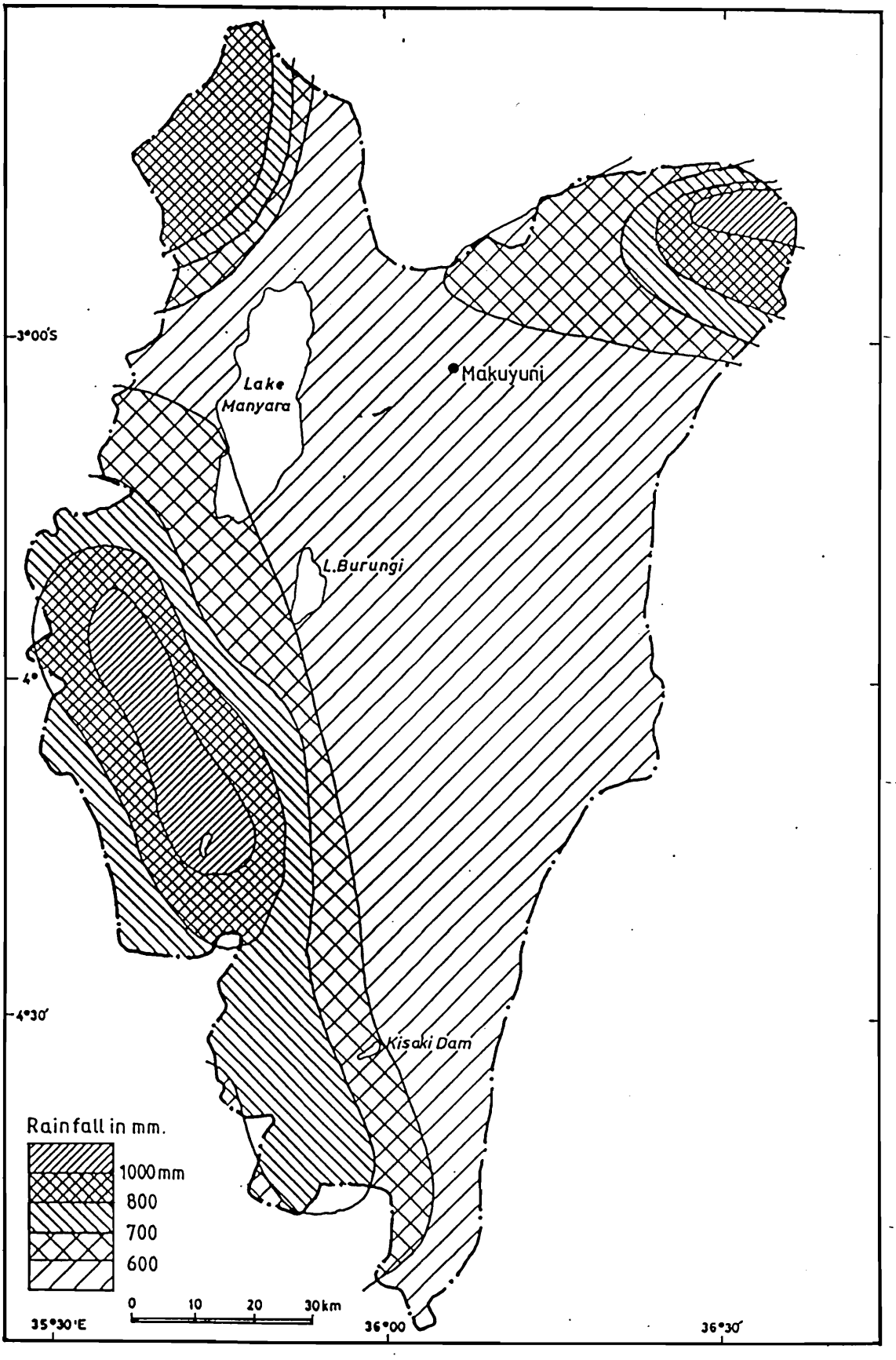
Generally, the area is semi-arid. The Tarangire Basins receive between 500 and over 1,000 mm of rainfall per year depending on relief. Thus, the highest rainfall occurs on Monduli, Babati, Ngorongoro, and Mbulu Highlands. The lowest rainfall occurs on the plains in the center and eastern parts of the basins. The mean annual precipitation is slightly over 650 mm and is evenly distributed (Prins, 1987). The area is characterized by a long dry season (June to September). There are two rainy seasons: the *Vuli* which starts in October and ends in February and the *Masika* which stretch from March to May. The mean annual temperature and evaporation are unknown but should be relatively high (Murray-Rust, 1971)

BIODIVERSITY ASPECTS

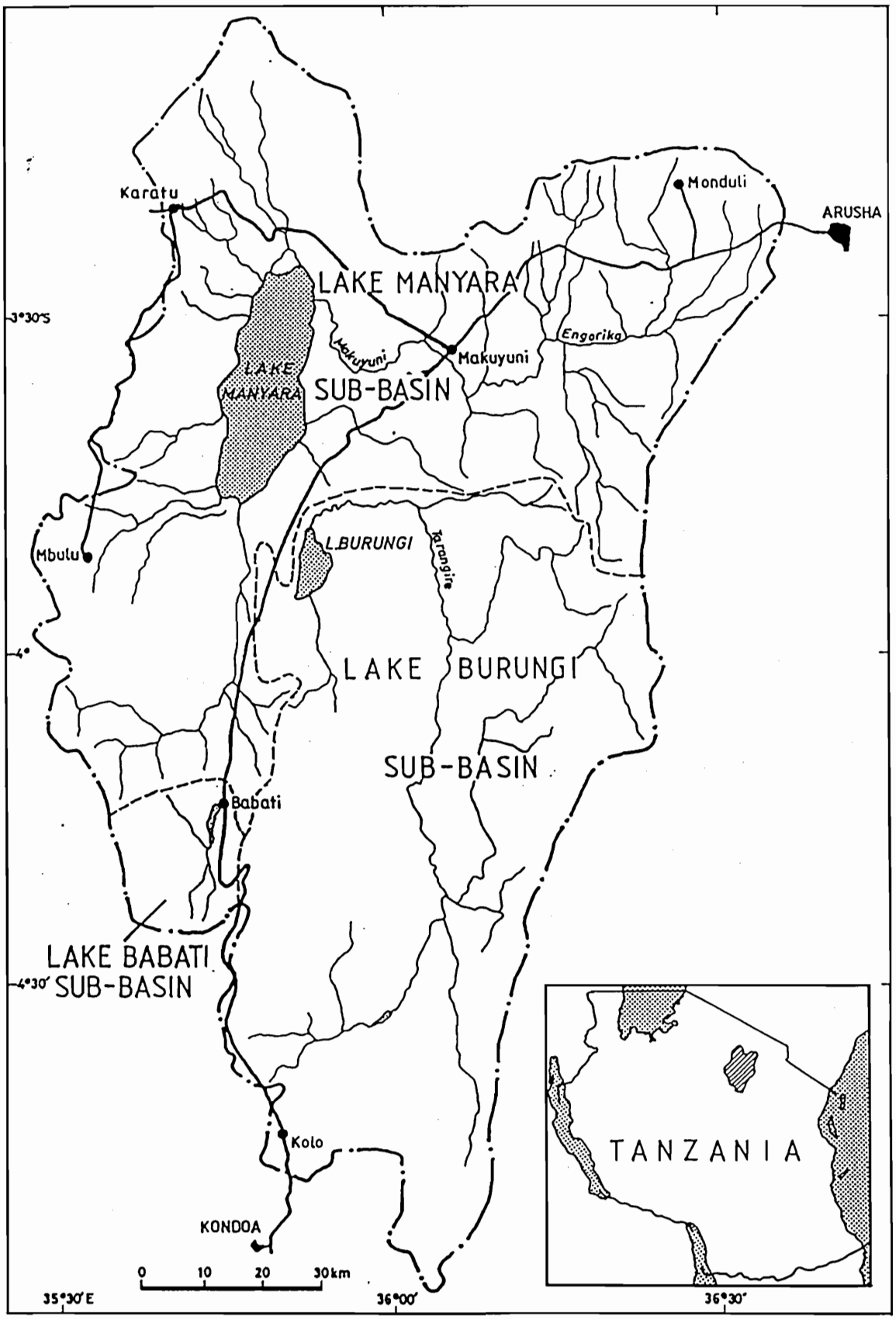
The Tarangire Ecosystem is known for its spectacular local biodiversity and abundance of large wild herbivores. Such biodiversity and abundance is maintained by ecological segregation, different habitat and food preferences and migration. On the basis of these we can identify three different hydro-ecological zones, thus:

The lowland plains of ephemeral runoff. This area lies below between 1,000 and 1,800m asl. This zone is arid and exhibit extreme seasonality with low precipitation (400-650mm/a). Most of the precipitation falls between December and April. In this zone, evapotranspiration is two to three times greater than rainfall. Plant growth is restricted almost throughout the year. Most of this zone comprises the Maasai Steppes in the east. Natural vegetation consists of thorn scrub rich is scleromorphic and sacculent species. Exceptions include solitary ranges of hills or mountains which

Rainfall Distribution Patterns in Lake Manyara Basin



Drainage Pattern in the Tarangire Ecosystem



are wooded or forested. There are also small moist enclaves including lakes, groundwater forests, rivers and wetlands. These areas are mostly covered by grasslands where drainage is poor, and by volcanic thickets and Acacia woodlands in well drained areas.

The intermediate upland zone of seasonal runoff. This zone lies between 1,400 and 2,100 m asl. It receives between 650mm and 900mm of rainfall. The ratio between precipitation and potential evapotranspiration is high and in one out of three rainy seasons, precipitation is usually below that of the potential evapotranspiration. These conditions tend to restrict plant growth to 8-11 months. Most of this zone comprises the escarpment of the Rift Valley where the natural vegetation consists of deciduous trees and savanna woodland dominated by *commiphora* bushland and bush thicket. These areas are largely cultivated.

The Highland zone of ephemeral runoff. This zone lies above 1,800m asl. Precipitation is between 900 and 1,300mm, being confined to the rainy season (November to May). In this zone largely comprising the Mbulu and Crater Highlands are humid (precipitation is between 900 and 1,300mm) with precipitation exceeding evapotranspiration. Because of the fairly uniform moisture content throughout the year, plant growth is continuous. The original vegetation was montane *Podocarpus* and *Olea* rainforest.

As a result of the diversity of habitat types, the ecosystem supports some of the biggest large mammal migrants in Tanzania. They include wildebeest, zebra, Thonpson's gazelle and Grant's gazelle. Other species include buffalo, impala, Coke's hartebeest and cheetah. The Rift escarpment forms a genetic separation between the Serengeti wildebeest and the Rift Valley wildebeest as well as between the eastern and western Thompson's gazelle.

The ecosystem is also heavily utilized by Maasai livestock. During the dry season, Maasai cattle constitute about 90% of the grazing biomass (8,500 kg/sq km) of the area. Other species include goats, shoats and donkeys.

VALUES OF BIODIVERSITY OF TARANGIRE ECOSYSTEM

Consumptive values include:

- commercial harvesting (and sale) of meat, leather, honey, timber, and aviary birds which contribute significantly to both the local and export economy of Tanzania;
- the use of wood and dung (which accounts for over 90% of the total domestic energy needs);
- the use of wildlife resources for everything from medicines to house construction the products of which are never formerly marketed and therefore their value does not appear in the national income accounts.

Non-consumptive values include:

- photographic tourism; and
- sport hunting.

The rich wildlife biodiversity attracts many visitors from within and outside the country. Tourism is currently the important foreign exchange earner for Tanzania.

FUNCTIONAL ASPECTS

Biodiversity conservation in the Tarangire Ecosystem has mainly been confined to the protected areas (PAs) (Figure 2). It is now realized that there is significant biodiversity in the non-protected, human priority development areas. These lands are subject to abuse and misuse as human population pressure increases. Resource degradation in such areas affects biodiversity in two distinct ways:

- land degradation directly affects PAs because dispersal of game populations into adjacent public/private lands often results into direct confrontation with land owners where usually game animals are the main victims.
- land degradation leads to reduced returns to local communities, so causing a further demand on resources of other non-degraded lands, including PAs.

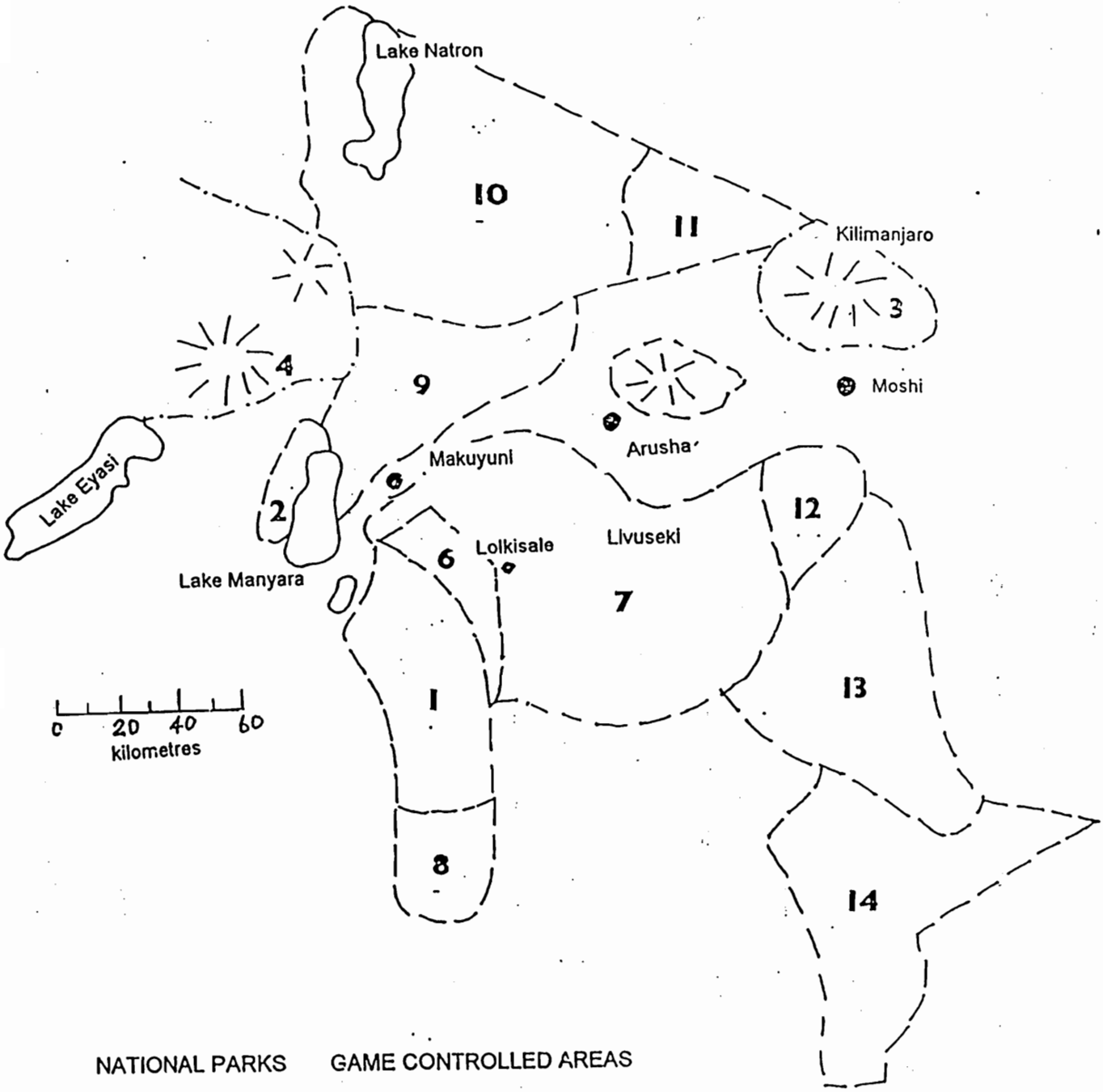
MANAGEMENT PRACTICES

Traditionally, the survival of the Maasai depended on a wide range of adaptive livestock grazing strategies designed to minimize the effects of drought:

- rotational grazing;
- organized management of communal grazing; and
- diversification of livestock herds and redistribution of stocks.

The recent history of Maasailand is a history of land loses and marginalization. In the 1940s substantial amount of land was alienated for estate farms and game reserves. At the same time, cultivators from highland area were moved into Maasailand. In the mid-1970s introduction of the Tanzanian Villagization Programme led to the partial settlement of the nomadic Maasai and their subsequent change in life-style to agropastoralism. The traditional Maasai system is now supplanted by new power structures which do not necessarily respect matters of local resource management or conservation. Villagization imposed a new settlement and land-use pattern, difficult to reconcile with the pastoral values. Thus, by 1987, about 10.5% of Maasailand was under cultivation. Effective extensive grazing within the remaining rangeland was restricted by tse tse fly infestation. The sedentary settlement pattern, together with increased farming has restricted the nomadic life style for the Maasai and game animal migration, with the following results:

- reduction of dry season pastures;
- decline in pasture quality due to overgrazing;
- intensified competition between wildlife and livestock for pasture and water; and



NATIONAL PARKS

1. Tarangire
2. Manyara
3. Kilimanjaro
4. Ngorongoro

GAME CONTROLLED AREAS

6. Lolkisale
7. Simanjiro
8. Mkungunero
9. Mtu wa Mbu
10. Lake Natron
11. Longido
12. Sanya Plains
13. Ruvu River
14. Kitwai

FIGURE 3: THE GREATER TARANGIRE-MANYARA ECOSYSTEM

- restriction of individual livestock holdings and herds. The current livestock biomass per household is only 6.4 units (26% of the minimum estimated biomass requirement for a Maasai household).

Peasants and commercial farmers in Maasailand do not use fertilizers and/or manure in agriculture. Because yields are relatively low, production is improved by expanding cropland at the expense of grazing. Thus, more and more land is coming under the plough and with it, biodiversity is being eroded. Thus, between 1957 and 1987, cultivation in Maasailand increased by about 45%, while woody cover decreased by 77%, contributing to a 16% increase in grassland and 33% bare ground. Already the carrying capacity of the grazing land (2.9 ha/capita) is below requirement levels by at least 87%. These developments are likely to have profound effect on the management of the pasture resources and biodiversity in general.

References

Dunford, C.; Mouat, D.A.; Norton-Griffiths, M. & Slaymaker, D.M. (1983). *Remote sensing for rural development in Africa.* ITC Journal, 2, pp.99-108.

Murray-Rust, H. (1971). *Soil erosion and sedimentation in Kisongo catchment, Arusha Region.* BRALUP Research Paper No. 17. University of Dar es Salaam.

Prins, H.H.T. (1987). *Nature conservation as an integral part of optimal land use in East Africa: the case of the Maasai Ecosystem of northern Tanzania.* Biological Conservation, 40, 141-161.

URT (1994). *Arusha Region Water Master Plan.* Main Report. Volume 1 United Republic of Tanzania.

SOCIAL-CULTURAL DIMENSION OF ENVIRONMENTALLY SOUND SMALL- SCALE DEVELOPMENT ACTIVITIES IN TARANGIRE NATIONAL PARK.

By Peter Toima.

1. Introduction.

Culture and realities of people living adjacent to **Tarangire National Park**, are valuable in designing and management of the park. The majority of the park neighbors, are the Maasai people who are livestock keepers.

Traditionally, the Maasai held pasture land in common, and each community member, had access to grazing, water and salt licks for livestock. Rights to specific areas of the range were clearly defined and determined by membership to a given community and territory. Access to any resources was negotiated and mediated through various social- parameters such as clan, sub-clan, associations and utilized rotationally, with wet and dry seasons areas used seasonally. These resources utilization and management techniques were used by the people adjacent to Tarangire, in order to ensure vegetation regeneration , soil fertility and environmental conservation.

These people traditional ways of conserving the environment, has helped preserve the natural environment to the present shape . Their conservation methods springs from respect to nature and methods of pasture management e.g. zoning, transhumance. Nature to them provides life to both human and animals. Plants are not cut or destroyed without a purpose , and even when there is purpose, they become careful not to destroy part of nature which is not needed. The famous **NP** in this country endowed with **fauna** and **flora** were Maasai lands. Nothing is attributed to this national heritage more than the conservationist nature deeply enshrined in the hearts of **Maasai pastoralists.**

2. Description of the Area.

The area of concern consists of villages **East North , South East** of **TarangireNational Park, in Simanjiro, Monduli,Babati and Kiteto districts. Such villages are Irkiushioibor, Makami, Kimotorok, Loiborsiret, Narokkawo, Sukuro,Emboreet,Terrat,Loiborsoit,Lorkisalie, Makuyuni, Mswakini and Minjingu.** The population in these village is averaging between 1000-2500 persons. The area is home to **agropastoralists** Maasai people (the largest group), **Barabaig, Waarusha, Mbugwe, Iraqw and Rangi** people. The people raise primarily **cattle, sheep, goats**, and some **chicken , dogs, cats** and use **donkeys** for traction and carrying water.
Nearly every household cultivates maize and beans on plot sizes ranging from 1-2 acres up to 40acres. Populations are most dense towards the north nearer to the closest major town of **Arusha,** and are some what denser towards village centers ,though bomas or homesteads are scattered through out the area. Transport is limited to rough roads, and there are few private vehicles(mostly land rovers 109) present. Most people move by foot and some by bicycle between villages.

3.Grazing system and water resources.

Availability of and seasonal access to water determines what areas are used when for grazing. Permanent bomas (**homesteads**) are situated near places of permanent water and the heads more out to temporary water sources, **dams,streams** and **ponds** in the wet season.

Most of the water sources in the wet season grazing areas are seasonal . A number of potential grazing areas adjacent to the **Eastern part of the park, like Oldonyo Sambu, in Emboreet villages and Lokonwa in Loiborsoit village** are without water or access is difficult.

Water is usually the first stated development activity in the villages neighboring **Tarangire.** It is considered more of an immediate constraint to livestock productivity and health than grazing. In critical cases of drought a few heads are reported to be in **Tarangire National Park.**

Since 1962 when the Government of Tanzania Nationalized land, all natural resources including water are publicly owned. Traditionally owned sources are described as clan property ; in terms of individually owned, but fellow clan members have primary rights of access. In this area there are three different systems of water management which are **clan/ individually** owned, and managed natural **wells** and **springs,** government constructed **dams** and **boreholes**, which rely on government infrastructure for maintenance , and **boreholes** and **hand pump wells** installed by NGOs and managed by village councils.

Regular maintenance is carried out by the youth (**Moran**) , although casual labour (non-Maasai) may be employed to dig. **Clan / Individually** owned sources of water are better maintained than communal sources, for example natural **dams and ponds.** This is attributed to organization and management possible in the clan-based system. Dry season **dams and natural ponds** are for communal use and are silting up. Many **boreholes** are in poor functioning condition. Water is considered by local people as priority development activity for both livestock and people. No recognition of the importance of clean water for human health. For a pastoral system, quantity and adequately well spaced sources are more important than quality, but notwithstanding clean water for domestic use is to improve.

Throughout the area water is a problem for livestock and people, either there is insufficient clean water in most of these villages.

4.Education.

Traditionally the Maasai were reluctant to send their children to school , but currently this attitude is seems to be changing. In most cases households have at least one child in school. There is big scopticism about the benefits of education and comments about children being only semi-literate, on completion of primary 7, are common. This changing trend is attributed to a need for change given the decline in herds and the pastoral economy, a need to be literate in Kiswahili, and to be able to demand better treatment at markets, hospitals and in urban areas. Also more educated people are returning to the villages to work, and are setting an example of a salary and higher standard of living. Education is equated with getting more power, with leadership and influence outside the traditional institutions. The

desire to send children to school is stronger amongst man aged managed 30-50 years, some of whom attended school themselves in the 1960s and 1970s. This is the group which have village council membership, and travel outside the villages.

More boys than girls attend school. The rationale is that a boy returns the investment to the home whereas a girl is expected to leave home to marry and to bring in bride wealth. Furthermore, a girl is seen as less capable. Little fees is required by primary schools. There are few boarding primary schools in the area. There is one **Animal husbandry vocational school** and ,no secondary schools . Few children proceed to secondary school, although there are poor standard seven results and money. Teachers children and relatives pass. Every village has a primary school, from standard one to seven. The facilities are poor, a typical school has about three or four rooms, few **desks** and **textbooks,** most of the buildings are not maintained, many pupils walk long distances to school, often going without food until evening. **Emboreet** is the oldest primary school established in **1953**. Most of other schools were established after the declaration of universal primary Education in1974. Most teachers are primary schools leavers from outside the villages with a three years, teacher training. These teachers have no morale on teaching because of low wages and lack of teaching facilities.

5. Land use.

Both human population pressures and poor returns of pastoralism are forcing residents in this area to turn to farming of maize and beans as a supplement or alternative to livestock . Diseases cause such high mortality among cattle and productivity is so low, that when an animal is lost people are less and less likely to risk investing in replacing that animal Vs investing resources in cultivation.

Previous and current government schemes encouraging establishment of village centers, sedentarisations and agricultural education have contributed to this tend. The requirements of cultivation have further limited the people ability to raise cattle. For example a stationery labour force is required at the field during the same seasons as herders ideally need to be mobile to cape flexibly with variable grazing conditions.

In 1994 a **VETAID** survey found that only 59% of households have sufficient livestock units per capital to be able to survive solely on their livestock, and all households cultivate between 1 to 40 acres of land. Livestock products provide important nutrients and protein, cash income as a sort of mobile bank, and act as buffer against crop failure. The Maasai culture traditionally centers on cattle keeping, and the switch to farming is an extremely dramatic socioeconomic change which many feel financially coerced into rather than freely choosing.
One of the most important issues facing pastoralism and wildlife in the villages adjacent to **Tarangire National Park**, is the availability of land. The land is fertile for cultivation, and both privately owned large farms, small scale cultivation, and growing cash interprises such as mining and charcoal production are fragmenting and reducing grazing areas. Wildlife causes damage to crops and previously tolerant communities are becoming increasingly hostile to its presence with the growth of farming. Incidences of retaliation against or hunting of wildlife on the part of the community, are now becoming occasionally evident. Historically the residents in the area and wildlife have coexisted easily. There was enough grazing land for pastoralists to avoid contact with wildlife when necessary; such as during

wildbeest calving when they transmit malignant catarrhall fever, and there was sufficient prey species to buffer domestic species from predatory harm. It was land use practices of the Maasai pastoralists over several hundred years, which allowed propagation of the richness of feval species encountered by colonialists, who ironically responded by establishing parks to protect the ecosystem from its previous caretakers.

In order for wildlife to survive it must be tolerated and supported by its neighbors, the communities living adjacent to the **National parks.**

6. Animal health infrastructure..

The geographical endemic threats of disease in **Tarangire ecosystem**, are compounded by the lack of infrastructure for managing animal health. There are several institutions in the area with a commitment to developing veterinary services, but logistical and administrative difficulties have resulted in little noticeable effect. Up to 1998, **Simanjiro district** for example had only 8 animal health assistance with limited or no transport to cover 20,000 square kilometers of backcountry with a livestock population of over 600,000 cattle, 160,000 sheep, 300,000 goats and 46,000 donkeys.

Animal health is a primary development priority of local communities in the area. People recognize that many of the problems they currently face can be addressed by consistent , quality veterinary services including availability of pharmaceuticals and advice on strategy for their use, and reduction of mortality from treatable diseases.

1. Addressing tick and tsetse borne diseases. Reactivating the cattle dips **Tz** is seen to have great potential for reducing cattle mortality.

2 Improving the quality of veterinary drug- delayed access to appropriate treatments causes cattle mortality. Since the primary sources of drugs, itineratant traders, are already quite expensive and their availability is unreliable, a consistent source would be well worth contributing to traditional treatments only alleviate symptoms and are not seen as very effective. People are willing to pay as much as is needed to make supply sustainable as long as they see worthwhile improvements in livestock productivity , especially as it is so costly to go to Arusha and make purchases themselves.

3. Vaccines- the last vaccination campaign was carried out by the government in 1997, versus Rinderpest and CBPP. Most of the people were unclear on what disease exactly the vaccination was for, and were under the impression that the government was supposed to come yearly for such campaigns but had neglected them.

4. Local trained expertise

Tarangire Kuro Ranger Post Relocation and/or Rehabilitation

Note: These case studies have been generated based on information that is sometimes conflicting or incomplete. If you have information that corrects or presents another interpretation of the situation, please inform the facilitators and the case study working group. In discussions with stakeholders, please be careful to avoid raising any expectations (or fears) that the activity described here will be implemented.

Purpose and Need of Activity: The purpose of relocating/rehabilitating the Kuro Ranger Post is to: 1) improve the living and working conditions for rangers and provide new facilities to enhance park and visitor security; 2) eliminate the need to truck potable water to the post; and 3) eliminate an unattractive group of buildings from the Park viewshed.

General Background[1]:

Tarangire National Park is the fourth largest park in Tanzania with one of the highest density of elephants of any park in the country. It is part of Tanzania's popular northern tourist circuit that includes Arusha, Mt. Kilimanjaro, Lake Manyara, and Serengeti National Parks as well as Ngorongoro Conservation Area. Many tourists visit Tarangire either as a first stop or last stop on the northern tour circuit.

The park derives its name from the Tarangire River that flows through the center of the national park from south to north/north-west and empties its water into Lake Burungi. During the dry season this river is a primary source of water in the Tarangire ecosystem. This park is endowed with wetlands (Silale, Gursi, Larmakau and Nguselororobi Swamps) which act as sponges to supply water to Tarangire River during dry periods. Because of the availability of water, the park has a high concentration and variety of wildlife in the dry season.

Park Infrastructure

The park has six ranger posts in various strategic locations. Headquarters is located near the park entrance gate in the extreme northwestern portion of the park adjacent to the park boundary. The headquarters office block contains the administrative offices for the Chief Park Warden, Warden of Tourism, Field Ecologist, Warden Antipoaching, Warden Community Conservation and Accounts. The garage and workshop for the park are located behind the administration headquarters building. The senior staff residential housing and resthouse are located within 500 meters east of the administrative offices. The junior staff village is located south of the senior staff, 1 km from the administrative offices. (See separate Management Zone Plan Figure 3, which shows the location of existing gate, proposed gates, administration area and ranger posts).

The main park entrance, where visitors register, pay fees, and purchase park guide books (when they are available consists of a gate, a small visitor contact building and toilet.

Ecological Setting:

Vegetation

Tarangire National Park is situated in the wooded steppe in an arid Acacia savannah belt that is dominated by *Acacia and Commiphora* species. The most important vegetation types found in the park are:

Riparian woodland
Acacia-Commiphora woodland
Acacia drepanolobium woodland
Grasslands with scattered baobab trees
Acacia tortilis parkland
Combretum-Dalbergia woodland
Deep gully vegetation
Wetlands and seasonal flood plain
Riverine grassland
Rocky hilltop outcrops [kopjes]

Wildlife

Tarangire National Park is a dry season refuge for a majority of the migratory wildlife in the Tarangire ecosystem. The

[1] Most of the information which follows on the Park and its ecological and socio-cultural setting is extracted verbatim from the *Management Zone Plan - Tarangire National Park* prepared by Tanzania National Parks (TANAPA), April 1994.

park is very rich in mammals and birds. It is estimated that during the dry season total biomass of large mammals inside the park is well in excess of 35 metric tons/km^2. Some of the more important wildlife species include: African Elephant, Lesser and Greater Kudu, African Buffalo, Cheetah, Fringe-eared Oryx, Leopard, Lion, Masai Giraffe, Spotted Hyena, Common Zebra, White-bearded Wildebeest, Warthog, Eland, Olive baboon, Bat-eared Fox, Mountain Reedbuck, Impala, Common Waterbuck, Bushbuck, Coke's Hartebeest, Gerenuk, and Bohor Reedbuck.

The park has more than 550 species of birds. Particularly rich bird life occurs in the open Acacia woodlands, in and along the wetlands (Silale Swamp), and in the flood plain of Tarangire river. A few species that warrant mention: Yellow-collared Lovebird, Masai Ostrich, Martial Eagle, White and Pink-backed Pelicans, Saddle-bill Stork, Goliath Heron, Hammerkop, Bateleur Eagle, Helmeted Guineafowl, Kori Bustard, Long-toed Lapwing, Brown Parrot, White-bellied Go-awaybird, Madagascar Bee-eater, African Hoopoe, and a variety of kingfishers, weavers, owls, doves, plovers, sandpipers, francolins, and ducks.

Geology and Soils

Tarangire National Park is situated within the eastern portion of the East African Rift Valley. The geology is based on three types of rock formations: the pre-Cambrian gneiss rocks, lake deposits and alluvial deposits. However, much of the park is underlain by gneiss and other pre-Cambrian crystalline rocks, which give rise to different physical features. These parent rocks are of varying resistance to weathering and erosion. The harder unweathered rocks stick out as outcrops and form prominent features in the park like the Sangaiwe hills on the central western boundary, Boundary Hill on the north eastern boundary, and other numerous smaller kopjes in the park.

The major soil types are the well-drained red loams that become alluvial along river valleys, alluvial on ridges and colluvial on hill slopes. They become increasingly stony along hill slopes due to lack of depth. The other soil types originating from lake deposits and sediments vary from clays to sands and are normally very saline. The third soil type is made up of alluvial deposits that are predominantly vertisols, commonly known as black-cotton soils. These clay soils are the expanding type that are poorly drained. They become wet and impassable to vehicles during the rains and dry up and crack during the dry season.

Physical Features

The southern half of the park and the extreme northern corner are relatively flat while the rest of the park is gently undulating. The park's landscape is dotted with rocky outcrops (kopjes) with scattered baobabs, especially in its northern and central portions. Tarangire hill is located on the western side of the river in the center of the northern half of the park. This well-known topographic feature stands at over 1600 meters above sea level and forms the highest feature in the entire Tarangire valley. The Tarangire river is the main perennial river and traverses the park from south to north/north-west. The general drainage pattern of the area is north-westwards towards the soda lakes of Burungi and Manyara.

Climate

Precise figures for many climatic parameters are not available, meteorological records are fragmentary and recording stations are widely separated. Tarangire National Park is located in a semi-arid area characterized by a prolonged dry season lasting up to 7 months. It lies in a typical bimodal rainfall region of northern Tanzania. The annual rainfall pattern consists of the short rains between November and December followed by a dry spell in January and long rains occur any time between February/March to May/June. The short rains are erratic, unreliable and variable in distribution. The annual average rainfall is about 650 mm. Temperatures are highest from December to February and lowest in June and July. The average maximum temperature is 27° C while average minimum is 16° C.

Human Interactions

Prior to 1950, the area which is now Tarangire National Park had little human settlement and was not used for livestock grazing due to the high concentration of tsetse flies, which transmitted sleeping sickness to both livestock and the human population. This one factor played a major role in protecting this area from human exploitation. The areas to the east of the park, the Masai Steppe, are some of the region's most important grazing lands for both wildlife and livestock. Only during very severe droughts when all the surrounding grazing lands were overgrazed, would the Masai pastoralists be

forced to use the Tarangire area for cattle grazing. The only other historical human use of the area was by fishermen who took up temporary residence in the park to harvest catfish from the Silale swamp.

The Tarangire Game Reserve was gazetted in 1957 in recognition of its importance as a dry season watering area for wildlife. Prior to its gazettement as a game reserve, the area was a well-known hunting area for rhino. The Tarangire Game Reserve lands were included as part of a larger area to establish Tarangire National Park. Tarangire National Park was established by a Presidential Decree signed on 14 May 1970 under Section 3 of the 1959 National Parks Ordinance. The Decree was published in the Gazette of the United Republic of Tanzania (No. 25, Vol 11) on 19 June 1970.

Park Significance

Neither the proclamation notice for Tarangire National Park nor the National Park Ordinance state the specific purposes for setting this area aside as a national park. However, prior to gazettement, the area was known for its importance as a dry season watering place for much of the wildlife in southern Masailand. Through an interdisciplinary team planning process, the Management Zone Plan team identified the following as the purpose and significance of Tarangire National Park:

1. critical dry season watering place for both resident wildlife and much of the migratory wildlife of southern Masailand.
2. one of Tanzania's most important wetlands and hydrological regimes that support a variety and abundance of both fauna and flora.
3. the unique association and mosaic of habitats and landforms that give Tarangire a distinctive character not duplicated anywhere else in Tanzania.
4. habitat for endangered, threatened, endemic, and rare species and species of special concern or species of exceptional value.
5. the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.
6. possesses, second only to the Serengeti/Ngorongoro ecosystem, the highest concentration of wildlife during the dry season of any area in Tanzania (Lamprey 1964).
7. one of the few protected areas in Tanzania with a hydrological regime that ensures a permanent year round water source for the park's most exceptional resource - the Tarangire River.
8. known for its river valley, wetlands, gently rolling hills, rocky outcrops, acacia woodlands, and numerous baobab trees.
9. the only national park in Tanzania's northern circuit where one can easily view a large concentration of elephants during almost any time of the year.
10. an uninterrupted history as an area with significant variety and concentration of wildlife dating back 9000 years as evidenced by the prehistoric pictographs at Kisesse, Kolo, and Pahi (located approximately 40 kilometers southwest of the park boundary).

Brief Description of Activities and Locations:

General Location:

Tarangire National Park is located 118 km south-west of Arusha, east of the Great North Road and within the administrative districts of Babati, Monduli, Kiteto, Simanjiro, and Kondoa. The park is accessible on the tarmacked Great North Road (Arusha-Dodoma) from Arusha to the turn off at Kwakuchinja village near Minjingu phosphate mine. All tourist access into the park is through an entrance gate located in the northwestern corner of the park near the park headquarters. An 8-km gravel road connects the park entrance with the Great North Road. All other access points into the park are for administrative use only, including Loibor Serrit Ranger post on the southeastern boundary and the former ranger post at Chubi near the southwestern corner of the park boundary.

The park lies at an elevation of between 1200 meters and 1600 meters above sea level. It comprises a 2600 km^2 portion of the Tarangire ecosystem. The entire ecosystem encompasses approximately 20,500 km^2 of the Masai Steppe, including Mto-wa-Mbu Game Controlled Area on the north, Lolkisale and Simanjiro Plains Game Controlled Areas on the east, Mkungunero Game Controlled Area to the south and Kwakuchinja Open Area (Mweka College Demonstration Area) on the west. (See separate Management Zone Plan, Figure 2 - Vicinity Map).

Map 1 shows the location of the existing Kuro post and the two alternative sites for a new ranger post. **Map 2** (rough site sketch) shows the location of existing facilities at Kuro. **Map 3 and Map 4** show the two alternative sites for relocation of the Ranger Post in more detail. **Figure 1** shows a proposed layout for two family unit staff quarters.

Proposed facilities include:

Offices: Three offices for up to 2-3 rangers each.

Ranger Quarters: Six rooms/buildings, each large enough for a ranger's visiting guests or families, including area for beds, a dresser and storage cabinet, a washing up area, and an area for use of small cookers.

Dining and Entertainment Area: A dining area large enough to seat 15, together with an area for relaxation, darts, ping radio/music listening or watching television.

Kitchen and Service Area:

- outdoor and indoor area for charcoal cooking:
- if affordable, gas cooking equipment, refrigerator and deep freeze;
- small store room for food stuffs and perishables; scullery;
- small service yard;
- two 6m steel containers that have been converted into food store rooms;
- a small laundry where washing is undertaken by hand and hand-driven machinery;
- service area is to be fenced with an electrified game fence;
- other structures or operational activities to avoid wildlife-human conflict.

Personal washing facilities: Needed for 6 rangers and their visitors; type not yet determined, but improvement over existing facilities is desired.

Water supply: Drilling and development of a borehole, to be operated by diesel engine. Water will be stored in Simtanks and piped
by gravity to the Post. Rainwater from rooftops is also to be captured and stored in cisterns.

Human waste disposal: VIP latrines will be needed for 6 rangers and visitors.

Solid Waste Disposal: Adequate provision needs to be made for solid waste disposal for rangers and visitors.

Fuel Storage, Maintenance, Fueling and Parking Area: A building will be needed to store fuel and an area designated for maintaining and fueling vehicles. A parking area will be needed for up to 5 vehicles.

Access Road: A new access road will need to be constructed to reach the Post. Design must take into account local soil and drainage conditions and anticipated number of vehicles/day and vehicle pattern.

Training: Training for new ranger staff in proper fuel handling, vehicle maintenance, solid waste disposal, use of cleaning agents and insecticides.

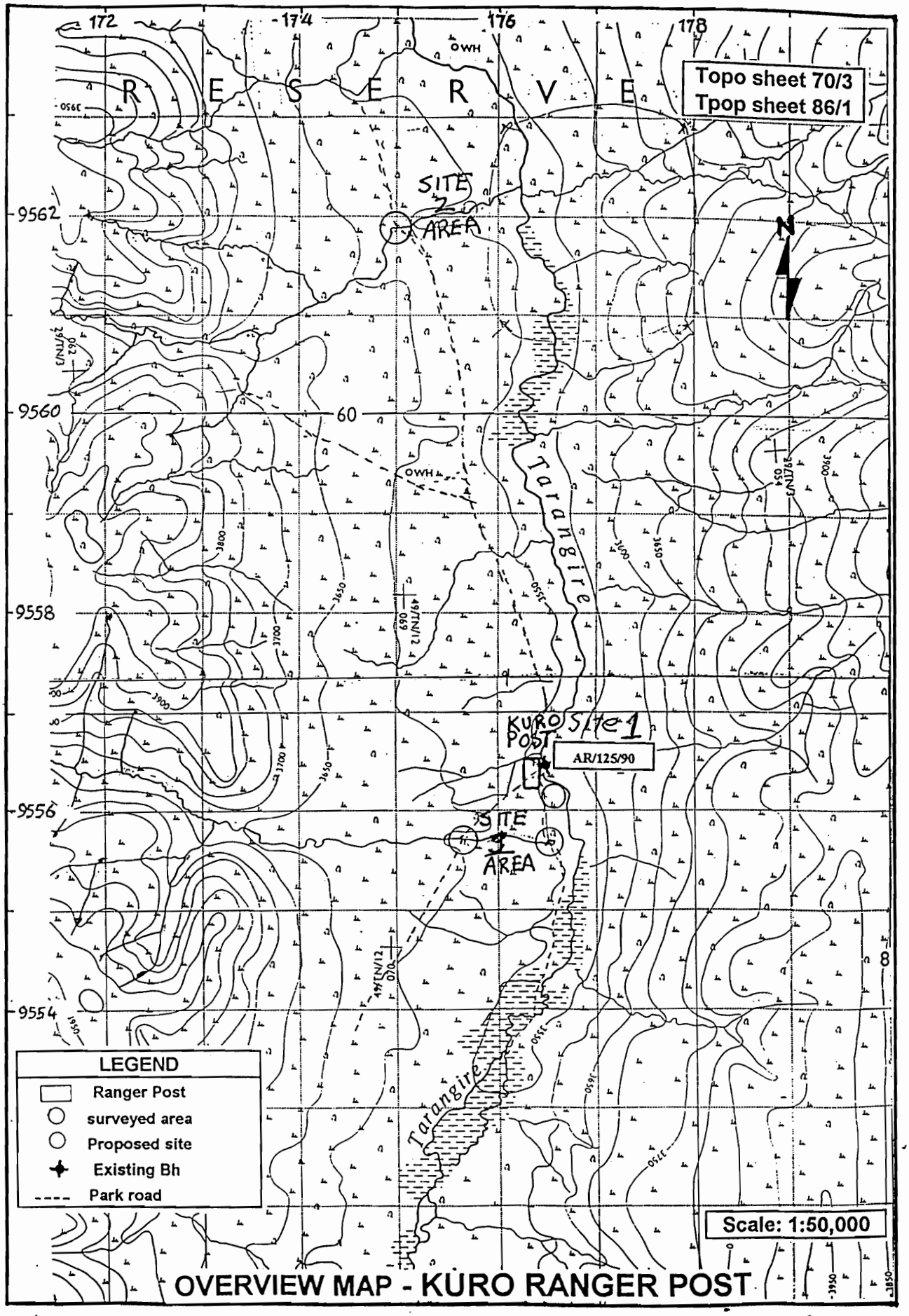
Contacts:

Site Resource persons: Patricia McCauley, Environmental Scientist WEGS Consultant

Background Reports and Data:

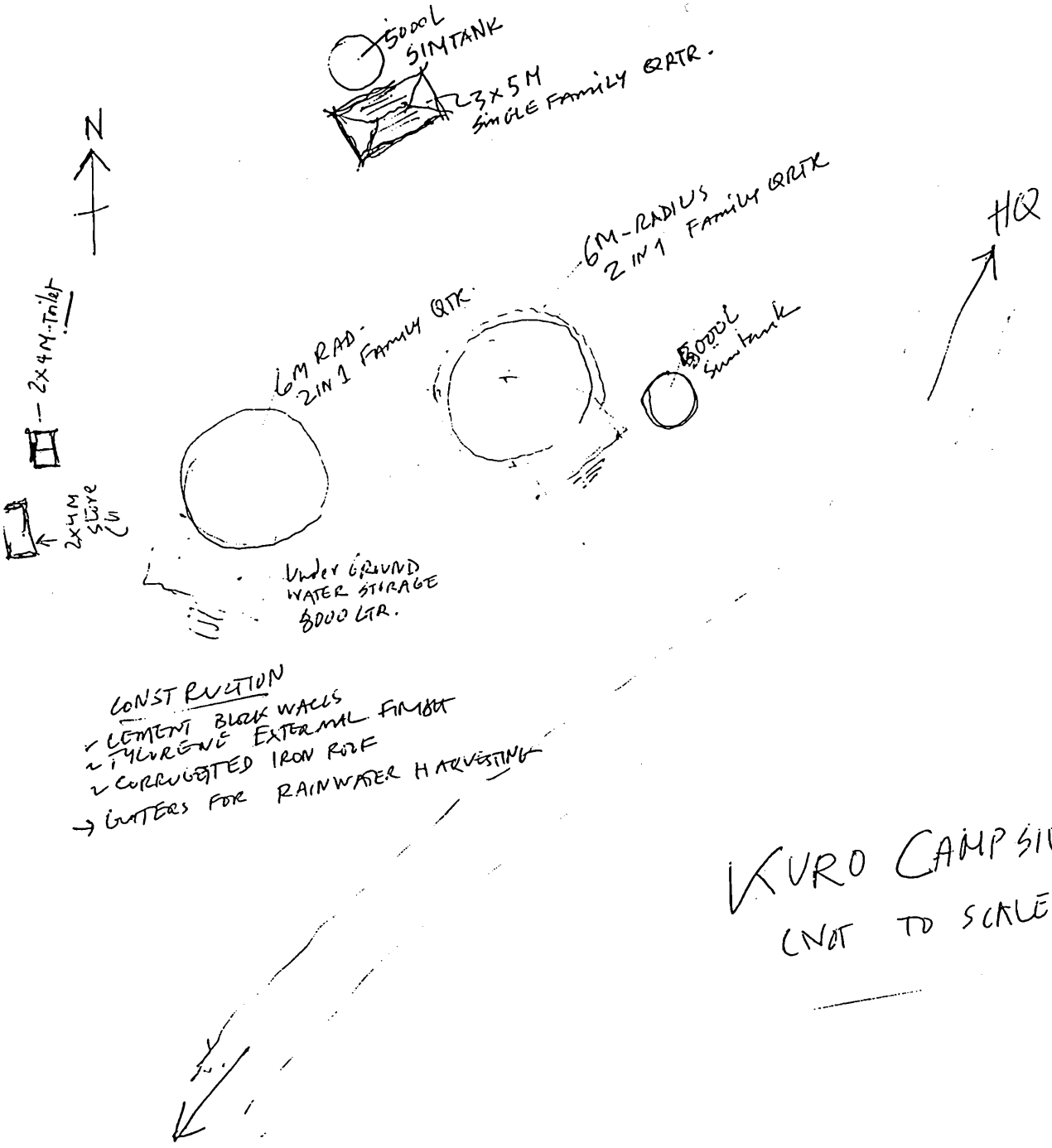
WEGS, *Pre-Feasibility Water Supply Report for the Improvement of Lake Manyara and Tarangire National Park Ranger Post and Headquarters Water Supplies*, March 1999.

Tanzania National Parks, Management Zone Plan, Tanzania National Park, April 1994.



OVERVIEW MAP - KURO RANGER POST

Map 1

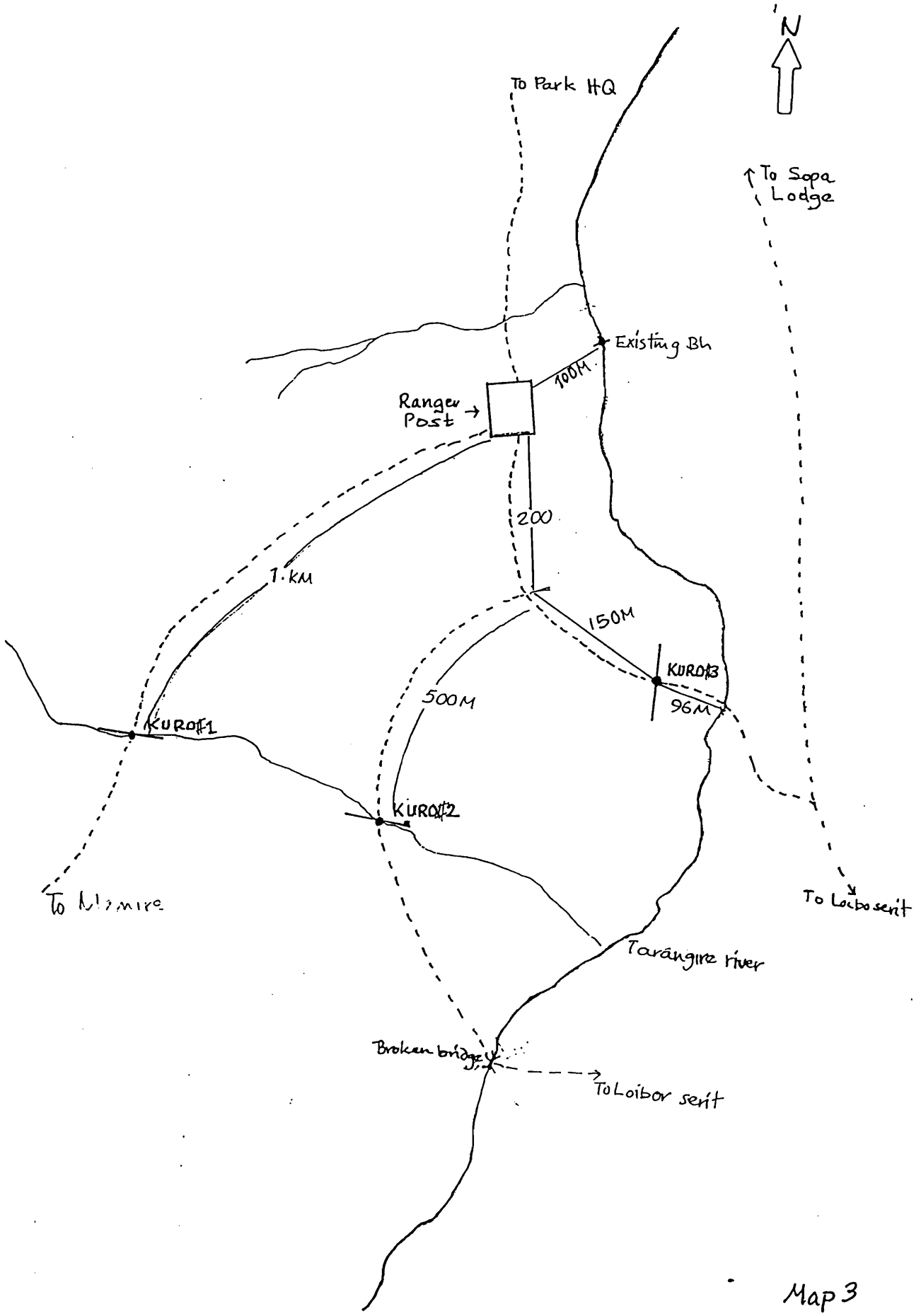


CONSTRUCTION
- CEMENT BLOCK WALLS
- STYRENE EXTERNAL FINISH
- CORRUGATED IRON ROOF
- GUTTERS FOR RAINWATER HARVESTING

KURO CAMPSITE
(NOT TO SCALE)

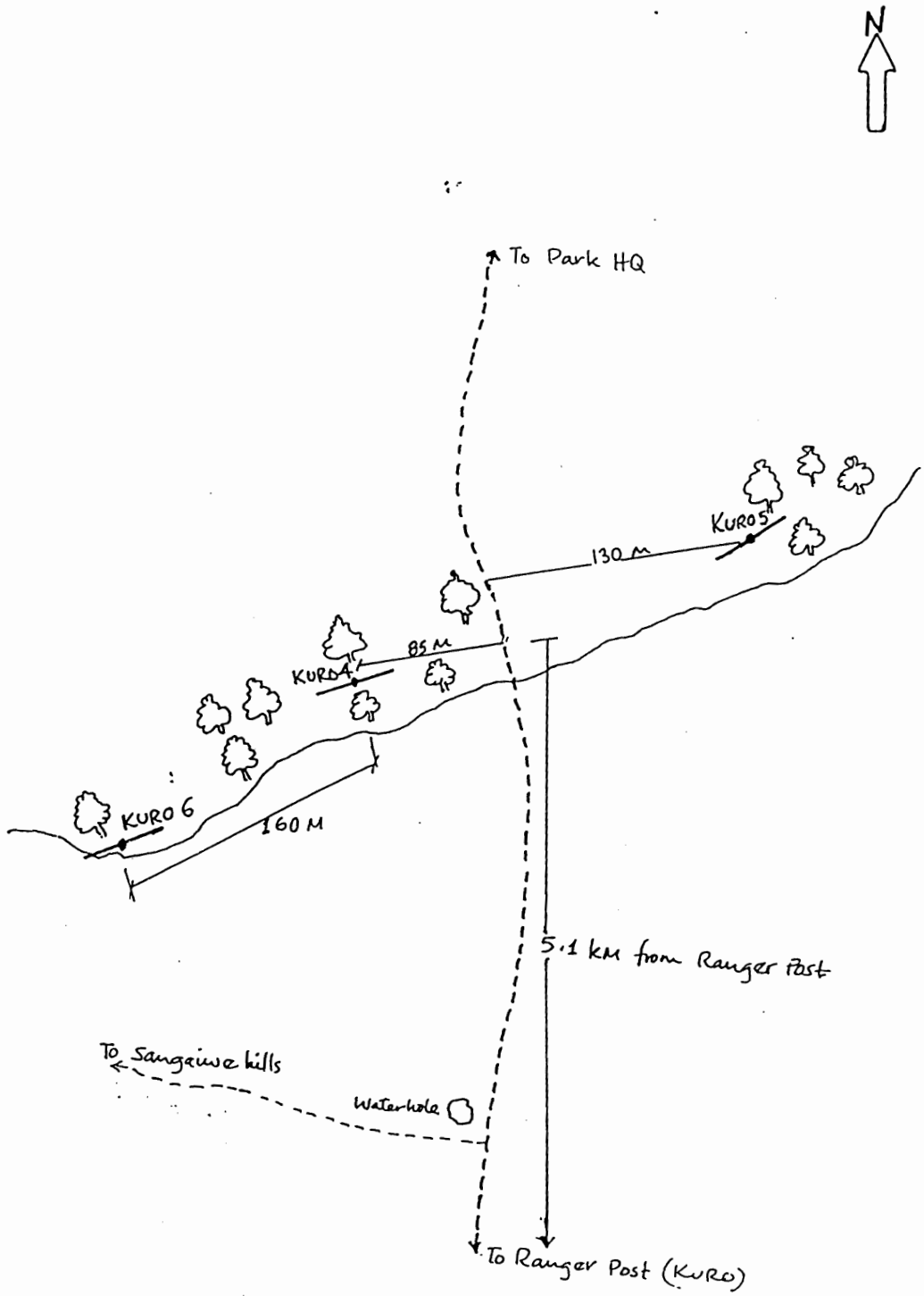
Map2

SITE 1


N
To Park HQ
To Sopa Lodge
Existing Bh
100M
Ranger Post
200
1.KM
150M
KUROF3
96M
500M
KUROF1
KUROF2
To Nimire
To Loibo serit
Tarangire river
Broken bridge
To Loibor serit

Map 3

KURO RANGER POST BH SITES
SITE 2 SKETCH MAP



BEST AVAILABLE

Map 4

Example of a TANAPA staff quarters

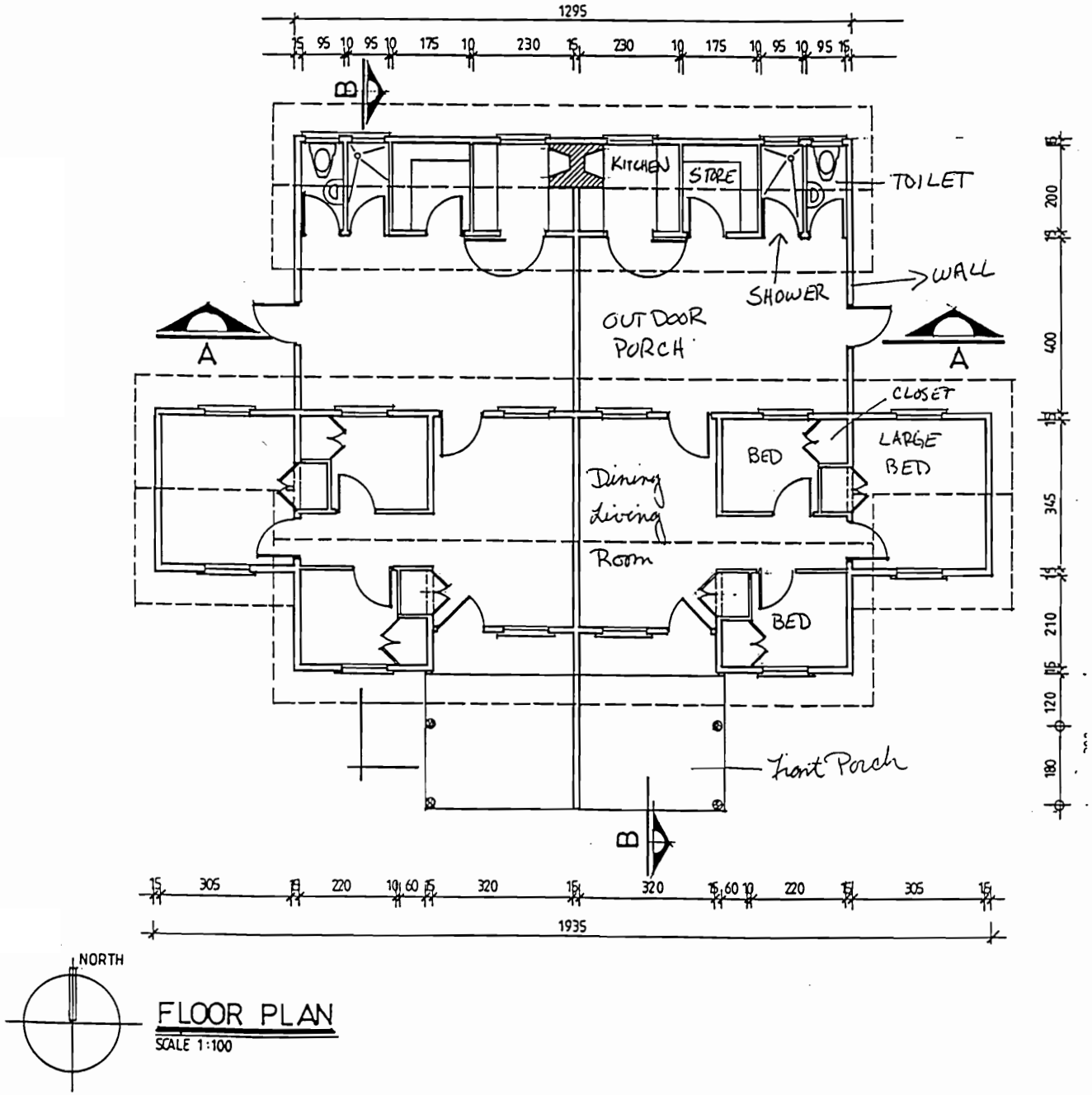


Figure 1

Tarangire National Park Visitor Center

Note: These case studies have been generated based on information that is sometimes conflicting or incomplete. If you have information that corrects or presents another interpretation of the situation, please inform the facilitators and the case study working group. In discussions with stakeholders, please be careful to avoid raising any expectations (or fears) that the activity described here will be implemented.

Purpose and Need of Activity:

The primary purpose of this activity is to enhance the visitor experience at Tarangire National Park, by improving the manner in which visitors are introduced to the Park. This is to be done by creating a more aesthetically pleasing approach to the Park; a new main entrance and a visitor center that will provide both interpretative materials and modern toilets and washing facilities

General Background[1]:

Tarangire National Park is the fourth largest park in Tanzania with one of the highest density of elephants of any park in the country. It is part of Tanzania's popular northern tourist circuit that includes Arusha, Mt. Kilimanjaro, Lake Manyara, and Serengeti National Parks as well as Ngorongoro Conservation Area. Many tourists visit Tarangire either as a first stop or last stop on the northern tour circuit.

The park derives its name from the Tarangire River that flows through the center of the national park from south to north/north-west and empties its water into Lake Burungi. During the dry season this river is a primary source of water in the Tarangire ecosystem. This park is endowed with wetlands (Silale, Gursi, Larmakau and Nguselororobi Swamps) which act as sponges to supply water to Tarangire River during dry periods. Because of the availability of water, the park has a high concentration and variety of wildlife in the dry season.

Park Infrastructure

The park has six ranger posts in various strategic locations. Headquarters is located near the park entrance gate in the extreme northwestern portion of the park adjacent to the park boundary. The headquarters office block contains the administrative offices for the Chief Park Warden, Warden of Tourism, Field Ecologist, Warden Antipoaching, Warden Community Conservation and Accounts. The garage and workshop for the park are located behind the administration headquarters building. The senior staff residential housing and resthouse are located within 500 meters east of the administrative offices. The junior staff village is located south of the senior staff, 1 km from the administrative offices. (See Management Zone Plan Figure 3, the symbol (indicates location of ranger posts).

The main park entrance, where visitors register, pay fees, and purchase park guide books (when they are available consists of a gate, a small visitor contact building and a toilet.

Ecological Setting:

Vegetation

- Tarangire National Park is situated in the wooded steppe in an arid Acacia savannah belt that is dominated by *Acacia and Commiphora* species.

Wildlife

Tarangire National Park is a dry season refuge for a majority of the migratory wildlife in the Tarangire ecosystem. The park is very rich in mammals and birds. It is estimated that during the dry season total biomass of large mammals inside the park is well in excess of 35 metric tons/km^2. Some of the more important wildlife species include: African Elephant,

[1] Most of the information which follows on the Park and its ecological and socio-cultural setting is extracted verbatim from the *Management Zone Plan - Tarangire National Park* prepared by Tanzania National Parks (TANAPA), April, 1994.

Lesser and Greater Kudu, African Buffalo, Cheetah, Fringe-eared Oryx, Leopard, Lion, Masai Giraffe, Spotted Hyena, Common Zebra, White-bearded Wildebeest, Warthog, Eland, Olive baboon, Bateared Fox, Mountain Reedbuck, Impala, Common Waterbuck, Bushbuck, Coke's Hartebeest, Gerenuk, and Bohor Reedbuck.

The park has more than 550 species of birds. Particularly rich bird life occurs in the open Acacia woodlands, in and along the wetlands (Silale Swamp), and in the flood plain of Tarangire River.

Geology and Soils

Tarangire National Park is situated within the eastern portion of the East African Rift Valley. The geology is based on three types of rock formations: the preCambrian gneiss rocks; lake deposits and alluvial deposits. However, much of the park is underlain by gneiss and other pre-Cambrian crystalline rocks, which give rise to different physical features. These parent rocks are of varying resistance to weathering and erosion. The harder unweathered rocks stick out as outcrops and form prominent features in the park like the Sangaiwe hills on the central western boundary, Boundary Hill on the north eastern boundary, and other numerous smaller kopjes in the park.

The major soil types are the well drained red-loams that become alluvial along river valleys, alluvial on ridges and colluvial on hill slopes. They become increasingly stony along hill slopes due to lack of depth. The other soil types originating from lake deposits and sediments vary from clays to sands and are normally very saline. The third soil type is made up of alluvial deposits that are predominantly vertisols, commonly known as black-cotton soils. These clay soils are the expanding type that are poorly drained. They become wet and impassable to vehicles during the rains and dry up and crack during the dry season.

Physical Features

The southern half of the park and the extreme northern corner are relatively flat while the rest of the park is gently undulating. The park's landscape is dotted with rocky outcrops (kopjes) with scattered baobabs, especially in its northern and central portions. Tarangire hill is located on the western side of the river in the center of the northern half of the park. This well-known topographic feature stands at over 1600 meters above sea level and forms the highest feature in the entire Tarangire valley. The Tarangire river is the main perennial river and traverses the park from south to north/north-west. The general drainage pattern of the area is north-westwards towards the soda lakes of Burungi and Manyara.

Climate

Precise figures for many climatic parameters are not available, meteorological records are fragmentary and recording stations are widely separated. Tarangire National Park is located in a semi-arid area characterized by a prolonged dry season lasting up to 7 months. It lies in a typical bimodal rainfall region of northern Tanzania. The annual rainfall pattern consists of the short rains between November and December followed by a dry spell in January and long rains occur any time between February/March to May/June. The short rains are erratic, unreliable and variable in distribution. The annual average rainfall is about 650 mm. Temperatures are highest from December to February and lowest in June and July. The average maximum temperature is 27°C while average minimum is 16° C.

Human Interactions

Prior to 1950, the area which is now Tarangire National Park had little human settlement and was not used for livestock grazing due to the high concentration of tsetse flies which transmitted sleeping sickness to both livestock and the human population. This one factor played a major role in protecting this area from human exploitation. The areas to the east of the park, the Masai Steppe, are some of the region's most important grazing lands for both wildlife and livestock. Only during very severe droughts when all the surrounding grazing lands were overgrazed, would the Masai pastoralists be forced to use the Tarangire area for cattle grazing. The only other historical human use of the area was by fishermen who took up temporary residence in the park to harvest catfish from the Silale swamp.

The Tarangire Game Reserve was gazetted in 1957 in recognition of its importance as a dry season watering area for wildlife. Prior to its gazettement as a game reserve, the area was a well-known hunting area for rhino. The Tarangire Game Reserve lands were included as part of a larger area to establish Tarangire National Park. Tarangire National Park

was established by a Presidential Decree signed on 14 May 1970 under Section 3 of the 1959 National Parks Ordinance. The Decree was published in the Gazette of the United Republic of Tanzania (No. 25, Vol 11) on 19 June 1970.

Park Significance

Neither the proclamation notice for Tarangire National Park nor the National Park Ordinance state the specific purposes for setting this area aside as a national park. However, prior to gazettement, the area was known for its importance as a dry season watering place for much of the wildlife in southern Masailand. Through an interdisciplinary team planning process, the Management Zone Plan team identified the following as the purpose and significance of Tarangire National Park:

- a critical dry season watering place for both resident wildlife and much of the migratory wildlife of southern Masailand.
- one of Tanzania's most important wetlands and hydrological regimes that support a variety and abundance of both fauna and flora.
- the unique association and mosaic of habitats and landforms that give Tarangire a distinctive character not duplicated anywhere else in Tanzania.
- habitat for endangered, threatened, endemic, and rare species and species of special concern or species of exceptional value.
- the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.
- possesses, second only to the Serengeti/Ngorongoro ecosystem, the highest concentration of wildlife during the dry season of any area in Tanzania (Lamprey 1964).
- is one of the few protected areas in Tanzania with a hydrological regime that ensures a permanent year round water source for the park's most exceptional resource - the Tarangire River.
- is known for its river valley, wetlands, gently rolling hills, rocky outcrops, acacia woodlands, and numerous baobab trees.
- is the only national park in Tanzania's northern circuit where one can easily view a large concentration of elephants during almost any time of the year.
- has an uninterrupted history as an area with significant variety and concentration of wildlife dating back 9000 years as evidenced by the prehistoric pictographs at Kisesse, Kolo, and Pahi (located approximately 40 kilometers southwest of the park boundary).

Brief Description of Activities and Locations:

General Location:

Tarangire National Park is located in northern Tanzania between 3' 40' and 5' 35' south and 35' 45' and 37' East at an elevation of between 1200 meters and 1600 meters above sea level. It comprises a 2600 km^2 portion of the Tarangire ecosystem. The entire ecosystem encompasses approximately 20,500 km^2 of the Masai Steppe, including Mto-wa-Mbu Game Controlled Area on the north, Lolkisale and Simanjiro Plains Game Controlled Areas on the east, Mkungunero Game Controlled Area to the south and Kwakuchinja Open Area (Mweka College Demonstration Area) on the west. (See Management Zone Plan Figure 2 - Vicinity Map). The park is located 118 km south-west of Arusha, east of the Great North Road and within the administrative districts of Babati, Monduli, Kiteto, Simanjiro, and Kondoa.

The park is accessible on the tarmacked Great North Road (Arusba-Dodoma) from Arusha to the turn off at Kwakuchinja village near Minjingu phosphate mine. All tourist access into the park is through the entrance gate located in the northwestern corner of the park near the park headquarters. An 8 km gravel road connects the park entrance with the Great North Road. All other access pints into the park are for administrative use only including Loibor Serrit Ranger post on the south-eastern boundary and the former ranger post at Chubi near the south western corner of the park boundary.

Maps: Map 1 shows the general location of the proposed Visitor's Welcome Center. Map 2 provides a sketch of the location of existing facilities and services.

Proposed Site: Map 3 shows: 1) the potential relocation of the main entrance; (2) the proposed relocation of the main road leading to the Park to slow traffic and create a more aesthetic approach; (3) the location of the proposed new visitor center.

Map 4 provides an architectural drawing of the proposed layout of the proposed facilities at the new entrance gate, including the visitor center. Map 5 shows the approximate location of the proposed site on a 1:50,000 scale topographic sheet.

The following are proposed:

Gate Check-In Facilities: See Design and Interpretive Workshop Summary, Tarangire and Lake Manyara National Park, Appendix 'D' (1999) attached.

Visitor Center: See Design and Interpretive Workshop Summary, Tarangire and Lake Manyara National Park, Appendix 'D' (1999) attached.

Toilets and Washing Facilities: See Design and Interpretive Workshop Summary, Tarangire and Lake Manyara National Park, Appendix 'D' (1999) attached.

Power: Electricity will be limited to photovoltaic panels supplying batteries and sufficient only for operation of the Post radios, a few lights and perhaps operation of video equipment.

Parking Lot: A gravel parking lot is proposed which would hold up to 25 Standard Vehicles; 2 Oversized Spaces; 5 Staff Spaces.

Water supply: Water supply is to be pumped from a borehole by diesel engine, then stored in Simtanks and piped by gravity to the visitor center and the toilets/washing facilities. Rainwater from rooftops is also to be captured and stored in cisterns.

Human waste disposal: Flush toilets will empty to in ground septic systems.

Solid Waste Disposal: Adequate provision needs to be made for solid waste disposal for park staff and visitors at the main gate and the visitor center.

Fueling: Petrol and fueling will be done at Park Headquarters. The fueling and storage area may require renovation and upgrading.

Realignment of Main Road: A new approach to the park is proposed. Design must take into account local soil and drainage conditions, anticipated number of vehicles/day and vehicle pattern; tree cutting and other effects on fauna and flora.

Capacity Building: Training of Tarangire National Park personnel in managing and conducting interpretive activities for arriving Park visitors.

Contacts:

Site Resource persons: John Kraft, Architect, WEGS Consultants.

Background Reports and Data:

WEGS, *Pre-Feasibility Water Supply Report for the Improvement of Lake Manyara and Tarangire National Park Ranger Post and Headquarters Water Supplies*, March 1999.
Tarangire National Park Management Zone Plan, Tanzania National Parks, April 1994.
Design and Interpretive Workshop Summary, Tarangire and Lake Manyara National Park, Appendix 'D' (1999)

Tarangire Visitor Experience Goals:

Visitors to Tarangire National Park will have the opportunity to:

- experience pristine areas and enjoy tremendous scenic vistas and values unimpaired by human development
- enjoy a wide network of game viewing circuits (vehicles required)
- observe wildlife in a relatively natural setting *(large concentrations of elephants, pythons, oryx, baobabs, pancake tortoise)*
- enjoy a diverse range of appropriate visitor use opportunities
- view a broad range of park landscapes and resources (e.g., Silalae and Gurusi flood plains, Larmakau Swamp, Tarangire Hill, Minyonyo water pools, Mkungunero water holes, Poachers (Baobab) Heights
- enjoy man-made developments, facilities, and structures that are designed in harmony with the park's natural environment
- continue to enjoy high quality visitor experiences traditionally associated with Tarangire National Park
- enjoy some off-road driving in specifically designated areas

Tarangire Interpretive Strategies:

[do a brief explanation of the entry sequence and experience for both parks]

At the Tarangire Welcome Center (north entrance), the proposed exhibits should cover:

- orientation to Tarangire National Park as well as orientation to all parks and reserves comprising the northern circuit
- park rules and regulations and critical visitor safety information
- Tarangire River as a dry season refuge and the seasonal migration of animals such as elands, oryx, wildebeest, and zebras
- topographic relief map of the vegetation communities and associated animal populations
- the unusually high concentrations of elephants and pythons in this region
- climatic changes and human interference, such as poaching, and the devastating effects they have had on such species as the rhino; rhinos are now extinct in Tarangire National Park
- the 2,000 year old Kolo cave paintings and the people who created them
- the internal structure and support of a baobab—creation of a shelter—and accompanying wayside
- have available animal and bird checklists
- activity board & chalkboard for wildlife sightings
- park history and establishment
- copy of Arusha manifesto
- park management concerns, e.g., use of fire as a management tool, collection of park artifacts, poaching, etc.
- park research activities

At the time of more detailed planning and design of the exhibits, the designer should present concepts for how the above topics can best be told in both an indoor and outdoor setting as well as the means to best interpret these stories.

Suggestions for the Kuro Ranger Post:

- wayside panel that explains that the ranger post used to be historical research station; based on the work conducted and scientific findings made, this valuable information led to the eventual establishment of the national park
- retrofit one of the existing buildings as an interpretive kiosk

At the Tarangire Safari Lodge overlook wall:

- develop 3-4 wayside panels interpreting the scene below (the Tarangire River, the abundance of visible wildlife, the familiar landscape of mixed woodland,

TANZANIAN NATIONAL PARKS (TANAPA) – NORTHERN CIRCUIT PARKS (Lake Manyara, Tarangire, Serengeti, Arusha, and Kilimanjaro national parks) OVERARCHING THEME STATEMENT

The geological forces that formed the Great Rift Valley, also created some of the areas most noteable and scenic features: the Serengeti plains and their kopjes; Tarangire's undulating landscape and acacia/baobab woodlands, the soda lake at Manyara, the three volcanic peaks of Kilimanjaro, the mosaic of volcanic features (ash cones and crater) at Arusha...

[the point needs to be made that the geological forces created a wealth of not only geological features but biological niches for a diversity of African wildlife]

NORTHERN CIRCUIT VISITOR EXPERIENCE GOALS:

TANAPA EDUCATION STRATEGIES (long-term)

- park brochures for both Lake Manyara and Tarangire national parks
- new park guides in 3-ring (A-5 booklet format)
- park maps as part of the park brochure and in looseleaf format
- posters as sales item and marketing tool
- promotional exhibit for travel fairs (trade providers)
- web page

- educational lesson plans and teachers guides for classroom activities and field trips
- travelling exhibit for temporary display in various schools and classrooms (materials must be simple and basic such as erasers in the shape of wildlife)
- video shorts / programs, AV equipment, and generator for transport to various village locales
- translation of these materials into Kiswahili
-

APPENDIX 'D': BUILDING PROGRAM FOR PROPOSED WELCOME CENTERS

Tarangire & Lake Manyara National Parks
Welcome Center Programming

Space Requirements:

WELCOME AREA:

1. Information Area
   - Desired Capacity: 40 Visitors (additional staging required at Lake Manyara)
   - Information Area to be staffed
   - Storage Area
   - Communication Equipment (Radio Room)
   - Exhibit Media to be determined (including 200 x 150 cm topographical relief map, panels, bone exhibits, etc.)
   - Interior Circulation and Informal Rest Areas
2. Sales Area
   - Display Area (shelves, free-standing units, wall space)
   - Counter (cash register)
   - Storage Areas
   - Secure Sales Area
3. Staff Offices (Adjacent to Welcome Area)
   - Tourism Warden Office
   - Chief Park Guide Office
4. Work Space
   - Work Room / Library
   - Seating
   - Storage for Miscellaneous Interpretive Materials (including surface bones)

EXTERIOR INTERPRETATIVE AREAS

1. Staging / Rest Areas with Interpretive Exhibits
2. Exterior Building Walls for Passive Interpretation (art motiffs)
3. Shade and View Areas
4. Experience Areas
5. Short Nature Trail or Loop Walk
6. Lake Manyara: River Overlook, connected to Nature Trailhead
7. Tarangire: Elevated Overlook at 150 cm above grade (offering panoramic views)

PERMIT / FEE COLLECTION AREA

1. Transaction Counter with space for two (2) staff
2. Cash Register
3. Document Storage / Files / Safe
4. Waiting Area: Capacity for 25 Drivers in Queue

RESTROOMS (Flush Systems Supplemented with Pit Latrines)

1. Men
   - Two (2) W.C. Stalls
   - Four (4) Urinals
   - Three (3) Hand Wash Basins (Lavatories)
   - Sanitary Fixtures Located on Exterior Walls
2. Women
   - Six (6) W.C. Stalls
   - Three (3) Hand Wash Basins (Lavatories)
   - Sanitary Fixtures Located on Exterior Walls
3. Pit Latrines
   - Men: one (1) W.C. stall / one (1) urinal
   - Women: two (2) W.C. stalls
4. Janitorial Space with Utility Storage Space

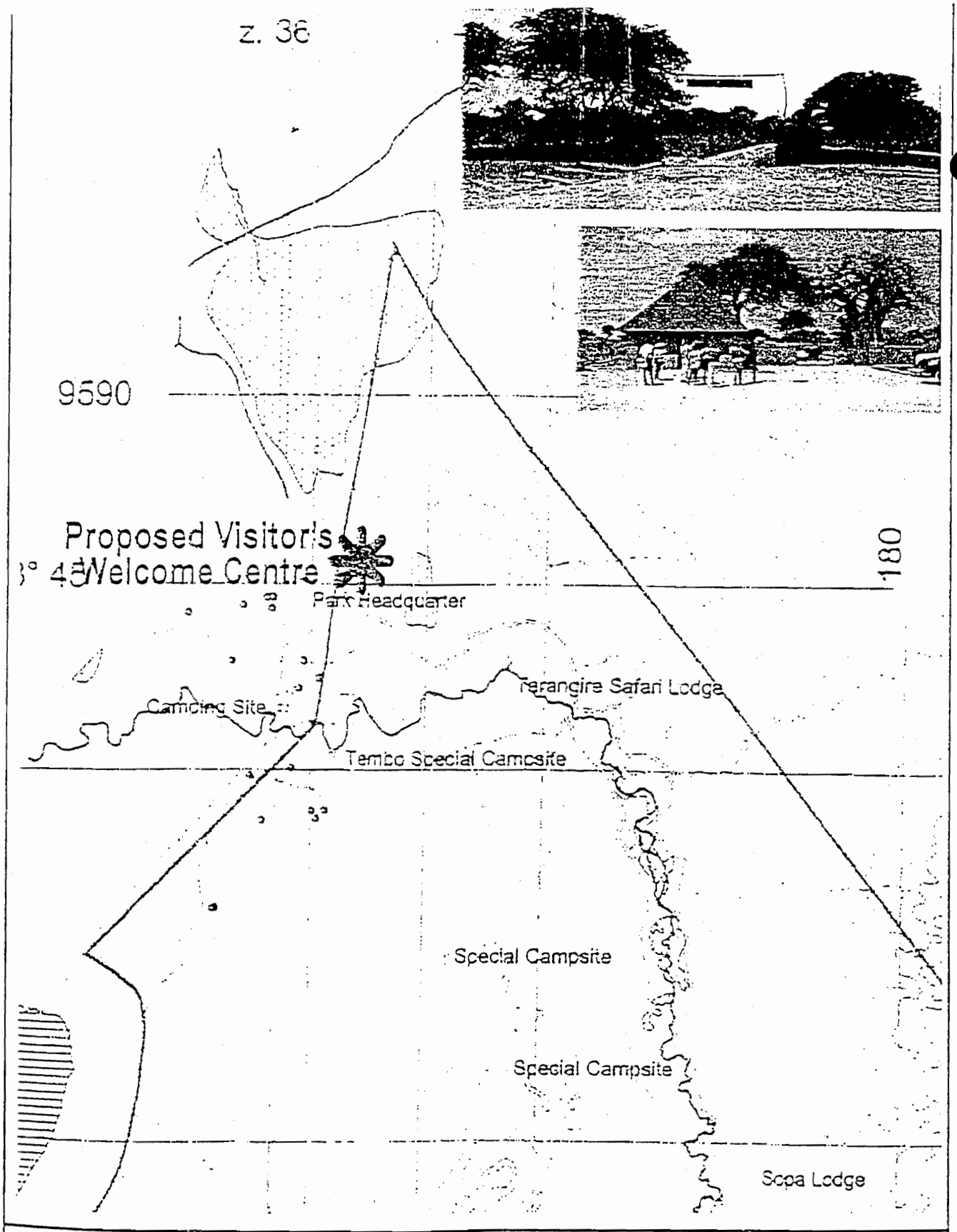
Note that prevailing winds come from the east; place restroom west of facilities to extent possible.

PARKING AREA

1. Designated Parking Areas
   - Lake Manyara: 35 Standard Vehicles, 2 Oversized Spaces, 5 Staff Spaces
   - Tarangire: 25 Standard Vehicles, 2 Oversized Spaces, 5 Staff Spaces

Note: Actual sizes of program elements to be determined.

z. 36



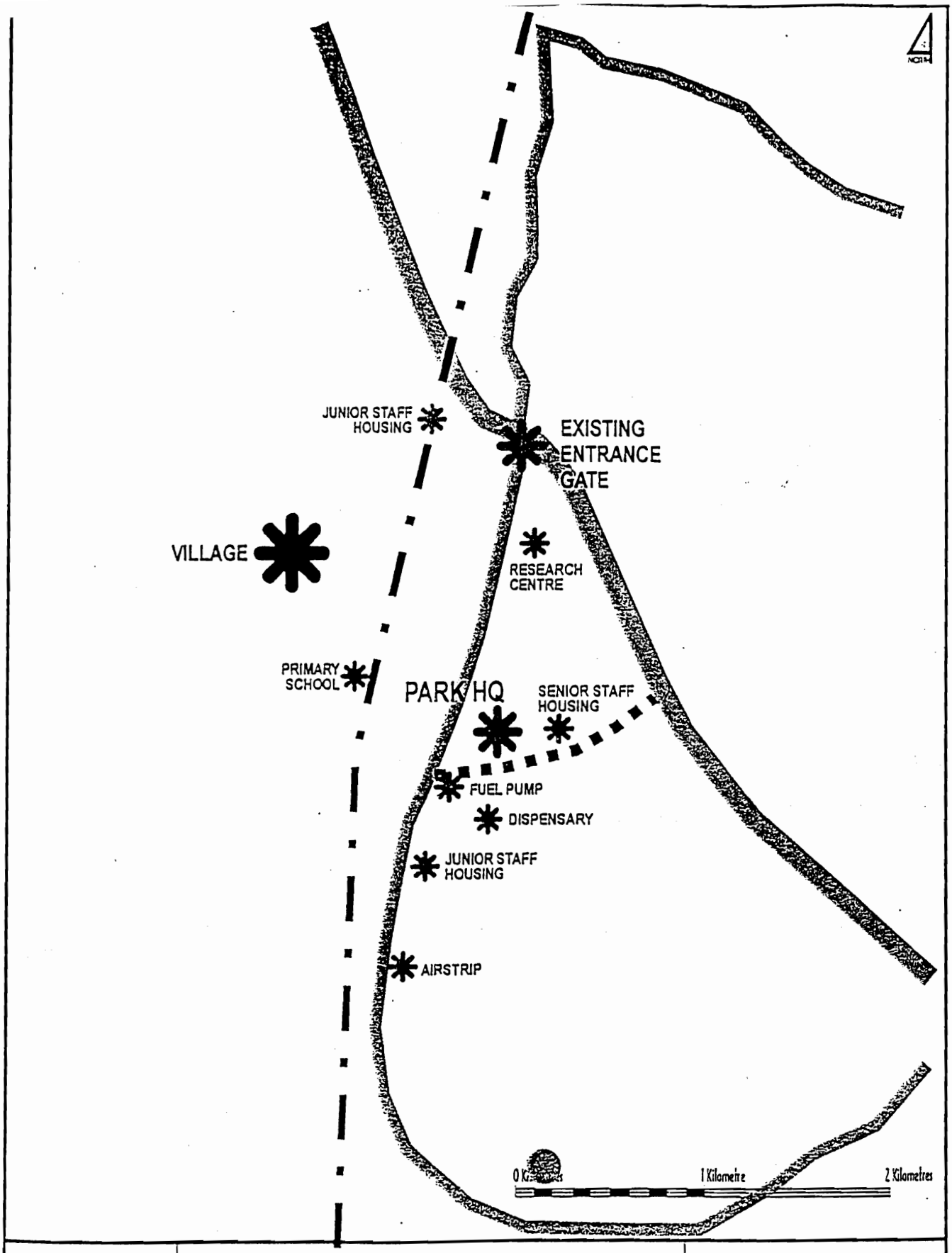
Tanzanian National Parks
African Wildlife Foundation

Robford Logistics

LOCATION MAP

PROPOSED RE-DEVELOPMENT OF ENTRANCE FACILITIES
TARANGIRE NATIONAL PARK

Date Drawn:	14 August 1999
Date Edited:	
Project #	7310 - 2/99
Drawing File Number:	7310-2/99:1 Tarangire NP Entrance Development Map
Drawn by:	MAP 1



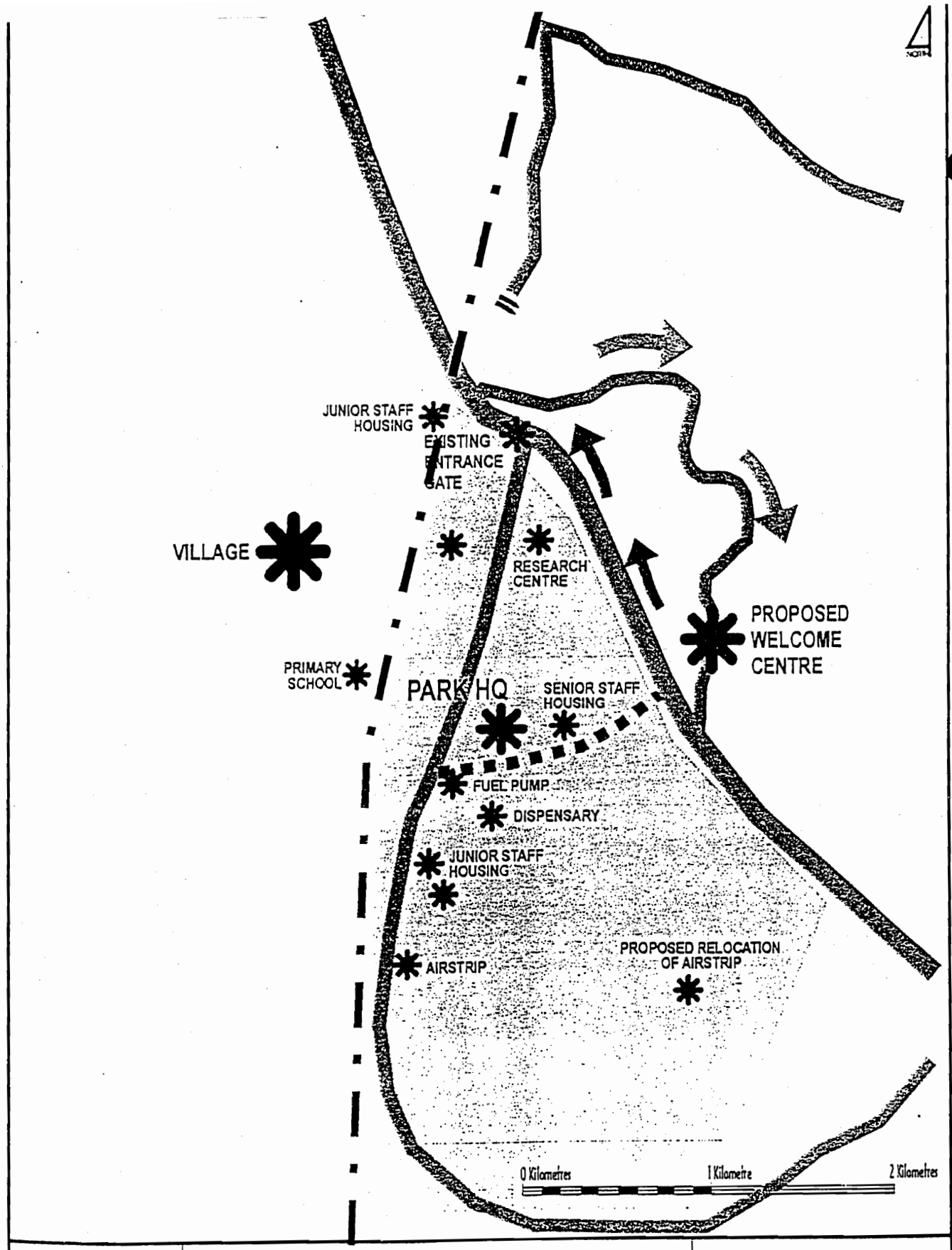
Tanzanian National Parks
African Wildlife Foundation

Robford Tourism

EXISTING FACILITIES & SERVICES

PROPOSED RE-DEVELOPMENT OF ENTRANCE FACILITIES
TARANGIRE NATIONAL PARK

Date Drafted	1 August 1999
Date Edited	
Project #	7310 - 2/99
Drawing File Number	7310-2/99:1 Tarangire NP Entrance Development Map
Drawn by	MAP 1



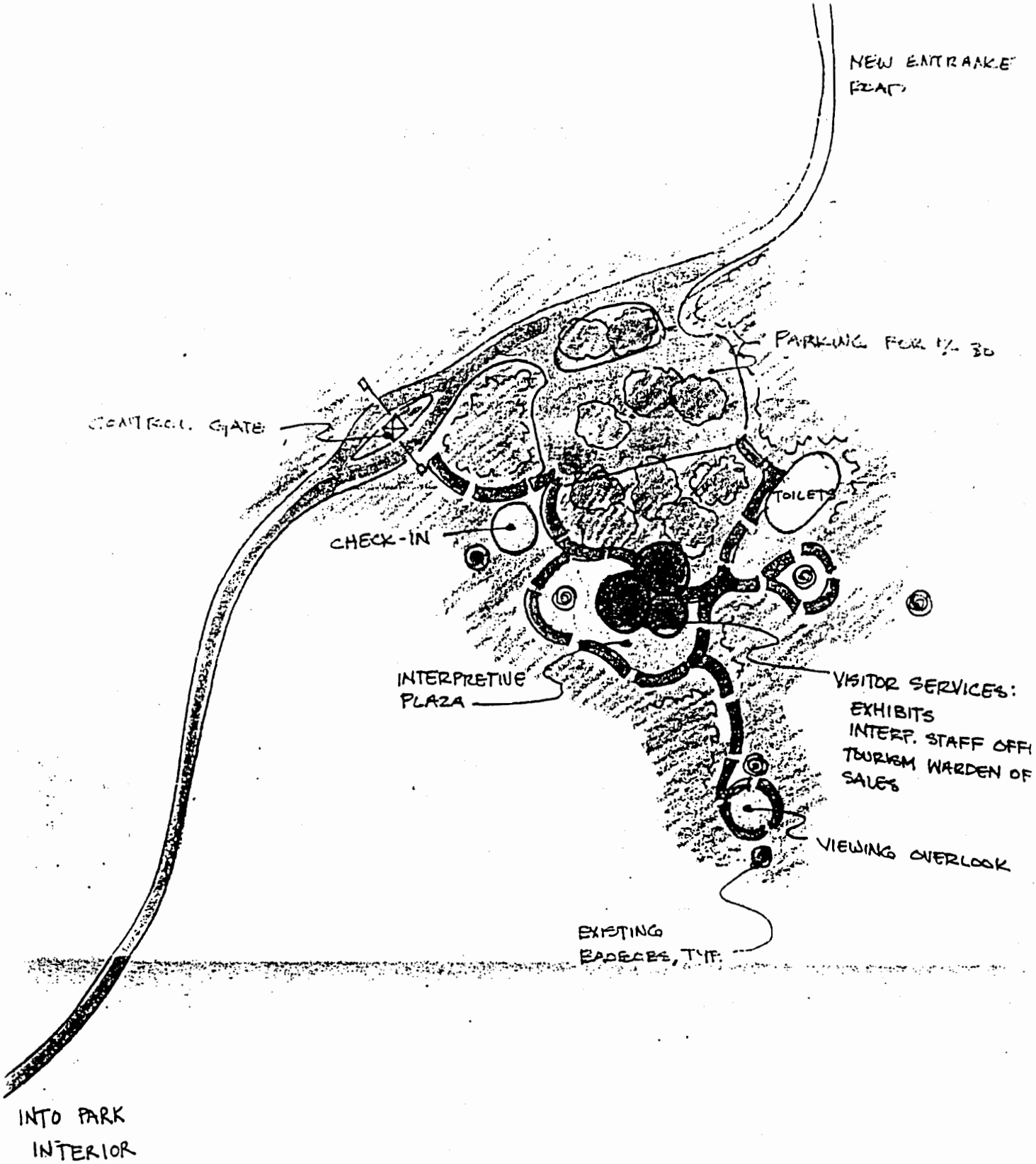
Tanzanian National Parks
African Wildlife Foundation

Robford Tourism

PROPOSED VISITOR FACILITIES & SERVICES

PROPOSED RE-DEVELOPMENT OF ENTRANCE FACILITIES TARANGIRE NATIONAL PARK

Date Drafted:	1 August 1999
Date Edited:	
Project #	7310 - 2/99
Drawing Ref Number	7310-2/99:1 Tarangire NP Entrance Development Map
Drawn by	MAP 3



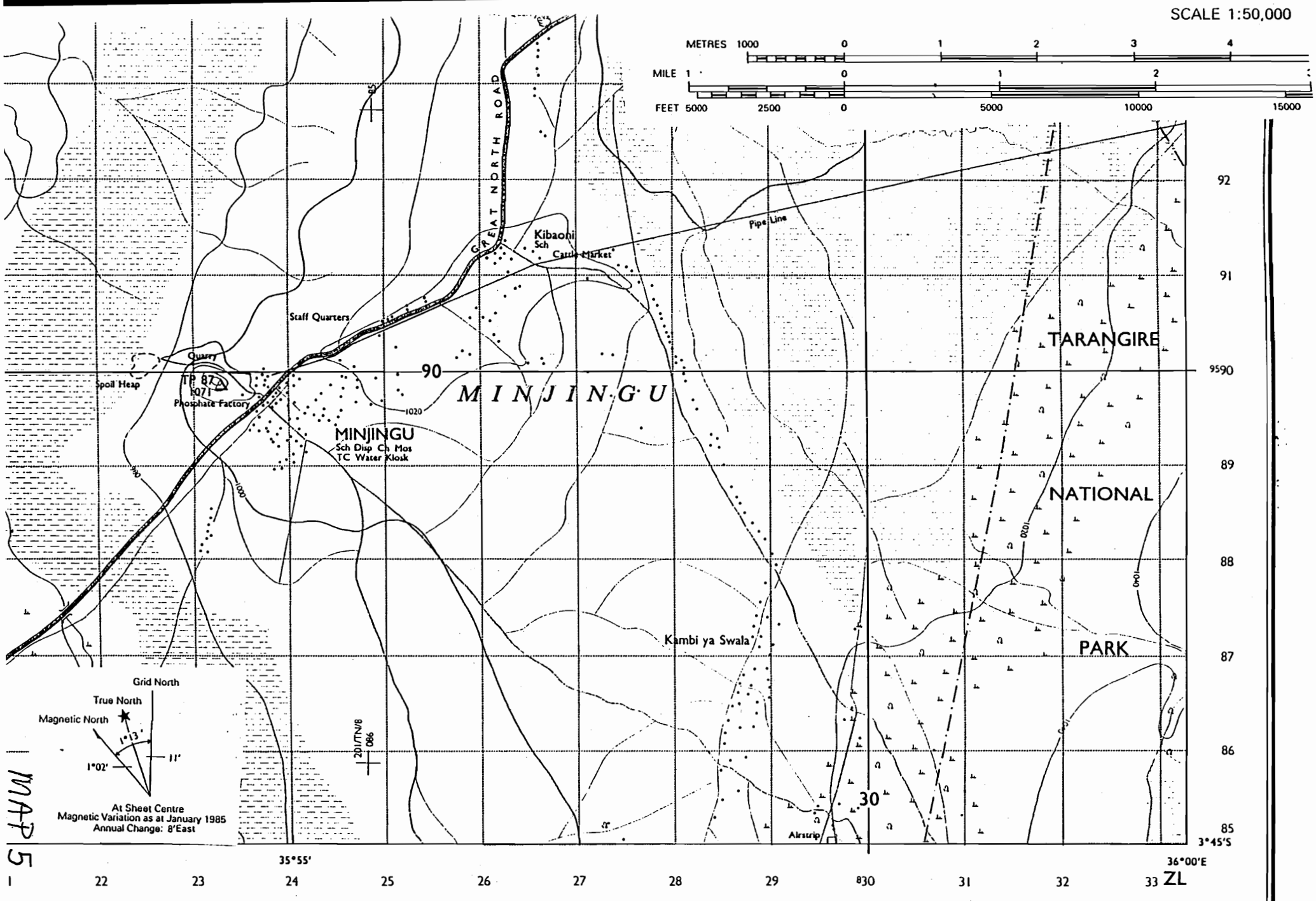
TARANGIRE NAT'L. PAR
WELCOME CTR. CONCEPT PLAN

08-06-99

1:1000

NORTH

MAP 4



MAP 5

Printed by Surveys and Mapping Division, Ministry of Lands, Housing and Urban Develop[illegible] Tanzania, 1991.

Ngoley Primary School Improvement and Water Development

Note: These case studies have been generated based on information that is sometimes conflicting or incomplete. If you have information that corrects or presents another interpretation of the situation, please inform the facilitators and the case study working group. In discussions with stakeholders, please be careful to avoid raising any expectations (or fears) that the activity described here will be implemented.

Purpose and Need of Activity:

The primary purpose of this activity is to create a sense of partnership and joint ownership of Park benefits with communities bordering Tarangire National Park. The intent is to build community support for the Park and demonstrate that the Park can generate real benefits for surrounding communities, including resources for construction of new water points and schools.

General Background[1]:

Tarangire National Park is the fourth largest park in Tanzania with one of the highest density of elephants of any park in the country. It is part of Tanzania's popular northern tourist circuit that includes Arusha, Mt. Kilimanjaro, Lake Manyara, and Serengeti National Parks as well as Ngorongoro Conservation Area. Many tourists visit Tarangire either as a first stop or last stop on the northern tour circuit.

The park derives its name from the Tarangire River that flows through the center of the national park from south to north/north-west and empties its water into Lake Burungi. During the dry season this river is a primary source of water in the Tarangire ecosystem. This park is endowed with wetlands (Silale, Gursi, Larmakau and Nguselororobi Swamps) which act as sponges to supply water to Tarangire River during dry periods. Because of the availability of water, the park has a high concentration and variety of wildlife in the dry season.

Ecological Setting:

Vegetation

Tarangire National Park and surrounding communities are situated in the wooded steppe in an arid Acacia savannah belt that is dominated by *Acacia and Commiphora* species. The most important vegetation types are:

- Riparian woodland
- *Acacia tortilis* parkland
- Wetlands and seasonal flood plain
- *Acacia-Commiphora* woodland
- Riverine grassland
- *Combretum-Dalbergia* woodland
- *Acacia drepanolobium* woodland
- Rocky hilltop outcrops [kopjes] vegetation
- Deep gully vegetation
- Grasslands with scattered baobab trees

Wildlife

Tarangire National Park is a dry season refuge for a majority of the migratory wildlife in the Tarangire ecosystem and which pass through the lands of surrounding communities and pastoralists. The park is very rich in mammals and birds. It is estimated that during the dry season total biomass of large mammals inside the park is well in excess of 35 metric tons/km^2. Some of the more important wildlife species include: African Elephant, Lesser and Greater Kudu, African Buffalo, Cheetah, Fringe-eared Oryx, Leopard, Lion, Masai Giraffe, Spotted Hyena, Common Zebra, White-

[1] Most of the information which follows on the Park and its ecological and socio-cultural setting is extracted verbatim from the *Management Zone Plan - Tarangire National Park* prepared by Tanzania National Parks (TANAPA), April, 1994.

bearded Wildebeest, Warthog, Eland, Olive baboon, Bateared Fox, Mountain Reedbuck, Impala, Common Waterbuck, Bushbuck, Coke's Hartebeest, Gerenuk, and Bohor Reedbuck. The park has more than 550 species of birds.

Geology and Soils

Tarangire National Park and surrounding communities are situated within the eastern portion of the East African Rift Valley. The geology is based on three types of rock formations: the Precambrian gneiss rocks, lake deposits and alluvial deposits. However, much of the park is underlain by gneiss and other pre-Cambrian crystalline rocks, which give rise to different physical features. These parent rocks are of varying resistance to weathering and erosion. The harder unweathered rocks stick out as outcrops and form prominent features in the park like the Sangaiwe hills on the central western boundary, Boundary Hill on the north eastern boundary, and other numerous smaller kopjes in the park.

The major soil types are the well drained red-loams that become alluvial along river valleys, alluvial on ridges and colluvial on hill slopes. They become increasingly stony along hill slopes due to lack of depth. The other soil types originating from lake deposits and sediments vary from clays to sands and are normally very saline. The third soil type is made up of alluvial deposits that are predominantly vertisols, commonly known as black-cotton soils. These clay soils are the expanding type that are poorly drained. They become wet and impassable to vehicles during the rains and dry up and crack during the dry season.

Climate

Precise figures for many climatic parameters are not available, meteorological records are fragmentary and recording stations are widely separated. Communities bordering Tarangire National Park are located in a semi-arid area characterized by a prolonged dry season lasting up to 7 months. It lies in a typical bimodal rainfall region of northern Tanzania. The annual rainfall pattern consists of the short rains between November and December followed by a dry spell in January and long rains occur any time between February/March to May/June. The short rains are erratic, unreliable and variable in distribution. The annual average rainfall is about 650 mm. Temperatures are highest from December to February and lowest in June and July. The average maximum temperature is 27° C while average minimum is 16° C.

Human Interactions

Prior to 1950, the area which is now Tarangire National Park had little human settlement and was not used for livestock grazing due to the high concentration of tsetse flies which transmitted sleeping sickness to both livestock and the human population. This one factor played a major role in protecting this area from human exploitation. The areas to the east of the park, the Masai Steppe, are some of the region's most important grazing lands for both wildlife and livestock. Only during very severe droughts when all the surrounding grazing lands were overgrazed, would the Masai pastoralists be forced to use the Tarangire area for cattle grazing. The only other historical human use of the area was by fishermen who took up temporary residence in the park to harvest catfish from the Silale swamp.

The Tarangire Game Reserve was gazetted in 1957 in recognition of its importance as a dry season watering area for wildlife. Prior to its gazettement as a game reserve, the area was a well-known hunting area for rhino. The Tarangire Game Reserve lands were included as part of a larger area to establish Tarangire National Park. Tarangire National Park was established by a Presidential Decree signed on 14 May 1970 under Section 3 of the 1959 National Parks Ordinance. The Decree was published in the Gazette of the United Republic of Tanzania (No. 25, Vol 11) on 19 June 1970.

Socio-Cultural Aspects[2]

The majority of the Park neighbors are Maasai. Traditionally, the Maasai held pastureland in common, and each community member had access to grazing, water and salt licks for livestock. Rights to specific areas of the range were clearly defined and determined by membership to a given community and territory. Access to any resource was negotiated and mediated through various social parameters such as clan, sub-clan, associations and marital links. Grazing resources were utilized rotationally, with wet and dry season areas used seasonally. The people adjacent to Tarangire used these resource utilization and management techniques, in order to ensure vegetation regeneration, soil

[2] This section was prepared by Peter Toima, Chief Executive for Inyuat e Maa, a community-based NGO.

fertility and environmental conservation.

Many of the National Parks in Tanzania were originally Maasai lands. The Maasai's traditional methods helped preserve the natural resource base. They are based on practical respect for the natural environment and methods of pasture management, e.g., zoning, transhumance.

Grazing Systems and Water Resources

Availability of, and seasonal access to water, determines what areas are used for grazing, and when. Permanent bomas (homesteads) are situated near places of permanent water and the herds move out to temporary water sources – dams, streams and ponds in the wet season. Most of the wet season water resources are seasonal. A number of potential grazing areas adjacent to the Eastern part of the Park (like Oldonyo, Sambu, Oloiborsoit, Emboreet) are without water or access is difficult.

Water is usually the first stated development need in the villages neighboring Tarangire, with water for livestock given highest priority. Since 1962, when the Government of Tanzania rationalized land, all natural resources, including water, have been publicly owned. Traditionally owned sources are described as clan property, but fellow clan members have primary rights of access. In this area there are three different systems of water management which are: clan/individually owned, and managed natural wells and springs; government constructed dams and boreholes, which rely on government infrastructure for maintenance; and boreholes and hand pump wells installed by NGOs and managed by Village Councils.

Regular maintenance is carried out by the youth (moran), although casual labour (non-Maasai) may be employed to dig clan/individually owned sources. Dry season dams and natural ponds are for communal use and are not necessarily maintained. Many dams are silting up. Many boreholes are in poor functioning condition. There is minimal recognition of the importance of clean water for human health. For a pastoral system, quantity and well-spaced sources are more important than quality, even though clean water for domestic use is essential for improvement of health among both children and adults.

Throughout the area, water is a major problem for livestock and people, with insufficient clean and potable water for most of these villages.

Education

Traditionally the Maasai were reluctant to send their children to school, but currently this attitude is changing. In most cases households have at least one child in school. There is considerable skepticism about the benefits of education, in part because schools are inadequate and many children are only semi-literate on completion of Primary 7. The changing trend is attributed to a need for change given the decline in herds and the pastoral economy, a need to be literate in Kiswahili, and to be able to communicate more effectively at markets, hospitals and in urban areas. Also more educated people are returning to the villages to work, and are setting an example with higher salaries and standards of living. Education is equated with increased power, leadership and influence outside the traditional institutions.

The desire to send children to school is stronger amongst men aged 30-50 years, some of whom attended school themselves in the 1960s and 1970s. These are the groups that have Village Council membership and travel outside the villages.

More boys than girls attend school. The rationale is that a boy returns the investment to the home whereas a girl is expected to leave home to marry and bring in bridewealth.

There are few boarding primary schools in the area. There is an animal husbandry vocational school, but no secondary schools. Few children proceed to secondary school, due to poor Standard 7 results and money. However, every village has a primary school, Standard One to Seven. The facilities are poor and most of the buildings are not maintained. Many pupils walk long distances to school, after going without food until evening. Emoreet is the oldest primary school, established in 1953. Most of the other schools were established after the declaration of Universal Primary Education in 1974. Most teachers are primary school leavers from outside the villages with three years of teacher training. The morale of these teachers is low, because of their low salaries and inadequate teaching facilities, materials and equipment.

Park Significance

Neither the proclamation notice for Tarangire National Park nor the National Park Ordinance state the specific purposes for setting this area aside as a national park. However, prior to gazettement, the area was known for its importance as a dry season watering place for much of the wildlife in southern Maasailand. Through an interdisciplinary team planning process, the Management Zone Plan team identified the following as the purpose and significance of Tarangire National Park:

- a critical dry season watering place for both resident wildlife and much of the migratory wildlife of southern Maasailand.
- one of Tanzania's most important wetlands and hydrological regimes that support a variety and abundance of both fauna and flora.
- the unique association and mosaic of habitats and landforms that give Tarangire a distinctive character not duplicated anywhere else in Tanzania.
- habitat for endangered, threatened, endemic, and rare species and species of special concern or species of exceptional value.
- the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.
- possesses, second only to the Serengeti/Ngorongoro ecosystem, the highest concentration of wildlife during the dry season of any area in Tanzania (Lamprey 1964).
- is one of the few protected areas in Tanzania with a hydrological regime that ensures a permanent year round water source for the park's most exceptional resource - the Tarangire River.
- is known for its river valley, wetlands, gently rolling hills, rocky outcrops, acacia woodlands, and numerous baobab trees.
- is the only national park in Tanzania's northern circuit where one can easily view a large concentration of elephants during almost any time of the year.
- has an uninterrupted history as an area with significant variety and concentration of wildlife dating back 9000 years as evidenced by the prehistoric pictographs at Kisesse, Kolo, and Pahi (located approximately 40 kilometers southwest of the park boundary).

Community Perceptions of the Park

A questionnaire survey of conservation attitudes was conducted by William D. Newmark, Nancy D. Leonard, Hashim I. Sariko and Eeo-Gratias M. Gamassa over a two year period between August 1987 and August 1989. In response to the question, "How would you feel if Tarangire National Park (TNP) were abolished?, "96 respondents were not in favor of abolishment, 22 were in favor, and 15 provided no response. To the question "What good things do people from TNP do?," 50 respondents said 'nothing'; 25 said "keep wildlife away"; 15 said "provide medical assistance and transportation"; 21 had other responses; and 24 provided no response.

Brief Description of Activities and Locations:

General Location:

Tarangire National Park is located in northern Tanzania between 3' 40' and 5' 35' south and 35' 45' and 37' East at an elevation of between 1200 meters and 1600 meters above sea level. It comprises a 2600 km^2 portion of the Tarangire

ecosystem. The entire ecosystem encompasses approximately 20,500 km^2 of the Masai Steppe, including Mto-wa-Mbu Game Controlled Area on the north, Lolkisale and Simanjiro Plains Game Controlled Areas on the east, Mkungunero Game Controlled Area to the south and Kwakuchinja Open Area (Mweka College Demonstration Area) on the west. (See Management Zone Plan Figure 2 - Vicinity Map). The park is located 118 km south-west of Arusha, east of the Great North Road and within the administrative districts of Babati, Monduli, Kiteto, Simanjiro, and Kondoa.

The park is accessible on the tarmacked Great North Road (Arusba-Dodoma) from Arusha to the turn off at Kwakuchinja village near Minjingu phosphate mine. All tourist access into the park is through the entrance gate located in the northwestern corner of the park near the park headquarters. An 8 km gravel road connects the park entrance with the Great North Road. All other access pints into the park are for administrative use only including Loibor Serrit Ranger post on the south-eastern boundary and the former ranger post at Chubi near the south western corner of the park boundary.

Existing Sites: Map 1 shows the general location the primary schools at Naitolia, Minjingu and Ngoley on a 1:50,000 scale topographic sheet.

Natolia Primary School: Map 1 is a sketch of Naitolia Primary School . To reach this school one drives on the main road toward Arusha approximately 31 kms from the Tarangire National Park junction. Turn right at the black signpost and continue on for approximately 5 kilometers to the school. This school has 200 students and 4 teachers. Jacob Porokwa (TANAPA Community Conservation Warden) came here with the Member of Parliament and a Minister in the Vice Presidents Office for Environment, Mr. Edward Lowasa. A promise was made to build two new staff houses for teachers . The person present on site during the visit was a Village Council Member, Mr. Menyensera Ngalesoni. A store was also to be constructed. Water comes from 5 km away. They have tried to develop a borehole.

Minjingu Primary School: Minjingu Primary is adjacent to the Minjingu phosphate mine on the Arusha-Dodoma road, very near the turnoff to Tarangire at Kwakuchinja village. Map 2 is a rough sketch of the school layout. The school is new and has 7 classrooms. Some of the school was damaged structurally by earthquakes, which are frequent in the area. Rainwater collection from roof gutters is planned. The school's latrines are inadequate for the size of the school population.

Proposed Improvements to Ngoley Primary School: Ngoley Primary School is approximately 31 kilometers from the Tarangire Main Gate and Ngoley Village is 3 kilometers from the Park boundary. A sketch of the school is provided as Map 3. The school has one building at present. There are 174 students with 4 teachers. In 1997 the roof of the school blew off. The villagers replaced it. There is a security problem at the school , which has caused the teaching staff to abandon the houses constructed for them. These houses are in disrepair and the teachers live elsewhere.

The following are proposed:

Construction of additional classrooms

Rehabilitation of houses for teachers, including cooking facilities, latrines, washing areas and solid waste pits

Construction of latrines for students

Solid waste pits for student refuse

Installation of water collection systems on classrooms and teachers houses with cistern storage

Drilling of a well and construction of a handpump for use by students and teachers

Tree and shrub planting

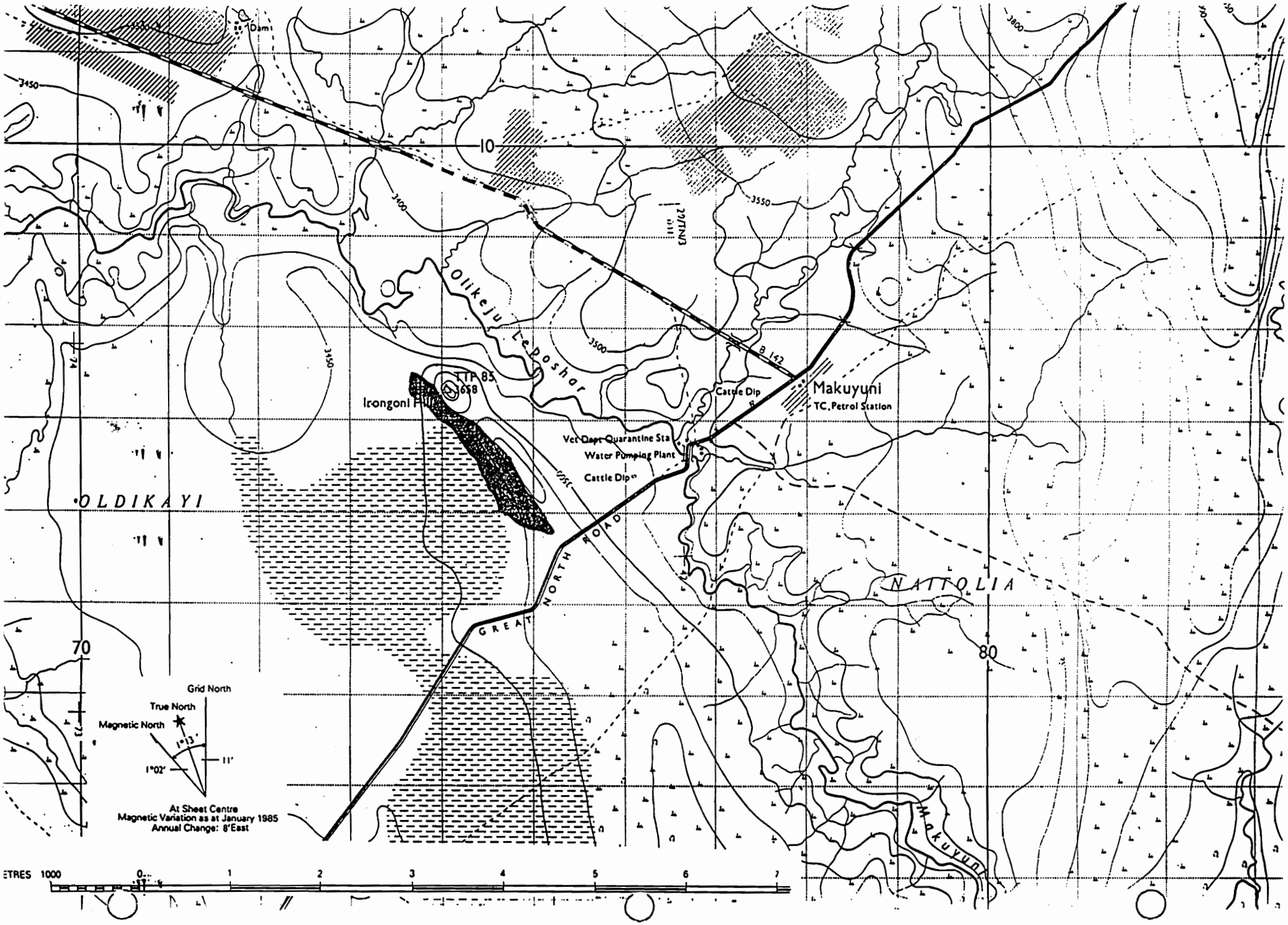
Establishment of a school garden with growing of vegetables and instruction in the use of natural fertilizers, insecticides and fungicides.

Contacts:

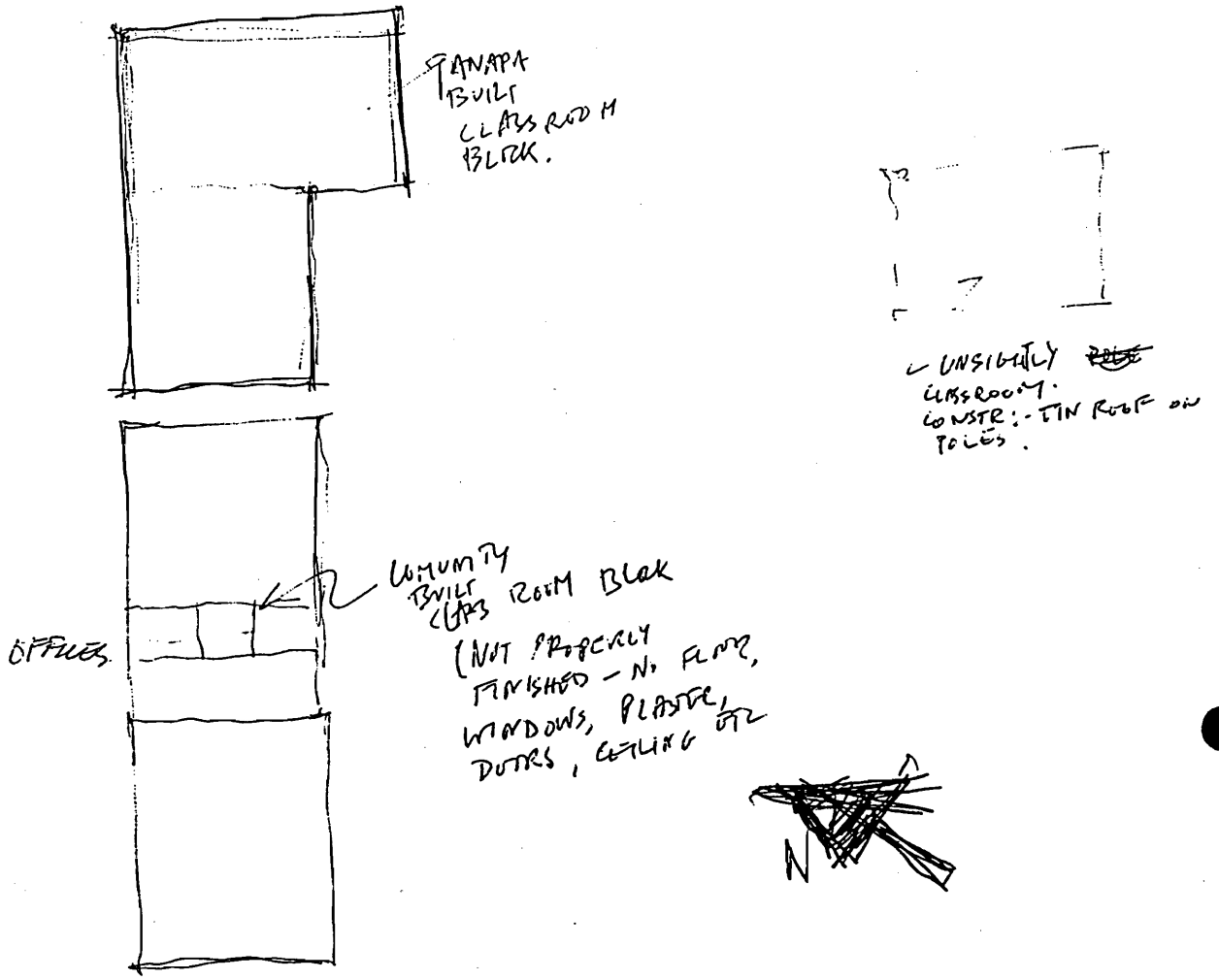
Site Resource persons:	Jacob Porokwa, Community Conservation Warden, Tarangire National Park Allan Kijazi, AWF Environmental Planner Charlotte Bingham, USAID Regional Environmental Officer
Other Contacts:	Head Teacher at Minjingu Primary Sophia Boniface Lyimo Head master at Ngoley Primary

Background Reports and Data:

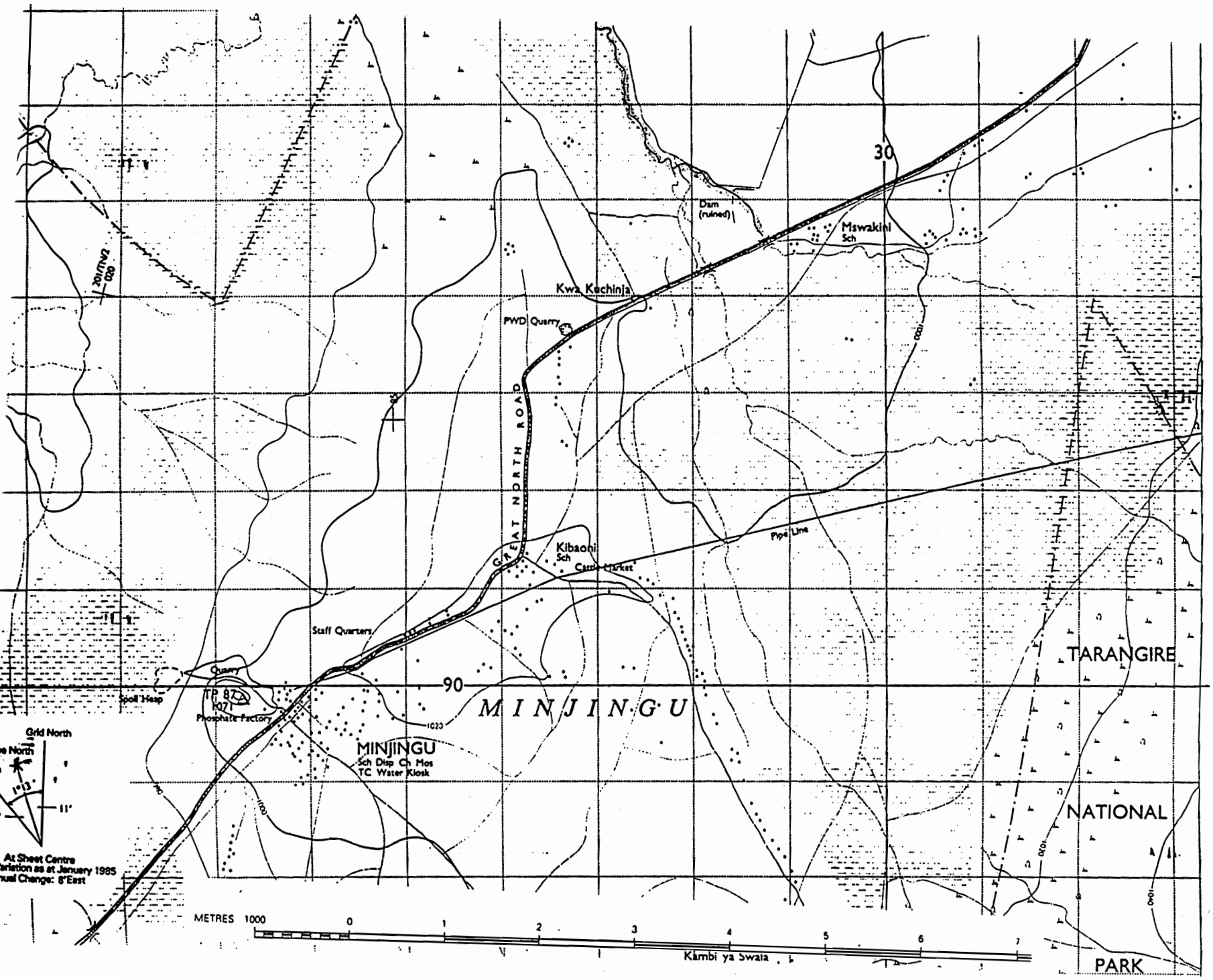
Tanzania National Parks, Management Zone Plan, Tanzania National Park, April 1994.
Sketch Map 1: Naitolia Primary School; Sketch Map 2; Minjingu Primary School; Sketch Map 3:Ngoley Primary School
1:50,000 Topographic Sheet


Dam
3450
10
3400
3550
Olikeju Le Doshar
3500
B 142
TTP 85
1658
Irongoni Hill
Cattle Dip
Makuyuni
TC, Petrol Station
Vet Dept Quarantine Sta
Water Pumping Plant
Cattle Dip
OLDIKAYI
GREAT NORTH ROAD
NATTOLIA
70
80
Makuyuni
Grid North
True North
Magnetic North
1°13'
11'
1°02'
At Sheet Centre
Magnetic Variation as at January 1985
Annual Change: 8'East
ETRES 1000
0
1
2
3
4
5
6
7

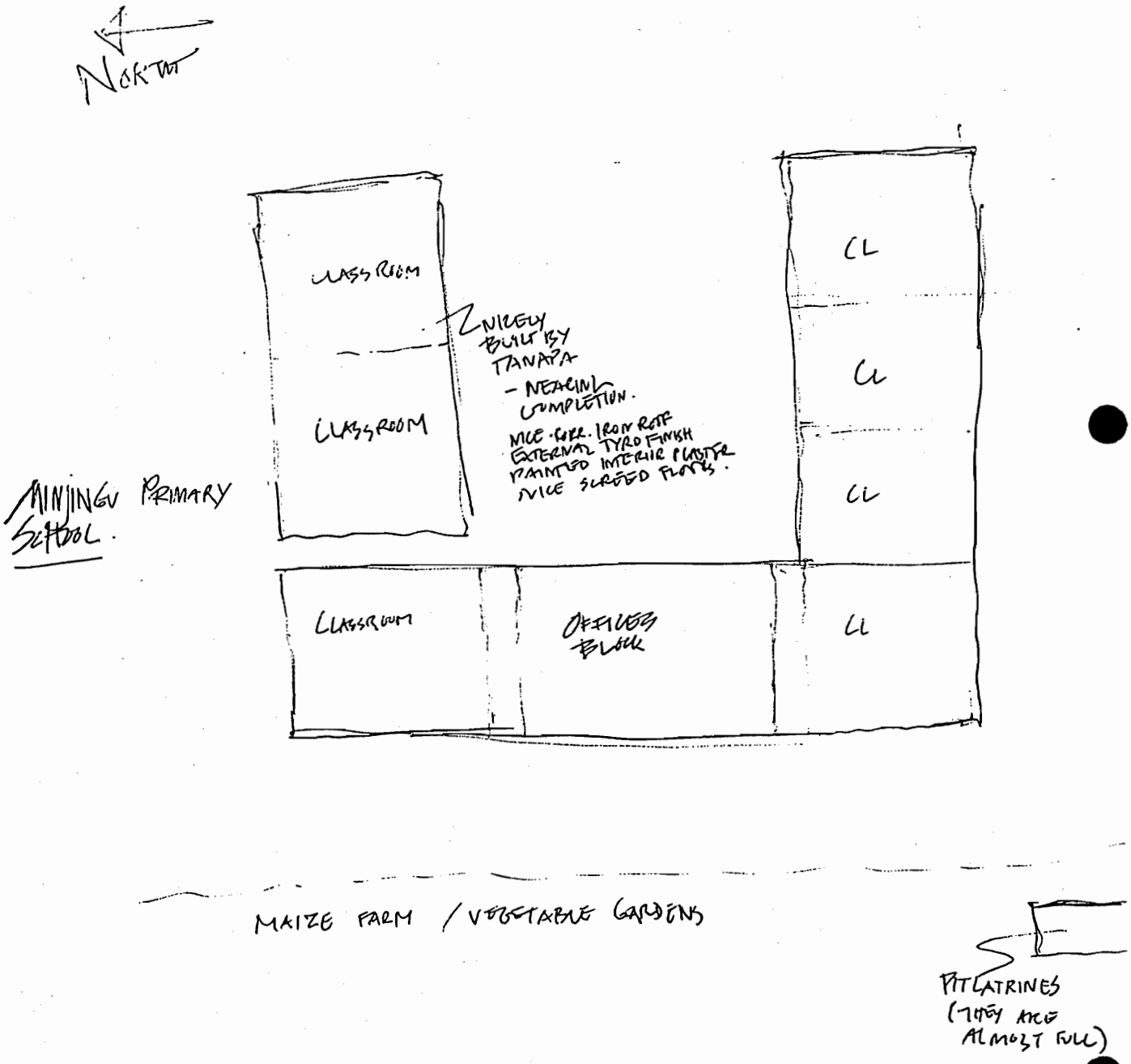
MAP 1



NAITOLIA PR SCHOOL

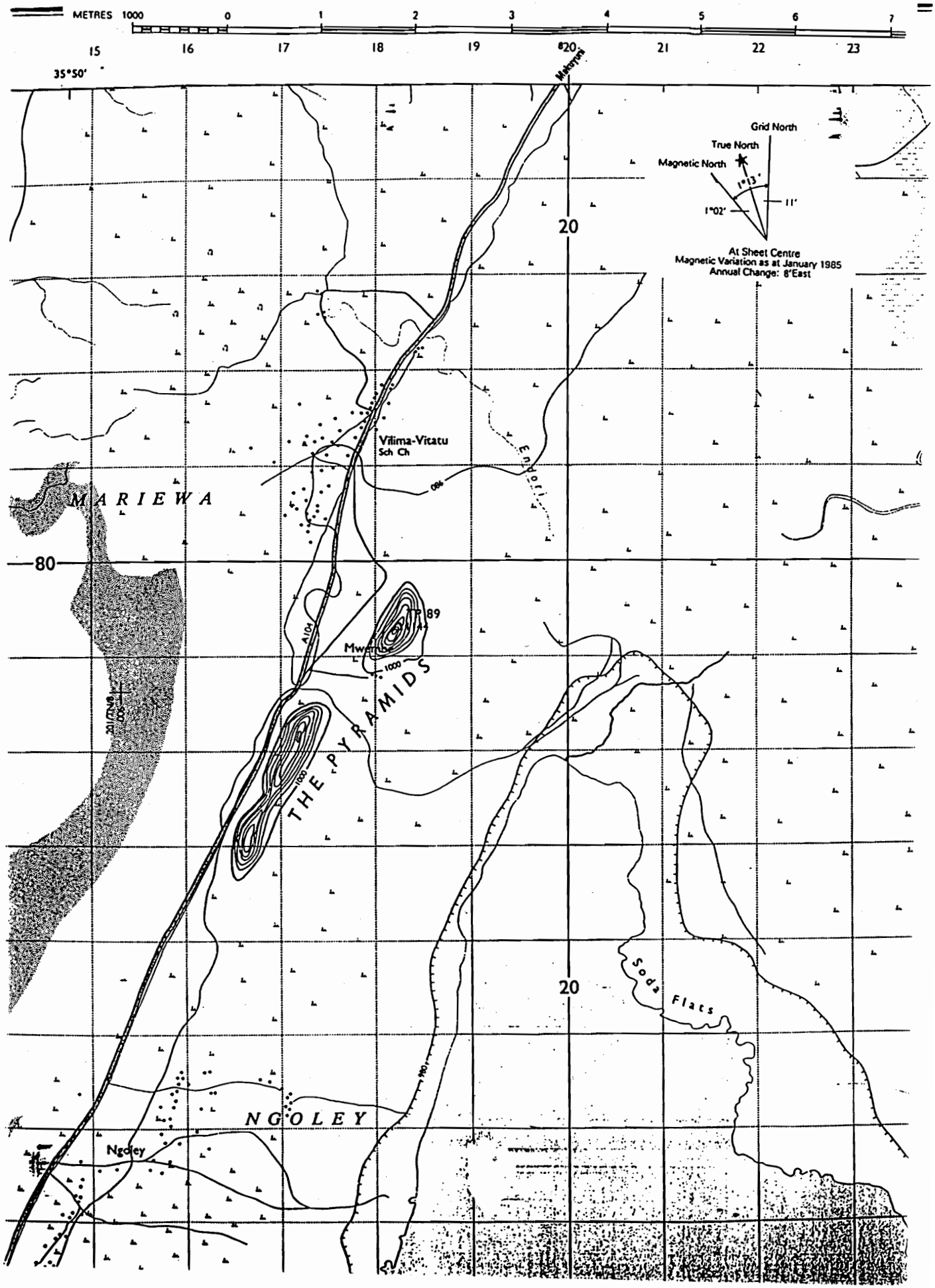

30
Dam (ruined)
Mswakini Sch
Kwa Kachinja
PWD Quarry
GREAT NORTH ROAD
Kibaoni Sch
Cattle Market
Pipe Line
Staff Quarters
Quarry
Spoil Heap
TP 87
1071
Phosphate Factory
90
MINJINGU
MINJINGU
Sch Disp Ch Mos
TC Water Kiosk
TARANGIRE
NATIONAL
PARK
Grid North
At Sheet Centre
Variation as at January 1985
Annual Change: 8'East
METRES 1000
Kambi ya Swala
96
95
94
93
92
91
9590
89
88
87
3°40'

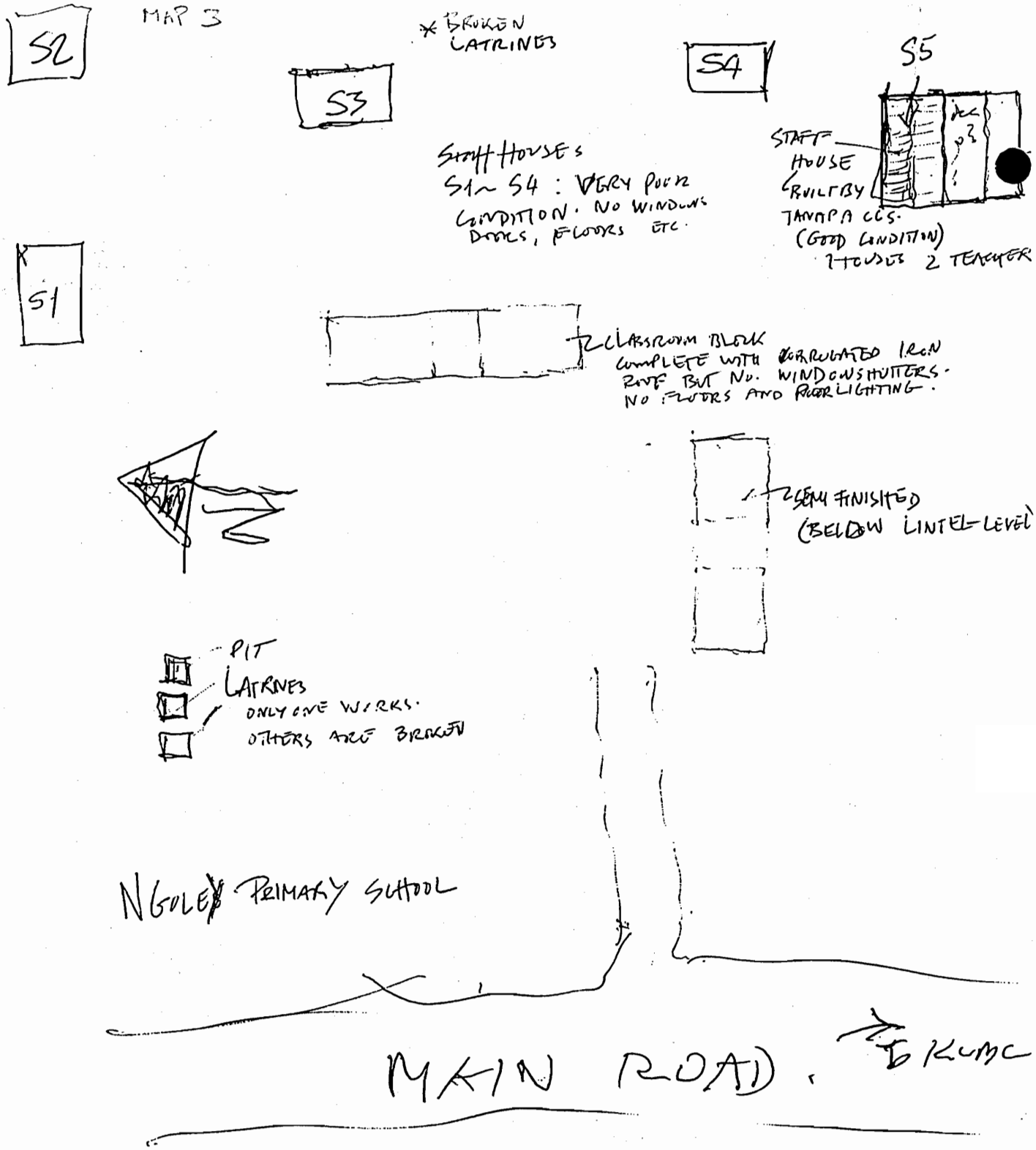
MAP 2


NORTH
CLASSROOM
CLASSROOM
NICELY BUILT BY TANAPA
- NEARING COMPLETION.
NICE CORR. IRON ROOF
EXTERNAL TYRO FINISH
PAINTED INTERIOR PLASTER
NICE SCREED FLOORS.
CL
CL
CL
CLASSROOM
OFFICES BLOCK
CL
MINJINGU PRIMARY SCHOOL.
MAIZE FARM / VEGETABLE GARDENS
PIT LATRINES
(THEY ARE ALMOST FULL)

BEST AVAILABLE

MAGUGU




MAP 3
S2
S3
S4
S5
S1
* BROKEN LATRINES
STAFF HOUSES
S1 ~ S4 : VERY POOR CONDITION. NO WINDOWS DOORS, FLOORS ETC.
STAFF HOUSE BUILT BY TANAPA CCS. (GOOD CONDITION) 1 HOUSE 2 TEACHER
CLASSROOM BLOCK COMPLETE WITH CORRUGATED IRON ROOF BUT NO. WINDOWS SHUTTERS. NO FLOORS AND POOR LIGHTING.
SEMI FINISHED (BELOW LINTEL LEVEL)
PIT LATRINES ONLY ONE WORKS. OTHERS ARE BROKEN
NGOLE PRIMARY SCHOOL
MAIN ROAD.
TO KUMC

Tarangire Hill Road Improvement and Special Campsite

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Purpose and Need of Activity:

The primary purpose of this activity is to establish an additional special campsite with a view east from Tarangire Hill to the valley below. The current Tarangire Hill road circuit is well-traveled as part of the visitor circuit, but is not a road used for regular travel between ranger posts. Certain segments are beginning to gully because of the steepness of grade and because they do not follow the contour of the hill. These segments are slippery and potentially hazardous in wet weather. These problems will require road realignment and in some cases relocation. Application of morum may be required in selected locations.

General Background[1]:

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The park derives its name from the Tarangire River that flows through the center of the national park from south to north/north-west and empties its water into Lake Burungi. During the dry season this river is a primary source of water in the Tarangire ecosystem. This park is endowed with wetlands (Silale, Gursi, Larmakau and Nguselororobi Swamps) which act as sponges to supply water to Tarangire River during dry periods. Because of the availability of water, the park has a high concentration and variety of wildlife in the dry season.

Park Infrastructure

The park has five ranger posts in various strategic locations. Headquarters is located near the park entrance gate in the extreme northwestern portion of the park adjacent to the park boundary. The headquarters office block contains the administrative offices for the Chief Park Warden, Warden of Tourism, Field Ecologist, Warden Antipoaching, Warden Community Conservation and Accounts. The garage and workshop for the park are located behind the administration headquarters building. The senior staff residential housing and resthouse are located within 500 meters east of the administrative offices. The junior staff village is located south of the senior staff, 1 km from the administrative offices. (See Management Zone Plan Figure 3, the symbol • indicates location of ranger posts).

Kuro	(central)
Sangaiwe	(north-west)
Mamire	(west)
Loibor Serrit	(east)
Boundary Hill	(north-east)

The main park entrance, where visitors register, pay fees, and purchase park guide books (when they are available consists of a gate, a small visitor contact building and toilet.

Ecological Setting:

Vegetation

Tarangire National Park is situated in the wooded steppe in an Acacia savannah belt that is dominated by *Acacia and*

[1] Most of the information which follows on the Park and its ecological and socio-cultural setting is extracted verbatim from the *Management Zone Plan - Tarangire National Park* prepared by Tanzania National Parks (TANAPA), April, 1994.

Commiphora species. The most important vegetation types found in the park are:

- Riparian woodland
- *Acacia tortilis* parkland
- Wetlands and seasonal flood plain
- *Acacia-Commiphora* woodland
- Riverine grassland
- *Combretum-Dalbergia* woodland
- *Acacia drepanolobium* woodland
- Rocky hilltop outcrops [kopjes] vegetation
- Deep gully vegetation
- Grasslands with scattered baobab trees

Wildlife

Tarangire National Park is a dry season refuge for a majority of the migratory wildlife in the Tarangire ecosystem. The park is very rich in mammals and birds. It is estimated that during the dry season total biomass of large mammals inside the park is well in excess of 35 metric tons/km^2. Some of the more important wildlife species include: African Elephant, Lesser and Greater Kudu, African Buffalo, Cheetah, Fringe-eared Oryx, Leopard, Lion, Masai Giraffe, Spotted Hyena, Common Zebra, White-bearded Wildebeest, Warthog, Eland, Olive baboon, Bateared Fox, Mountain Reedbuck, Impala, Common Waterbuck, Bushbuck, Coke's Hartebeest, Gerenuk, and Bohor Reedbuck.

The park has more than 550 species of birds. Particularly rich bird life occurs in the open Acacia woodlands, in and along the wetlands (Silale Swamp), and in the flood plain of Tarangire River. A few species that warrant mention: Yellowcollared Lovebird, Masai Ostrich, Martial Eagle, White and Pink-backed Pelicans, Saddle-bill Stork, Goliath Heron, Hammerkop, Bateleur Eagle, Helmeted Guineafowl, Kori Bustard, Long-toed Lapwing, Brown Parrot, White-bellied Go-awaybird, Madagascar Bee-eater, African Hoopoe, and a variety of kingfishers, weavers, owls, doves, plovers, sandpipers, francolins, and ducks.

Geology and Soils

Tarangire National Park is situated within the eastern portion of the East African Rift Valley. The geology is based on three types of rock formations: the preCambrian gneiss rocks; lake deposits and alluvial deposits. However, much of the park is underlain by gneiss and other pre-Cambrian crystalline rocks which give rise to different physical features. These parent rocks are of varying resistance to weathering and erosion. The harder unweathered rocks stick out as outcrops and form prominent features in the park like the Sangaiwe hills on the central western boundary, Boundary Hill on the north eastern boundary, and other numerous smaller kopjes in the park.

The major soil types are the well drained red-loams that become alluvial along river valleys, alluvial on ridges and colluvial on hill slopes. They become increasingly stony along hill slopes due to lack of depth. The other soil types originating from lake deposits and sediments vary from clays to sands and are normally very saline. The third soil type is made up of alluvial deposits that are predominantly vertisols, commonly known as black-cotton soils. These clay soils are the expanding type that are poorly drained. When wetted they liquefy and seek to form into a flat, level mass. They become wet and impassable to vehicles during the rains and dry up and crack during the dry season. This soil is unsuitable for building any fills or for any use in road improvements.

The red loam soil is generally located on the upland ridges and on the higher flood plain terraces along the river. The loam can vary from a soil with a proportion of sand, to a hard, clay loam. Regardless, the loam has much lower clay content than the black cotton, and is better draining. it also lacks cohesiveness, and can be quite soft, forming deep ruts in roads if wetted when loose and uncompacted. The red loam appears to be easily eroded if stripped of vegetative cover (as on a road) and on a slope steeper than approximately 8-10%; it can be quite slippery when wet on steep sections of road. This phenomenon was experienced by the DOI road assessment team with only 5 mm of rain.[2]

[2] Department of Interior, Partnership in Biodiversity, *Draft Road Assessment Report for Tarangire National Park*, April 1998.

Physical Features

The southern half of the park and the extreme northern corner are relatively flat while the rest of the park is gently undulating. The park's landscape is dotted with rocky outcrops (kopjes) with scattered baobabs, especially in its northern and central portions. Tarangire hill is located on the western side of the river in the center of the northern half of the park. This well-known topographic feature stands at over 1600 meters above sea level and forms the highest feature in the entire Tarangire valley. The Tarangire river is the main perennial river and traverses the park from south to north/north-west. The general drainage pattern of the area is north-westwards towards the soda lakes of Burungi and Manyara.

Climate

Precise figures for many climatic parameters are not available, meteorological records are fragmentary and recording stations are widely separated. Tarangire National Park is located in a semi-arid area characterized by a prolonged dry season lasting up to 7 months. It lies in a typical bimodal rainfall region of northern Tanzania. The annual rainfall pattern consists of the short rains between November and December followed by a dry spell in January and long rains occur any time between February/March to May/June. The short rains are erratic, unreliable and variable in distribution. The annual average rainfall is about 650 mm. Temperatures are highest from December to February and lowest in June and July. The average maximum temperature is 27° C while average minimum is 16° C.

Human Interactions

Prior to 1950, the area which is now Tarangire National Park had little human settlement and was not used for livestock grazing due to the high concentration of tsetse flies which transmitted sleeping sickness to both livestock and the human population. This one factor played a major role in protecting this area from human exploitation. The areas to the east of the park, the Masai Steppe, are some of the region's most important grazing lands for both wildlife and livestock. Only during very severe droughts when all the surrounding grazing lands were overgrazed, would the Masai pastoralists be forced to use the Tarangire area for cattle grazing. The only other historical human use of the area was by fishermen who took up temporary residence in the park to harvest catfish from the Silale swamp.

The Tarangire Game Reserve was gazetted in 1957 in recognition of its importance as a dry season watering area for wildlife. Prior to its gazettement as a game reserve, the area was a well-known hunting area for rhino. The Tarangire Game Reserve lands were included as part of a larger area to establish Tarangire National Park. Tarangire National Park was established by a Presidential Decree signed on 14 May 1970 under Section 3 of the 1959 National Parks Ordinance. The Decree was published in the Gazette of the United Republic of Tanzania (No. 25, Vol 11) on 19 June 1970.

Park Significance

Neither the proclamation notice for Tarangire National Park nor the National Park Ordinance state the specific purposes for setting this area aside as a national park. However, prior to gazettement, the area was known for its importance as a dry season watering place for much of the wildlife in southern Masailand. Through an interdisciplinary team planning process, the Management Zone Plan team identified the following as the purpose and significance of Tarangire National Park:

- a critical dry season watering place for both resident wildlife and much of the migratory wildlife of southern Masailand.
- one of Tanzania's most important wetlands and hydrological regimes that support a variety and abundance of both fauna and flora.
- the unique association and mosaic of habitats and landforms that give Tarangire a distinctive character not duplicated anywhere else in Tanzania.
- habitat for endangered, threatened, endemic, and rare species and species of special concern or species of exceptional value.

- the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.

- possesses, second only to the Serengeti/Ngorongoro ecosystem, the highest concentration of wildlife during the dry season of any area in Tanzania (Lamprey 1964).

- is one of the few protected areas in Tanzania with a hydrological regime that ensures a permanent year round water source for the park's most exceptional resource - the Tarangire River.

- is known for its river valley, wetlands, gently rolling hills, rocky outcrops, acacia woodlands, and numerous baobab trees.

- is the only national park in Tanzania's northern circuit where one can easily view a large concentration of elephants during almost any time of the year.

- has an uninterrupted history as an area with significant variety and concentration of wildlife dating back 9000 years as evidenced by the prehistoric pictographs at Kisesse, Kolo, and Pahi (located approximately 40 kilometers southwest of the park boundary).

Brief Description of Activities and Locations:

General Location:

Tarangire National Park is located in northern Tanzania between 3' 40' and 5' 35' south and 35' 45' and 37' East at an elevation of between 1200 meters and 1600 meters above sea level. It comprises a 2600 km^2 portion of the Tarangire ecosystem. The entire ecosystem encompasses approximately 20,500 km^2 of the Masai Steppe, including Mto-wa-Mbu Game Controlled Area on the north, Lolkisale and Simanjiro Plains Game Controlled Areas on the east, Mkungunero Game Controlled Area to the south and Kwakuchinja Open Area (Mweka College Demonstration Area) on the west. (See Management Zone Plan Figure 2 - Vicinity Map). The park is located 118 km south-west of Arusha, east of the Great North Road and within the administrative districts of Babati, Monduli, Kiteto, Simanjiro, and Kondoa.

The park is accessible on the tarmacked Great North Road (Arusba-Dodoma) from Arusha to the turn off at Kwakuchinja village near Minjingu phosphate mine. All tourist access into the park is through an entrance gate located in the northwestern corner of the park near the park headquarters. An 8 km gravel road connects the park entrance with the Great North Road. All other access pints into the park are for administrative use only including Loibor Serrit Ranger post on the south-eastern boundary and the former ranger post at Chubi near the south western corner of the park boundary.

Existing Sites: Map 1 shows the route the case site team will take and the general location of existing Tarangire public and special campsites and the proposed campsite and road improvement for Tarangire Hill.

Proposed Site: Map 2 is a site sketch for the proposed road segment realignment/relocation and new special campsite alternatives on Tarangire Hill. Map 3 provides general locations on a 1:50,000 scale topographic sheet.

The following is proposed:

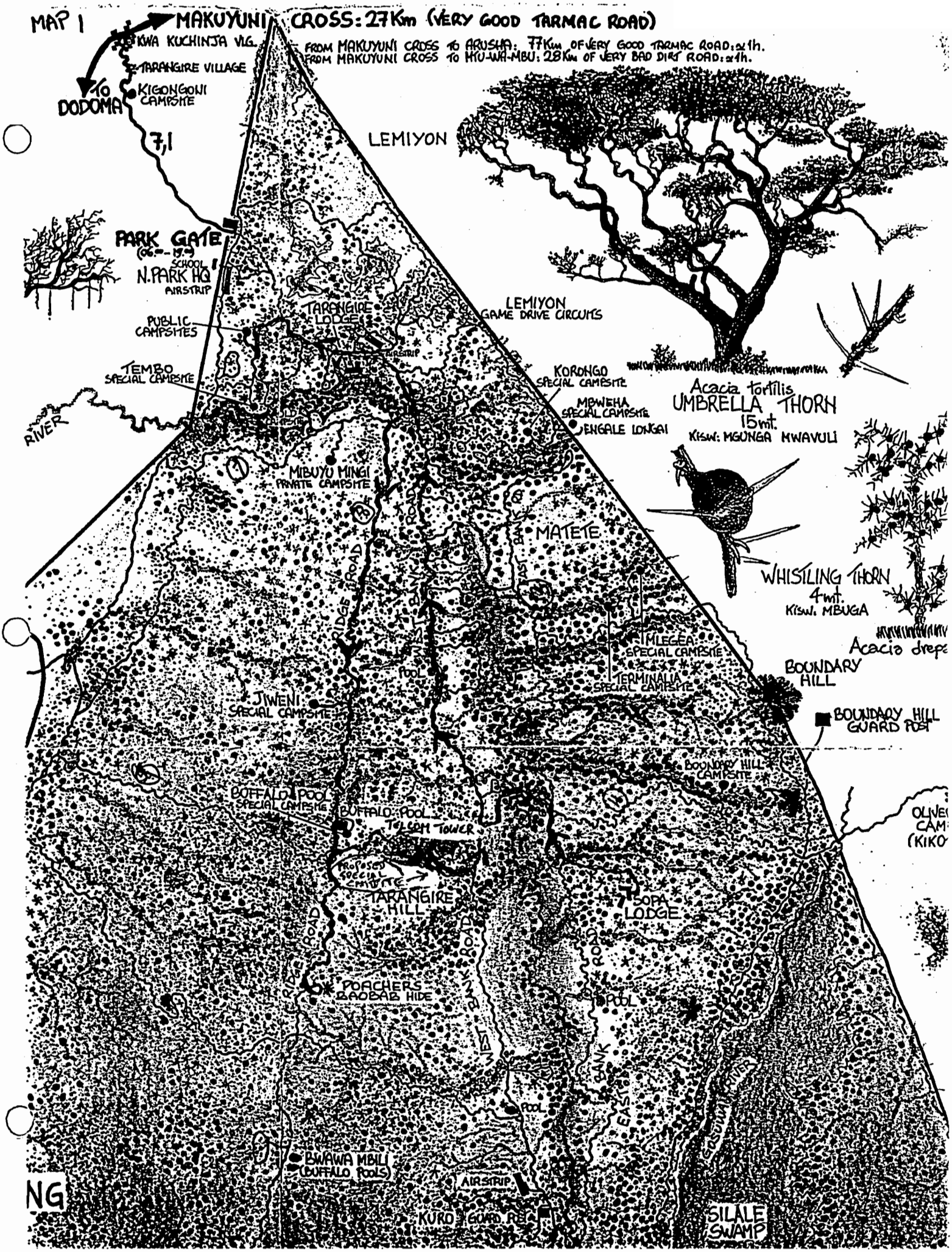
Upgrading of access road to Poachers' Hide from Class IV to Class III

Realignment/relocation of designated segments of Tarangire Hill road with grading and removal of vegetation

Upgrading of Tarangire Hill Road from Class IV to Class III.

Provision of access road to proposed Tarangire Hill Special Campsite

Capacity Building Workshops for Tour Operators in proper use and maintenance of Special Campsites


MAP 1
MAKUYUNI CROSS: 27Km (VERY GOOD TARMAC ROAD)
FROM MAKUYUNI CROSS TO ARUSHA: 77Km OF VERY GOOD TARMAC ROAD: ≈1h.
FROM MAKUYUNI CROSS TO MKU-WA-MBU: 28Km OF VERY BAD DIRT ROAD: ≈4h.
KWA KUCHINJA VLG.
TARANGIRE VILLAGE
TO DODOMA
KIGONGONI CAMPSITE
7,1
LEMIYON
PARK GATE
N.PARK HQ
SCHOOL
AIRSTRIP
TARANGIRE LODGE
LEMIYON GAME DRIVE CIRCUITS
PUBLIC CAMPSITES
TEMBO SPECIAL CAMPSITE
RIVER
KORONGO SPECIAL CAMPSITE
MBWEHA SPECIAL CAMPSITE
ENGALE LONGAI
Acacia tortilis
UMBRELLA THORN
15mt.
KISW: MGUNGA MWAVULI
MIBUYU MINGI PRIVATE CAMPSITE
MATETE
WHISTLING THORN
4mt.
KISW. MBUGA
IMLEGEA SPECIAL CAMPSITE
TERMINALIA SPECIAL CAMPSITE
BOUNDARY HILL
BOUNDARY HILL GUARD POST
JIWENI SPECIAL CAMPSITE
BOUNDARY HILL CAMPSITE
BUFFALO POOL SPECIAL CAMPSITE
BUFFALO POOL
TELEM TOWER
PROPOSED SPECIAL CAMPSITE
TARANGIRE HILL
SOPA LODGE
POACHERS BAOBAB HIDE
POOL
BWAWA MBILI (BUFFALO POOLS)
AIRSTRIP
KURO GUARD POST
SILALE SWAMP
NG

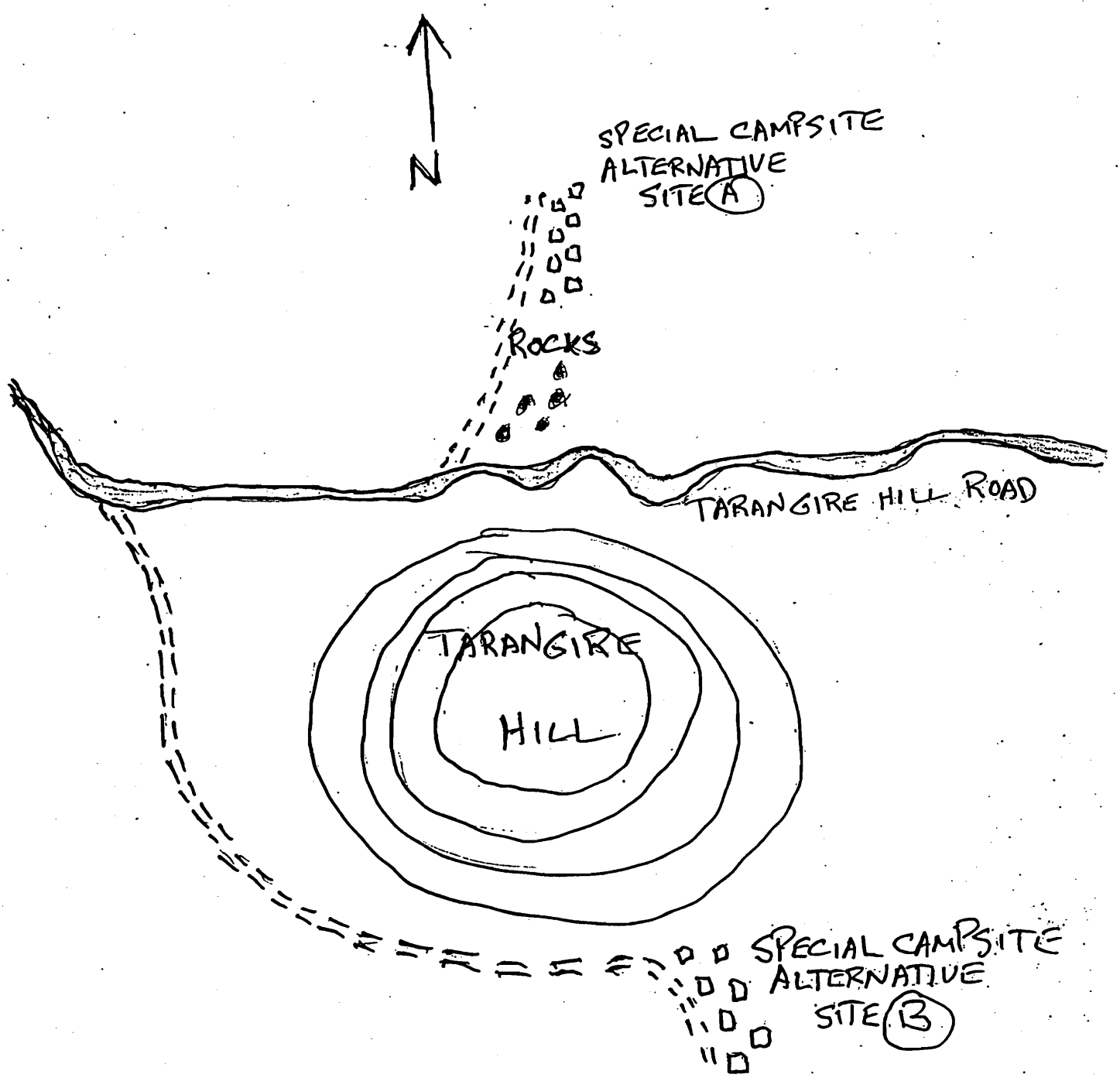
Contacts:

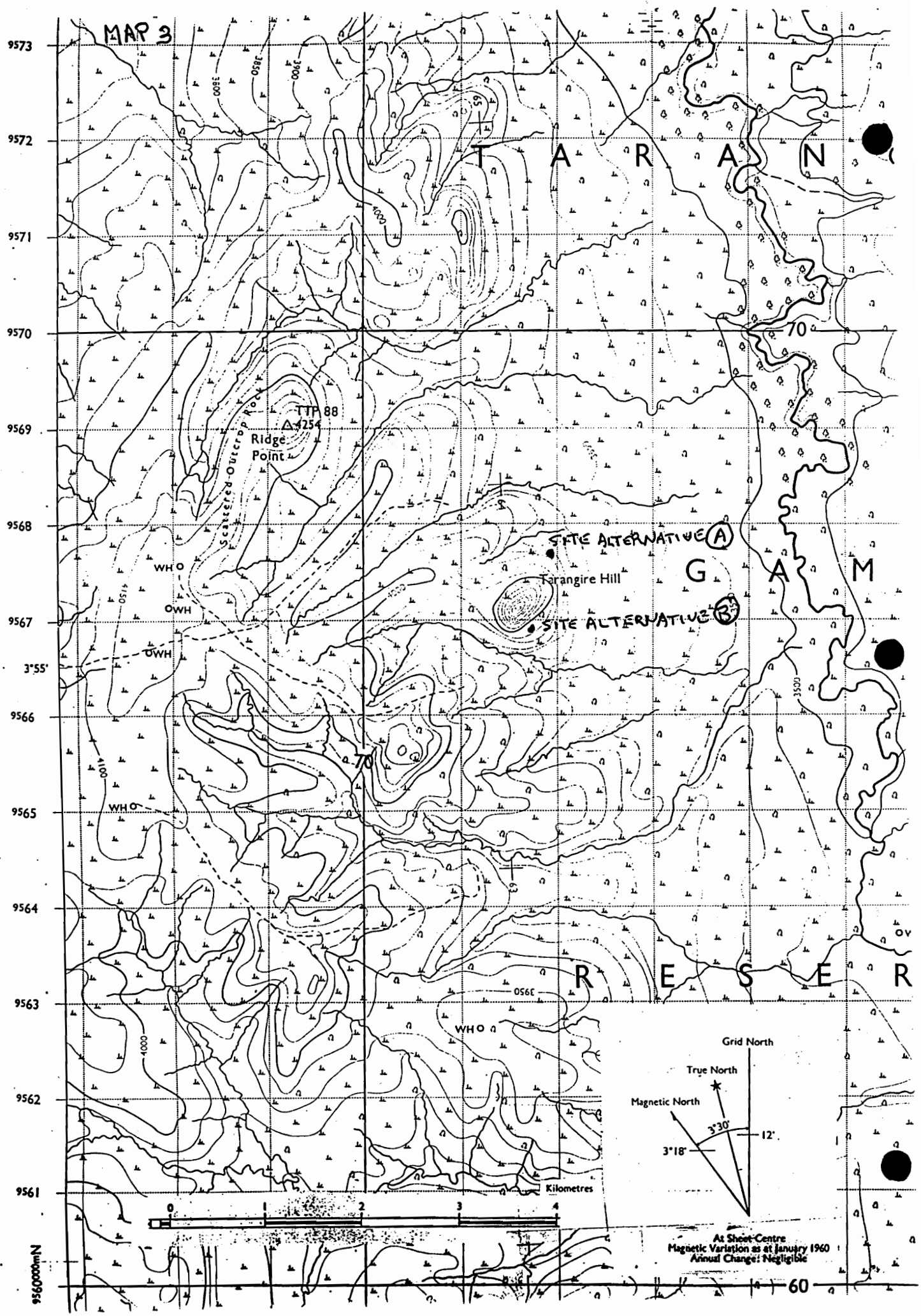
Site Resource persons: Wes Fisher, AWF Consultant
David Dyauli Junior, Mechanical Engineer, Tarangire

Background Reports and Data:

Tanzania National Parks, Management Zone Plan, Tanzania National Park, April 1994.
United States Department of Interior Partnership in Biodiversity, *Draft Road Assessment Report, Tarangire National Park, Tanzania*, April 1998.
1:50,000 Topographic Sheet

MAP 2


N
SPECIAL CAMPSITE
ALTERNATIVE
SITE A
ROCKS
TARANGIRE HILL ROAD
TARANGIRE
HILL
SPECIAL CAMPSITE
ALTERNATIVE
SITE B


MAP 3
T A R A N
G A M
R E S E R
Scattered Outcrop Rock
TTP 88
Δ 4254
Ridge Point
SITE ALTERNATIVE A
Tarangire Hill
SITE ALTERNATIVE B
WH
3950
3900
3800
4000
4150
4100
3500
3950
4000
9573
9572
9571
9570
9569
9568
9567
3°55'
9566
9565
9564
9563
9562
9561
9560000mN
Grid North
True North
Magnetic North
3°30'
12'
3°18'
Kilometres
0
1
2
3
4
At Sheet Centre
Magnetic Variation as at January 1960
Annual Change: Negligible
60

15. Additional Issues in Environmental Review (Detailed Environmental Impact Assessment: Steps and Requirements)

Description/Objectives

This module covers issues in environmental assessment and review in further detail, to deepen your knowledge and familiarity with methods that you can either use or may otherwise encounter in future project-related activities. The material included in this section of the sourcebook describes some of the more detailed environmental impact assessment processes and techniques that are commonly used by the EIA community around the world today. You would need to be fully conversant in these tools and methods if you had to conduct an EA or EIA yourself. However, such a situation is unlikely for participants of most courses.

The purpose for presenting this material is to familiarize you with the universe of options and technical requirements:

- should such a document (EIA, EA, etc.) ever be required for a project you are associated with; or,
- should you ever need to probe more deeply into a specific, potential environmental problem than the simpler tools of information gathering and judgment seem to enable.

Most likely, there are scientific experts within the government or research institutions of your country that can assist you should such a situation arise.

This module also provides you with the opportunity to clarify assessment procedures and requirements that still remain unclear at this point. With your input, the facilitators can adapt this session to meet your needs. Options might include: a) repeating and clarifying USAID Environmental Review and IEE procedures; or b) a free-wheeling group discussion on the relevance of IEE/environmental procedures, the level of input to be expected on USAID activities, and your need for additional support requirements.

It is therefore important for you to let one of the facilitators know whether you would like them to cover any of these or other topics during this module.

Readings

Module Backgrounder: "Environmental Impact Assessment: Methods and Tools"

MODULE BACKGROUNDER
Environmental Impact Assessment: Methods and Tools

In this module backgrounder, we introduce you to the various procedural steps and analytical tools involved in the full environmental impact assessment process. After a brief overview of the practice of environmental assessment in various countries, we describe present the initial steps to determine whether an EA is necessary, and some specific tools and methods.

1. Introduction

Environmental impact assessment (EIA), first and foremost, is a formal study process to predict the environmental consequences of a proposed major development project (UNEP, 1988). It is also a decision-making tool for achieving environmental sustainable development (CIDA, 1994). And, it is a process for identifying the likely consequences for the biogeophysical [and socioeconomic, some argue] environment and for man's health and welfare of implementing particular activities and for conveying this information, at a stage when it can materially affect their decision, to those responsible for sanctioning the proposals" (p. 6, Wathern, 1988).

The primary function of environmental impact assessment (EIA) in the decision-making process is to ensure that decisions on proposed actions take the environment into account or, to quote from Reg 216, "to ensure that environmental factors and values are integrated into the decision-making process." This means that the environmental effects (both positive and negative) of an action are considered along with other factors. To do this, the information acquired and evaluated in the EIA process should be organized and presented in a manner that facilitates understanding of quantifiable, non-quantifiable or qualitative environmental considerations as well as technical and economic factors.

The term *environmental impact assessment* is roughly synonymous with *environmental assessment*; although some countries and institutions may prefer one term or assign each a slightly different meaning. The term "environmental assessment" has become increasingly popular, as proponents have emphasized its tangible benefits and positive planning-oriented aspects and the term "impact" has been seen as having too negative of a connotation. However, impacts can be either positive or negative. Here, we use the term EIA for the more general process to avoid possible confusion with the EA process specific to USAID and Reg. 16. In either, case the focus is on the environment and on the assessment of impacts on it.

The EIA process should consider in comparative fashion several reasonable alternatives that could meet the purpose and need of the proposed action. These alternatives should include the option of not carrying out an action in any way (the no-action alternative) and describe the reasoning for the preference of one alternative over another. While there has been criticism leveled at this process (see Box 1), there are few today who would seriously question the validity and usefulness of examining environmental impacts of development projects.

Although EIA laws and regulations may differ from country to country, many nations have included both formal statements of environmental policy and a set of procedures designed to integrate these policies into the planning routines of government agencies and private developers.

An EIA program will often require that environmental specialists and planners consider a broader range of alternative solutions and/or locations for proposed actions than might have been considered in the absence of such a program. An EIA program may also require that potential impacts to environmental resources be evaluated in detail, and that a preferred alternative be selected on objective merits. This procedure for reviewing proposed projects before they are implemented means that traditional planning methods may have to be altered or adapted to accommodate all of the EIA program requirements.

The aspects of traditional planning that are most likely to be affected by the adoption of formal EIA procedures are precisely those aspects that constitute the core of an effective EIA program. These aspects are balanced decision-making and public participation (see Box 1.2). In the absence of an EIA program, decisions on development, redevelopment, or remedial actions can be made unilaterally, often by individuals or organizations that have some degree of bias or preference toward how the action should be oriented in location, design, or both. Such unilateral decision-making provides minimal information about the planning process to the concerned public, and eliminates the opportunity for public participation and comment on the proposed action. An effective EIA program, conversely, precludes unilateral decision-making by informing decision-makers and involving the public.

In the United States, the passage of National Environmental Protection Act (NEPA) in 1969 mandated the EIA process for all projects involving federal actions, including the issuance of permits, licenses, and financial assistance. In the years following NEPA, a number of states enacted environmental policy acts mandating similar EIA requirements for state-level projects, and some local municipalities have followed this lead. As a result, an EIA in some form is likely to be required by statute for many development or redevelopment projects in the United States.

Following concern over U.S. funds used to purchase dangerous pesticides abroad, environmental groups sued USAID over its lack of compliance with NEPA in the 1970s. Regulation 16 and the environmental review procedures it requires, which form the basis for the present course, was the resulting compromise.

In the past several years, an increasing number of countries and multinational institutions have enacted laws and directives establishing EIA requirements for project reviews. In 1985, the European Economic Community issued a directive establishing minimum requirements for EIA in all member countries. The United Nations Environment Program adopted Goals and Principles of EIA in 1987. In 1991, twenty-six nations of the United Nations Economic Commission for Europe signed a Convention on EA in a Transboundary Context, requiring all signatory nations to establish EIA procedures for transboundary impacts.

Increasing emphasis on EIA is also being observed by members of the donor agencies and international banking community (see Box 1.3 for a discussion of EIA preparation in developing countries). The World Bank issued in 1989 an operational directive requiring EIAs for certain categories of projects, while multilateral development banks are working to incorporate EIA

procedures into their lending practices. Legislation in the U.S. provided some of the impetus for the adoption of EIA policies at these multilateral institutions.[i]

Differences in EIA policies among bilateral and multilateral agencies can confront host governments and project collaborators with a bewildering array of procedures and requirements, particularly where several funders are involved in a single project (Campbell, 1993). An international effort coordinated by OECD and UNEP is presently underway to address the lack of coherence in EIA procedures.

While a number of African countries have recently adopted strategies and legislation that call for the establishment of EIA procedures and protocols, and plans are underway in several others, most African countries have no specific environmental legislation. (See background readings "Institutional set-ups in selected African Countries" from UNEP, 1994, and Kakonge and Ivembore, 1993). In South and East Africa, these include, but are not limited to, Zimbabwe, Zambia, Swaziland, and the Seychelles.

Box 1.1 Common Misconceptions about EIA (adapted from Yates, 1989 and Ahmed and Sammy, 1985)

EIA is "anti-development". It is rare that an EIA and its identification of a particular impact will lead to the abandonment of a project. The role of EIA is to generate information and options for decision-makers, not to mandate specific decisions. EIA provides the decision-maker with environmental information, just as an economic feasibility provides economic information. An EIA can show a project to be environmentally unsound, just as an economic study could show a project to be economically unsound. Few rational observers would condemn economic analysis for this reason.

EIA is too expensive or a waste of money. The median estimate for EIAs is that they cost about one-half to one percent of a project's construction cost. In Thailand, for instance, suggested allowances for EIA costs are from 0.1% to 1.1%, with the higher percentages for smaller projects (less than $1 million US). The cost savings in improved project design and avoided environmental impacts is often many times this amount. In the long-run, not doing an EIA can turn out to be far more expensive.

EIA is ineffective. A common criticism of EIAs are that they are carried out too late to affect a decision, and often simply justify a decision already taken. Witnessing this outcome, EIA observers in Latin America and Asia have suggested earlier incorporation of EIA in project design is necessary. Arguably, EIAs conducted too late in the decision process or as mere formalities are ineffective and a waste of time and money. Well-timed EIAs, however, have proven quite effective on many levels (see examples below): increasing public awareness and input, improving accountability, reducing costs, and improving the environment.

The Pelosi Amendment of 1989 requires that multilateral institutions receiving US funding must subject their projects to environmental assessment.

2. Initial Stages of an EIA

The following sections summarize the steps involved in determining whether to conduct an EIA - screening, preliminary analysis, and scoping. The stages involved in doing the EIA itself (i.e., baseline study, selection of alternatives, impact identification, impacts quantification/prediction, evaluation of alternatives, and mitigation) have been discussed in their earlier module on EIA and will be touched on only briefly here.

Box 1.2 The EIA process and public participation

Public participation in the EIA process is a critical component in achieving the open decision-making goal. Public participation should begin in the earliest phases of project planning and continue through the decision-making process. Public involvement can be formalized by scheduling public hearings and public information sessions, creating public advisory and/or liaison groups, and periodically distributing information concerning the status of project planning. Public involvement in the EIA process gives communities and individuals a voice in issues that may bear directly on their health, welfare, and quality of life. An open flow of environmental information can foster objective consideration of the full range of issues involved in project planning and can allow communities and citizens to make reasoned choices about the benefits and risks of proposed actions.

Despite the importance of public participation in EIA, and all that has been written about it, it has been notably absent in most developing countries (Kakonge and Ivembore, 1994). As noted by Campbell (1993), "little progress has been made in addressing the practical issues involved in achieving this desirable target in developing countries. *The result is that public participation does not feature strongly in developing country EIAs.*" (original emphasis, p.9) According to participants at an international EIA conference in New Delhi, "it is difficult, often even impossible, to obtain or consult copies of the EIA reports. The public has an equally limited, if any, role in most developing countries to question or comment on the quality of the reports or conduct of the environmental clearance process."

A major obstacle to public participation in most African countries has been the lack of domestic legislative frameworks for EIA. As noted by Cook and Donnelly-Roark (1994) in a review of public participation in World Bank sponsored environmental assessments in Africa, "without such a legislative framework, there can be no domestic policy on public participation in environmental assessment. Countries needing to meet World Bank requirements for environmental assessment have had to develop participation procedures on a project-specific, ad hoc basis." (p.86)

Therefore, public participation remains an important goal and benefit of institutionalizing EIA procedures in African countries. Zimbabwe's recent EIA policy, for example, explicitly allows the public "unrestricted access" to all formal EIA documents, and requires public consultation for both the preliminary and draft EIAs.

The summary provided here is distilled from numerous sources (EPA, 1993; UNEP, 1988; Wathern, 1988; and others). Many books and articles have been written to describe these procedures in far greater detail, and often use somewhat different categories and titles to describe similar procedures.

Box 1.3 Observations about EIA and Environmental Standards (from UN, 1994)

The preparation of EIA documents in developing countries often encounters difficulties. It is not an exaggeration to state that environment-related data are virtually non-existent in many developing countries. Such data were initially not available in the industrialized countries either. While governments are expected to collect and make available such information, there are typically enormous costs involved in doing so. Thus, data availability still remains a problem in the industrialized world; it is one of the greatest hindrances to environmental planning in developing countries.

Developing countries often lack technical know-how, and trained personnel are a priority need in most developing countries. Skills are required at all levels of environmental planning-field research, analysis of information, reviewing EIA reports, etc. While it is true that environmental problems often exhibit common characteristics, many environmental problems faced by the developing world are fundamentally different to those faced by developed nations. As a result, the EIA process in the developing countries requires different types of training and expertise. This is particularly true of social assessment and risk analysis, where perceptions differ greatly between the two groups. This underscores the importance of regional cooperation among developing countries in sharing information among countries with similar economic, social, and cultural backgrounds.

Despite these differences, it is still possible for the developing countries to learn and borrow-from the experience of the industrialized nations. For example, some environmental standards in industrialized countries, such as those for ambient air quality are based on extensive analyses of epidemiological, medical and industrial occupational exposure data. These standards are designed to achieve "safe" ambient levels in these countries. It would be imprudent for developing countries to recreate these analyses, since they can freely adopt the scientific data readily available. Note that this does not necessarily mean, however, that they adopt identical ambient standards. Most standards, such as those developed in the United States, include a margin of safety. It is not clear that other countries would necessarily want to adopt the same politicized margins of safety as the United States. It is thus extremely important that developing countries recognize what parameters are readily usable (and what parameters are not) from the environmental experience of developed countries.

EIAs in developing countries are becoming more sophisticated, particularly as experience is gained over time. Although they still tend to be less comprehensive than the EIAs prepared within the donor nations themselves, they are nonetheless improving consideration of environmental factors in these countries.

A fundamental goal of the EIA process is to incorporate environmental considerations as part of the decision-making process; therefore, agencies should integrate the EIA process with other planning processes at the earliest possible time. This will ensure that planning and decisions reflect environmental values, avoid unnecessary delays or procedural corrections later in the planning

process, and minimize potential conflicts. In addition, design changes can be incorporated into the project planning to avoid or reduce environmental impacts identified by an EIA.

2.1 Screening

Screening is the first and simplest stage of environmental review. Its purpose is to determine the nature and extent of environmental analysis needed to assess and manage a project, and is generally undertaken at the stage of project identification.

Most environmental impact assessment processes involve initial screening protocols to evaluate the level of likely impacts and the extent of environmental review needed. In the case of both USAID and the World Bank, there are categories of activities, which are either likely or unlikely to have a significant effect on the environment, and thus distinguish the level of environmental review needed. Table 2.1 below compares these two sets of categories.

Environmental screening can involve some initial and limited efforts to assess the nature and significance of likely impacts. Under some definitions of screening, this step includes using simple impact identification methods, such as checklists, to help redesign projects at early stage to avoid potential environmental problems. (See "Environmental Screening of NGO Development Projects," Canadian Council for International Cooperation, 1994; see also attached "Environmental Screening," World Bank Environmental Sourcebook Update). In other cases, these efforts are part of a preliminary assessments -- an Initial Environmental Examination, in USAID parlance, or a preliminary environmental impact assessment in Zimbabwe's protocols -- which may or not be required depending on a simple screening protocol.

2.2 Preliminary Assessment

Preliminary assessments and environmental screening procedures are closely related and somewhat overlapping. Where full EIAs are not necessarily required, yet the potential for significant impacts exists, a rapid preliminary assessment can be useful. This is one of the purposes of the Initial Environmental Examination. Based on the IEE, a decision on whether to conduct a full EA is usually made or deferred. Preliminary assessments such as IEEs can be require from less than one person-week to more than one person-month of effort, depending on the need for background studies and site surveys. They can involve the use of many of the simpler methods, such as checklists and matrices, often used in full environmental impact assessments.

Table 2.1: Comparison of USAID and World Bank Categories for Screening Projects

USAID CATEGORIES	WORLD BANK CATEGORIES
Classes of Activities With Environmental Impacts, 22 CFR Part 216.2(d)(1): EA or EIS typically required.	**Category A: Full EA required. The projects or components included in this list are likely to have adverse impacts that normally warrant classification in Category A.**
a) river basin development b) irrigation and water management c) agricultural land leveling d) drainage projects e) large scale agricultural mechanization f) new lands development g) resettlement projects h) penetration road building or road improvement projects i) power plants j) industrial plants k) potable and water sew sewerage, other than small-scale l) the use of pesticides	a) dams and reservoirs; b) forestry and production projects; c) industrial plants [large-scale]; d) irrigation, drainage, and flood control [large-scale]; e) land clearance and leveling; f) mineral development [including oil and gas]; g) port and harbor development; h) reclamation and new land development; i) resettlement and new land development; j) river basin development; k) thermal and hydropower development; and l) manufacture, transportation, and use of pesticides and other hazardous and/or toxic materials.
Classes of projects not listed above or below that are subject to Initial Environmental Examinations to determine whether further analysis (EA/EIS) is needed.	**Category B: A Full EA is not required, some environmental analysis is. The following projects and components may have environmental impacts for which more limited analysis is appropriate.** a) agro-industries; b) electrical transmission; c) aquaculture and mariculture; d) irrigation and drainage [small-scale]; e) renewable energy; f) rural electrification; g) tourism; h) rural water supply and sanitation; i) watershed projects j) small-scale rehabilitation, maintenance, and upgrading
Categorical Exclusion: IEE or EA generally not required (See Rg 216 for important exceptions) a) educational, technical assistance and training b) controlled experimentation c) studies, academic or research workshops d) projects in which USAID is a minor donor e) non-project-specific contributions to organizations f) institution building grants to U.S. institutions g) nutrition, health care, family planning services h) commodity import program assistance i) support for intermediate credit institutions for capitalization j) maternal or child feeding k) food for development programs l) matching and support grants to PVOs m) local capacity building for development planning n) the application of design criteria approved by USAID	**Category C: No EA or other analysis required.** a) education; b) family planning; c) health; d) nutrition; e) institution development; f) technical assistance; and g) most human resource projects.

2.3 Scoping (EPA, 1993)

Once a decision to conduct an EIA is made, the scoping process is initiated to determine the key boundaries, issues, and impacts (e.g. time scale, geographical scale, budget, project alternatives, affected environment, significant impacts) that the assessment should address. These are defined through discussions with decision-makers, project proponents, local experts, and the general public.

Scoping is the early, open process of considering the issues and choices of alternatives to be examined in the EIA of a particular action, policy, or program. Scoping helps insure that real problems are identified early and studied properly, that issues of no real concern do not consume undue time and effort, and that the EIA 'report when made public is balanced and thorough. Scoping is used to determine the breadth of issues to be addressed, to identify the significant issues related to a proposed action, and to identify and eliminate from detailed study the issues that are not significant or that have been treated in prior EIAs.

In the U.S., scoping originated in response to early applications of NEPA by federal agencies. In some early environmental impact studies, great lengths were made to study every conceivable impact, regardless of its significance, and consequently enormous EIAs were submitted in which critical issues were obscured by the volume of details. Other environmental impact studies went to the opposite extreme, presenting too little information and analysis to be of use in the environmental decision-making process. To remedy these problems, the existing EIA regulations were supplemented to include a requirement for all agencies to engage in scoping at the beginning of the EIA process (Environmental Law Institute, 1991).

Scoping typically is conducted in a meeting or series of meetings involving the project proponent, the public, and the responsible government agencies. The structure of the meetings may vary depending on the nature and complexity of the proposed action and on the number of interested participants. Small-scale scoping meetings might be conducted like business conferences, with participants contributing in informal discussions of the issues. Large-scale scoping meetings might require a more formal atmosphere, like that of a public hearing, where interested parties are afforded the opportunity to present testimony. Other types of scoping meetings could include "workshops," with participants in small work groups exploring different alternatives and designs. As is the case with all procedural and analytical stages of the EIA process, documentation of the scoping process should be systematic and thorough.

2.4 Doing the EIA Itself

The previous sections have summarized the steps involved in determining whether an EA should be conducted. Conducting the EA itself involves a number of activities such as conducting the baseline study, selecting alternatives, identifying impacts, quantifying and predicting impacts, evaluating alternatives, and selecting mitigation options. We refer the reader to the earlier module where the specific tasks and steps involved in each of these activities have been described. We note here that the process and findings of an EIA need to be documented, so that the results can be effectively communicated to decision-makers and the public. The effectiveness of an EIA is a function not only of the analysis, but how well the findings are conveyed by the EIA managers and specialists to the larger audience. Good documentation should address the questions that decision-makers are likely to ask, and present straightforward and easy-to-find answers. Sample and

indicative outlines of USAID and World Bank EA documents are provided for reference at the end of this module backgrounder.

3. Resources Required for Preparing an EIA

The minimum resources "needed to perform EIAs that can successfully shape major projects" are described in UNEP (1988, p.15; see attached reading). These include:

- Qualified multi-disciplinary staff;
- Technical guidelines, agreed with the competent authority;
- Information about the environment;
- Analytical capabilities;
- Administrative resources;
- Institutional arrangements;
- Review, monitoring, and enforcement powers.

One item missing from UNEP's list is perhaps the most obvious, but cannot be overlooked: detailed information about proposed activity itself. "You can't assess the impact of something if you don't know what the something is."[2]

Other than qualified staff, the most essential resources are time and money. The following are some estimates from various sources:

- Generic, preliminary assessments take from 2 to 10 weeks of time (UNEP, 1988).

- In the case of the **World Bank EA**, "the time required to prepare an EA, and the resulting cost, vary with the type, size and complexity of the project; the characteristics of its physical, sociocultural and institutional settings; and the amount and quality of environmental data already available. EAs need as much time as the feasibility study, of which EA is essentially a part. Therefore, EAs can take from less than six months to more than 18 months to complete, but many require about 12 months. EAs conducted according to Bank procedures do not delay projects; on the contrary, in many cases, they have shortened the total time from identification to operation, by revealing promptly environmental issues that might have halted work altogether, had they emerged at a later stage. Whether or not a particular EIA actually delays a project depends largely on how well it is coordinated with feasibility studies and other preparation activities." (from World Bank, 1991).

- The World Bank also cites the rule of thumb that "**EA preparation cost** rarely exceeds one percent of the total capital cost of the project and is frequently less than that. The cost of implementing mitigating measures can range from 0 to 10 percent of total project cost, with 3 to 5 percent being common. These estimates do not take into account possible cost savings that result from implementing EIA

[2] C. Bingham, personal communication.

recommendations that reduce or avoid the costs of environmental impacts or allow environmental objectives to be met in a more cost-effective manner. For example, project-induced epidemics of malaria or schistosomiasis, ignoring the costs in human misery, may cost millions (US$) to bring under control, compared to the relatively minor costs of preventing them." (from World Bank, 1991).

- Requests for **USAID categorical exclusions** typically require less than a day to prepare.

- Simple IEEs can be done in a few days, depending on the characteristics of the proposed activity and whether a field visit is necessary. **IEEs of a complex nature** can take several person-weeks or, sometimes, months to prepare. The IEEs for projects with multiple components, covering a wide geographic area or affecting many aspects of the environment require a full-time environmental expert and may require assistance from others for specialized expertise. Consultation and/or coordination is typically needed with country officials, NGO representatives, the USAID country mission, regional offices, Washington or other donors and most likely with some combination of these.

- Generically, the length of time for **standard EIA** ranges from 3 months to 2 years. The cost is nearly always less than 1 percent of the cost of a major development project, a figure cited frequently in the literature (UNEP, 1988).

- In comparison, the **USAID EA** can be a relatively modest analysis requiring a team of two or three people from three weeks to four months to complete, once the scoping sessions are completed. The scoping process, it should be noted, can be rather time consuming.

3.1 Expertise Required for Conducting an EIA

For USAID procedures, EAs and EISs are usually carried out by teams of outside consultants, while IEEs have been conducted by internal staff. EA and EIS teams may be strengthened with qualified local expertise and may also benefit from participation of the regional environmental staff (Hecht, 1991).

World Bank experience is similar. "Although there are countries where government agencies themselves are capable of preparing EAs, the usual method is for the borrower to obtain specialist consultants, just as they often do for feasibility studies. EAs require interdisciplinary analysis and are therefore prepared by teams: members work together in the field. The disciplines listed below are generally represented on the core team for any EA:"

- project manager: often a planner, social or natural scientist, or environmental engineer who has experience in preparing several and/or similar EAs and has management skills and experience to provide overall guidance and to integrate the findings of individual disciplines;
- ecologist or biologist (aquatic, marine or terrestrial specializations, as appropriate);
- sociologist/anthropologist: with experience with communities similar to that of the project;
- **geographer or geologist/hydrologist/soils scientist.**

"If the project is in the agricultural sector, an agronomist, land-use specialist, forest scientist, or fisheries biologist, as appropriate, should be included in the core team. For industrial or energy projects, an engineer with the corresponding expertise (such as in pollution control) will be needed." (World Bank, 1991, formatting and emphasis added).

EIA specialists can be retained from a variety of sources. Large international environmental consulting firms have many of the necessary disciplines on staff or in subconsultant arrangements, and can form and manage teams for any EIA. There are also smaller firms that specialize in EA and manage EIAs. They are more likely to need subconsultants to fill out EIA teams. The expertise of local consulting firms varies from country to country. Frequently a local firm will be able to provide experts (e.g., from local universities or institutions) to participate in an EIA as a core team member or as a specialist. It is less common, at present, to find local firms with experience and capability to carry out an EIA on their own. Where such firms do exist, they should be seriously considered for EIA projects. Therefore, local firms should be participants in EIAs being managed by international firms. This provides the local staff with on-the-job training and provides the international staff with essential local knowledge, and experience.

Other sources of experts include research institutions (e.g., marine institutes, tropical medicine research centers, national research institutions), colleges and universities, academies of science and technology, government agencies in the country and in other countries (loans and exchanges may be possible), and NGOs.

4. Tools and Methods for Environmental Impact Assessment

4.1 Introduction

Tools and methods for environmental impact assessment have received considerable attention in the 25 years since the first EIAs were conducted. The existing set of tools and methods ranges from the simple and straightforward, such as matrices and checklists, to the sophisticated and resource intensive, such as geographic information systems, ecological risk assessments, and detailed simulation modeling.

The various procedures, their appropriate roles, and their advantages and disadvantages are discussed extensively in the literature. No attempt is made here to replicate these documents; instead, the reader is urged to closely review the attached background readings or references.[3]

Much of the "EIA methodology" literature, including the material included here, is oriented towards impact identification, data assembly, prediction, and evaluation (see Table 4.1). Since most course participants are unlikely to conduct full-blown EIAs, but rather focus on preliminary assessments, these objectives may be the most relevant here. Public participation, communication,

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Selected sections from Sadar et al. (1994) provide a rudimentary overview of the most basic impact identification and assessment techniques. Bisset (1987) provides a more detailed review of methods for EIA in developing countries with selected case studies. Participants can also review two of the readings provided in Appendix B.

and management techniques are discussed extensively in a number of the supplementary background readings, including Cook and Donnelly-Roark (1994) and World Bank (1991, Volume 1).

In this course, the focus is on the simpler EIA impact assessment tools and methods. Much could also be said about more resource-intensive and sophisticated techniques; see, for example, the background reading on GIS methods included here. In general, however, it is important to avoid "the considerable gulf between the sophisticated EIA methodologies developed in some academic institutions and large consultancies which are emphasized in some training programmes, and the more modest EIA methods which have been found to be of practical relevance in many field situations" (p.43, Lee, 1987).

Table 4.1: Classification of Assessment Methods by Task (adapted from Lee, 1987)

Class of Method	Role
Identification	To assist in identifying the project alternatives, project characteristics and environmental parameters to be investigated in the assessment.
Data assembly	To assist in describing the characteristics of the development and of the environment that may be affected.
Prediction	To predict the magnitude of the impacts which the development is likely to have on the environment.
Evaluation	To assess the significance of the impacts which the development will have on the environment.
Communication	To assist in consultation and public participation, and in expressing the findings of the study in a form suitable for decision-making purposes.
Management	To assist in managing the scoping of the study, the preparation of the impact study, the efficient conduct of the consultation process, etc.
Decision-making	To assist decision-makers in assessing and understanding the significance of environmental impacts relative to other factors relevant to a decision on the proposed development.

4.2 Summary and Examples of Some EIA Tools

Participants should review the principal background readings: Sadar (1994), Bisset (1987), and UNEP (1988), for a more thorough discussion of basic EIA tools and methods. This section supplements the background readings with brief summaries and examples for the following, and draws some text from USEPA (1993).

- ad hoc (identification);
- checklists (identification);
- matrices (identification, data);
- overlays (identification, data, prediction);
- networks (identification, data, prediction, communication);
- simulation modeling (identification, data, prediction);
- risk assessment (prediction, evaluation, decision-making);
- cost-benefit analysis (evaluation, decision-making).

The latter four methods are unlikely to be used at the level of environmental assessments most course participants will need to undertake; they are nonetheless briefly included since they are generally categories of analysis commonly conducted. This list is also by no means comprehensive. Many other methods, such as multi-criteria analysis, Habitat Evaluation Procedure (HEP) models, system diagrams, and public participation techniques are not included; for a full overview of EIA methods, see the background materials. A summary of the first five impact assessment methods is shown on Table 4.2.

4.2.1 Ad Hoc Approaches

As the name implies, ad hoc methods are relatively crude and informal techniques that are usually qualitative and unsystematic, such as a collection of expert and lay opinions. As such, they generally fall short on the systematic and replicable characteristics of ideal EIA methodologies, as discussed in the earlier

EIA session. As noted by Sadar et al. (1994), these methods focus on broad areas of possible impacts (e.g. forests, animals, etc.), rather than defining specific parameters to be investigated.

Table 4.2: Comparison of Impact Assessment Methods (adapted from Chatzimikes, 1983)

Type of Method	Impact Identification	Impact Measurement	Impact Interpretation	Impact Evaluation	Ease of Application
Ad Hoc	Fair	n/a	n/a	n/a	Not Difficult
Checklists	Good	n/a	n/a	n/a	Not Difficult
Matrices	Excellent	Fair	Fair	Good	Moderately Difficult
Overlays	Good	n/a	n/a	n/a	Moderately Difficult
Networks	Excellent	Excellent	Excellent	Excellent	Difficult

n/a = not applicable to task

4.2.2 Checklists

The use of checklists for identifying and, to a limited extent, characterizing, environmental impacts, is very common throughout existing EIA processes. A checklist forces the assessment to consider a standardized set of activities or effects for each proposed action, thus bringing uniformity to the assessment process. Checklists can be used to determine environmental impact thresholds, thus indicating whether a full-scale EIA is needed for a particular project or whether a finding of no significant impact could be issued. Following Bisset (1987), four different types of checklists can be distinguished as shown below. A summary of advantages and disadvantages is shown on Table 4.3.

- **Simple checklists**, simply list environmental factors to check for. They usually provide no guidance on a) the assessment of impacts on these factors, b) any useful predictive techniques, or c) the type of data needed (see Table 1.1 in Bisset, 1987).
- **Descriptive checklists**, provide guidance on assessment, with corresponding information on appropriate measurements and predictive techniques (see Table 1.2 in Bisset, 1987).
- **Scaling checklists**, attempt to indicate the importance of impacts to decision-makers (see Table 1.3 in Bisset, 1987).
- **Questionnaire checklists,** can provide a thorough and useful step-by-step procedure, particularly useful to non-experts. The USAID "Project Environmental Impact Checklist" included in an earlier module provides a very thorough and useful questionnaire checklist for initial screening and examination of USAID projects. The checklist provides a systematic method capable of incorporating subjective assessments of impact significance. Other useful checklists can be found in CCIC (1994), designed for the screening of the following types of NGO development projects: pest control, coastal ecosystems, domestic water supply and sanitation, irrigation, and small dams and reservoirs.

4.2.3 Matrices (Impact Identification)

The main disadvantage of checklists -- that they generally fail to link specific development activities with given impacts -- led to the development of matrices, perhaps the most popular and widely used EIA methodology (Bisset, 1987). In a typical matrix, alternative actions (measures, projects, sites, designs) are listed as column headings, while the rows are the criteria that should determine the choice of alternative. In each cell of the matrix, a conclusion can be listed indicating whether the alternative action is likely to have a

positive or negative effect relative to the indicated criterion. In some matrices, the conclusion is stated as a numerical value or symbol indicating the level of intensity of the effect. There is an opportunity, moreover, to apply relative weighting to the various criteria when evaluating the completed matrix (EPA, 1993).

The progression of an EIA methodology from checklist to matrix is intuitively and easily accomplished. A checklist can be viewed as a single-column summary of a proposed action, with only a broad characterization of the nature and magnitude of potential environmental impacts provided. An EIA matrix provides a finer degree of impact characterization by associating a set of columns (effects) with each row (environmental attribute) of the matrix.

Table 4.3: Some Advantages and Disadvantages of (adapted from Bisset, 1987)

EA Tool	Advantages	Disadvantages
Checklists	· Useful for structuring initial stages of assessment · Help to ensure that vital factors are not neglected · Easy to apply, particularly by non-experts	· Danger of "tunnel vision", limiting consideration to items on a given checklist Deal only with the environment; do not indicate causal linkages between activities and impacts
Matrices	· Indicates causal linkages between activities and impacts · Can include weights to signify relative impact significance · Can help to distinguish among phases of project development (operation, construction, dismantling, etc.)	· Danger of "tunnel vision", as with checklists, which can be overcome by expanding the matrix
Overlays	· Excellent for showing spatial dimension and location of impacts · Most useful for assessing alternative routes for linear developments, such as pipelines, roads, transmission lines, etc.	· Deals less successfully with timing, reversibility, and probability of impacts · Sharp boundary definitions can be misleading; transitions within and among land types can be less dramatic than mappings may indicate
Networks (See Principles of Practice Module)	· Provides visual summaries that are easily understood and communicated to decision-makers and the public · Useful for identifying important indirect impacts	· May oversimplify relationships; can be hard to show adequate level of detail to illustrate individual system impacts · As with all other methods above, static analysis doesn't show changes over time · Doesn't show relative significance of impacts

One of the most famous matrices is the "Leopold Matrix", formulated for use by the U.S. Geological Survey. The Leopold matrix consists of 100 columns representing examples of causative actions, and 88 rows representing environmental components and characteristics. As a first step, the columns that correspond with the nature of the proposed action are checked off. Then, for each column that is marked, the cells

corresponding to environmental effects are examined. Two scores (on a scale from 1 to 10) are listed in each cell, separated by a slash (/); the first score represents the magnitude of the possible impact, while the second score represents the *importance* of the possible impact. Beneficial impacts are indicated by a plus (+) sign. The interpretation of the matrix is based on the professional judgment of those individuals performing the EIA. See Sadar (1994), attached, for a visual example and further explanation of the Leopold and other common matrices. A summary of advantages and disadvantages is shown on Table 4.

4.2.4 Overlays (Impact Identification and Prediction)

This technique has always been extremely useful in identifying areas that have high environmental sensitivity. The technique entails the separate mapping of various critical environmental features - wetlands, steep slopes, soils, floodplains, bedrock outcrops, wildlife habitats, vegetative communities, and cultural resources - at the same scale as the project's site plan. The environmental features are mapped on transparent plastic in different colors. The several environmental maps can then be overlaid on the project map to highlight the areas of highest environmental sensitivity (EPA, 1993).

Geographical Information Systems (GISs) are essentially computerized graphical overlays and interacting data files. Environmental features are mapped, and the mapping digitized and stored in the GIS data base. The mapped features can be combined to produce computer-generated displays of one or more environmental features in a specified geographical area. If the GIS mapping is conducted systematically, information acquired on specific projects can be combined, and the GIS data base becomes more detailed over time (EPA, 1993).

4.2.5 Simulation Modeling (Impact Prediction)

In this approach to environmental impact assessment, the principal cause-effect relationships of a proposed action are described in terms of mathematical functions and combined to yield a mathematical model capable of predicting future environmental conditions. Mathematical models come in all degrees of complexity, from simple variations on mass balance equations (e.g., for estimating nitrate-nitrogen in groundwater) to highly complex multivariate systems. The mathematical functions may be purely determined by existing conditions, or may have strong random elements contributing to the model output. Some models include statistical routines for estimating error associated with model outputs. Most commonly used mathematical models for impact assessment have been adapted for computers, in either batch or interactive modes (EPA, 1993).

A listing, though certainly a non-inclusive one, of environmental effects that have been mathematically modeled would include: energy, thermal plumes, noise, transportation, air emissions, stormwater runoff, pollutant transport in water, pollutant transport in soils, risk assessment, ecological risk assessment, and wasteload allocations (EPA, 1993).

4.2.6 Risk Assessment

This refers to a category of analyses by which the potential risk of harm to individuals, communities, and ecosystems can be evaluated. The general techniques include comparison of expected conditions with prevailing environmental standards, modeling of expected conditions and estimation of error terms associated with model estimates, and Monte Carlo simulation of the frequency of certain events under expected conditions.

4.2.7 *Cost-Benefit Analysis*

This is a formalized accounting of the anticipated costs and benefits of an action. The cost-benefit analysis is of particular use when comparing alternative forms of an action. The "costs" of an action include, but are not limited to the economic costs, the risks to long-term environmental quality and public health, and the impacts to natural and man-made resources. The benefits include monetary benefits, but also extend to positive changes in the quality of life, protection of sensitive environmental resources, and long-term enhancements to human health and welfare.

5. Choosing Among Methods

As indicated above, there may be several alternative methods available to perform a single assessment task. The following are some overarching criteria to apply when selecting a method to use in particular assessment situations (text below adapted from Lee, 1987).

Appropriateness. The assessment method chosen should be appropriate to the specific task for which it is to be used. Therefore those involved in the choice of the assessment methods to be used should clearly understand the specific EIA tasks to be undertaken and the nature of the 'output' which the EIA methods selected should ideally produce - for example whether the output should be quantitative or qualitative, its desirable temporal and spatial distribution, its required degree of accuracy, etc. They also require a good understanding of the 'attributes' of the alternative methods from which the choice is to be made in order to match method with task as closely as possible. For example, during scoping, fairly simple assessment methods which provide 'order of magnitude' assessments of impact may be entirely appropriate - therefore, it may be inappropriate at this stage of the EIA process to use sophisticated methods which provide very detailed and precise output. However, simple methods may be too crude and approximate for use in some of the later stages of impact prediction.

Replicability. Ideally a method should be sufficiently free from assessor bias that different assessors, using the same method, would obtain similar results if carrying out an assessment of the same project. Some methods leave more opportunity than others for the intrusion of the assessor's own subjective judgments and are likely to less satisfactory from this standpoint. In evaluating the likely replicability of an EIA method, the following questions might be considered:

- Does it provide a clearly expressed and precise measure of impact?
- Is the nature and extent of any uncertainty attaching to the estimate made explicit?
- Are the essential features of the method which is used to derive the measure clearly stated?
- Are the sources and quality of data used when applying the method clearly stated?
- Are any assumptions made in the use of the method (including those related to data deficiencies) clearly indicated?

Consistency. Ideally, a method should be capable of being consistently applied to alternative forms of the same project and to different projects within the same investment programme. This is desirable if alternatives are to be compared on a consistent basis and competing projects within a programme are to be prioritized according to a common method of evaluation. In assessing the consistency of a method, the following questions may be considered:

- Does it ensure that data inputs for evaluating alternatives are obtained on a consistent basis?
- Does it ensure that the output measures for the alternatives under consideration are strictly comparable?

- Does it provide sufficient guidance on the treatment of uncertainty (e.g. in the prediction of the magnitude of impacts) and in the use of subjective judgment (e.g. in assessing the significance of a particular impact) to ensure that the assessments of alternatives are broadly comparable?

Economy. A method should be cost-effective in the sense of enabling an environmental impact assessment of the required quality for a project to be completed as economically as possible. The resource needs of the alternative assessment methods available for similar kinds of task vary considerably according to the quantity and quality of data input requirements, the quantity and skills of staff required for their use, the overall length of time required to obtain usable output, etc, It is important to recognize that environmental impact assessment studies are not primarily undertaken as research studies to advance knowledge but as inputs to planning and decision making processes for which time, technical and cost constraints are operative.

The ranking of alternative assessment methods, according to the above criteria, may differ. For example, in some circumstances, considerations of economy may conflict with those of appropriateness, replicability, and consistency. If so, a trade-off between these different goals of good assessment practice will have to be faced. However, in a well-organized EIA system, the resolution of such conflicts should not be a serious problem, for the following reasons:

- the most sophisticated and resource demanding methods are often in practice not the most appropriate ones to use;
- the resource constraints on EIA studies, though real, need not be over-restrictive on the use of best practice if, for example,
- the impact studies to be prepared by developers are commenced sufficiently early in the planning and design process;
- adequate training is given in the selection and correct use of appropriate EIA methods and in the effective management of the EIA process;
- as experience shows, the costs of satisfactorily conducted EIA studies normally account for a very small percentage of a new project.

6. Typical Report Structure for Environmental Impact Assessments

In the following examples, we provide report outlines for environmental impact assessments. These are adapted from the USAID and World Bank materials, and provide potentially useful background material for preparing environmental assessments, scoping sessions, or more preliminary documents. Since they lay out the content of these analyses, they help to suggest the nature of the work required.

6.1 Indicative Outline of a USAID Environmental Assessment Report

Below is a typical outline for Environmental Assessment reports submitted to the USAID. It is based on communications from USAID environmental advisors (see 22 CFR Part 216.6 in the Sourcebook Appendix for a more complete description of EA contents).

1. **Summary:** This section stresses major conclusions, areas of controversy, and issues to be resolved.
2. **Introduction:**
   a. Description of proposed action.
   b. Purpose of project.
   c. Results of the scoping exercise

3. **Alternatives:** This section discusses which alternatives were chosen and why; contrasts impacts among alternatives, and identifies preferred alternative(s) and appropriate mitigation measures.
   a. Environmental impacts of proposed action
   b. Environmental impacts of no action
   c. Environmental impacts of alternative 1...
4. **Affected Environment:** This section, essentially the baseline study, succinctly describes affected environment, using data and analyses commensurate with the significance of the impacts.
5. **Environmental Consequences:** The section presents the basis for section 3 above. This section can be organized by discipline category (e.g. ecology, land use, geology, etc.) or by the nature of the impacts (long-term, short-term, irreversible, etc.) Organizing by topic can be efficient, since specialists can be assigned to write appropriate sections.
6. **List of Preparers**
7. **Appendices**

6.2 Indicative Outline of a World Bank Project-Specific EA Report

Below is a typical outline for a project-specific environmental assessment report submitted to the World Bank. It is adapted from World Bank, 1991, Annexes A1 and 1-3 (note: Bank-specific language and requirements have been deleted). The Banks requires that full EA reports should be concise and should focus on the significant environmental issues. The report's level of detail and sophistication should be commensurate with the potential impacts. The following items should be included in the report:

(a) **Executive Summary.** Concise discussion of significant findings and recommended actions.

(b) **Policy, Legal, and Administrative Framework.** Discussion of the policy, legal, and administrative framework within the EA is prepared. The environmental requirements of any cofinanciers should be explained.

(c) **Project description.** Concise description of the project's geographic, ecological, social, and temporal context, including any off-site investments that may be required by the project (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities).

(d) **Baseline Data.** Assessment of the dimensions of the study area and description of relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Current and proposed development activities within the project area (but not directly connected to the project) should also be taken into account.

(e) **Environmental Impacts.** Identification and assessment of the positive and negative impacts likely to result from the proposed project. Mitigation measures, and any residual negative impacts that cannot be mitigated, should be identified. Opportunities for environmental enhancement should be explored. The extent and quality of available data, key data gaps, and uncertainties associated with predictions should be identified/estimated. Topics that do not require further attention should be specified.

(f) **Analysis of Alternatives.** Systematic comparison of the proposed investment design, site, technology, and operational alternatives in terms of their potential environmental impacts; capital and recurrent costs; suitability under local conditions; and institutional, training, and monitoring requirements. For each of the alternatives, the environmental costs and benefits should be quantified to the extent possible, and economic values should be attached where feasible. The basis for the selection of the alternative proposed for the project design must be stated.

(g) **Mitigation Plan.** Identification of feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels, and estimation of the potential environmental impacts; capital and recurrent costs; and institutional, training, and monitoring requirements of those measures. The plan (sometimes known as "action plan," or "environmental mitigation or management plan," outlined in Annex C) should provide details on proposed work programs and schedules. Such details help ensure that the proposed environmental actions are in phase with engineering and other project activities throughout implementation. The plan should consider compensatory measures if mitigation measures are not feasible or cost-effective.

(h) **Environmental Management and Training.** Assessment of the existence, role, and capability of environmental units on-site, or at the agency and ministry level. Based on these findings, recommendations should be made concerning the establishment and/or expansion of such units, and the training of staff, to the point that EA recommendations can be implemented.

(i) **Environmental Monitoring Plan.** Specification of the type of monitoring, who would do it, how much it would cost, and what other inputs (e.g., training) are necessary.

(j) **Appendices**

- (i) **List of EA Preparers**--individuals and organizations.
- (ii) **References** -- written materials used in study preparation. This list is especially important given the large amount of unpublished documentation often used.
- (iii) **Record of Interagency/Forum/Consultation Meetings** -including lists of both invitees and attendees. The record of consultations for obtaining the informed views of the affected people and local NGOs should be included. The record should specify any means other than consultations that were used to obtain the views of affected groups and local NGOs.

6.3 Indicative Outline for a USAID Scoping Statement (adapted from Samba, 1992)

Below is a typical outline for a scoping statement submitted to the USAID. It is adapted from Samba, 1992.

1. **Preface:** The statement can begin with an overview of Reg. 16.
2. **General Project Description**
3. **Environmental Assessment Issues**
   - a. **Significant Issues:** This section lays out the scope and significance of issues to be analyzed in the Environmental Assessment or Impact Statement. Significant issues are numbered, and their significance for the environment and natural resources is described, including direct and indirect effects of the project on the environment. Following are examples of significant issues that have emerge in scoping activities: accelerated erosion; laterization of soils; loss of soil structure and fertility; tropical forest conservation; wetland conservation; species and habitat loss; disease transmission; etc..
   - b. **Issues That Are Not Significant:** These issues are also numbered, with a brief presentation of why they will not have significant effect on the environment.
   - c. **Environmental Assessment Preparation:** This section suggests the timing of the preparation of environmental analyses, variations required in the format of the Environmental Assessment, and the tentative planning and decision making schedule.
   - d. **Conduct of Analysis and Disciplines Participating in the EA or EIS.**
4. **Identification of the Participants in the Scoping Session**

Module 16

16. Environmental Assessments of Pesticide Use in USAID Projects: Issues and Methods

Description/Objectives

This module introduces participants to environmental concerns in pesticide purchase, handling and use and to USAID procedures for environmental assessment of pesticide use in projects. Although pesticide environmental assessment is generally performed by specialists, participants may be involved in the interpretation of results from a pesticide environmental assessment, as well as in the implementation of recommended monitoring activities. USAID policy and procedures regarding pesticide use are described in Reg 16 § 216.3(b): "Except as provided in § 216.3(b)(2), all proposed projects involving assistance for the procurement or use, or both, of pesticides shall be subject to the procedures prescribed in § 216.3(b)(1) (I) through (v) below..." [See Appendix A]

Readings

Consortium for International Crop Protection, 1991. *How to prepare environmental assessments of pesticide use in AID agricultural projects*, January.

HOW TO PREPARE ENVIRONMENTAL ASSESSMENTS OF PESTICIDE USE IN A.I.D. PROJECTS

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FOREWORD AND ACKNOWLEDGEMENTS

To meet its objectives in developing country projects, the U.S. Agency for International Development (A.I.D.) has to deal with a range of insects, diseases, weeds, rodents, and other harmful pests. Pesticides are often used to control these organisms.

Use of pesticides in developing countries requires special understanding and responsibilities. Some developing countries have no laws to govern the importation, domestic use, and disposal of pesticides. Countries with laws often lack the resources to enforce proper use.

Since 1978, A.I.D. has required an "Environmental Assessment" (EA) of pesticides for use in its projects. The purpose of an EA is to alert A.I.D. officials and host country decision makers of potential risks and to avert use of unacceptable pesticides. The EA identifies less hazardous pesticides and nonchemical alternatives, and specifies safety measures, training, and research so that pesticides will be used properly as a component of integrated pest management (IPM).

A.I.D. has depended heavily on the Consortium for International Crop Protection (CICP) in preparing the Environmental Assessments. CICP in fact has developed more A.I.D. Assessments of pesticides than any other organization. CICP staff and consultants, representing a diverse range of expertise in pest and pesticide management and related fields, have assisted nearly every A.I.D. mission and overseas office with EAs. In addition, CICP personnel have helped with follow-up training, research, and monitoring.

This guide was developed to help CICP consultants, A.I.D. staff, and A.I.D. contractors conduct accurate and complete Assessments of pesticides. It is based on the experience of many who have participated (through CICP) in developing EAs.

The assistance and experience of CICP consultants, developing country collaborators, and A.I.D. employees and contractors were invaluable in preparing the guide. We especially acknowledge the efforts of the late Dr. Frederick W. Whittemore and Mr. Carroll W. Collier (retired), both formerly of the A.I.D. Bureau of Science and Technology, Office of Agriculture. Dr. Whittemore and Mr. Collier directed and assisted the CICP staff and CICP consultants in developing dozens of EAs. We also acknowledge the following colleagues for reviewing and commenting on a draft of the guide: Mr. Bill Barclay (Greenpeace), Dr. Carl S. Barfield (University of Florida), Dr. Hiram Larew (A.I.D. Bureau of Science and Technology), Dr. Angel A. Chiri (A.I.D. Bureau for Latin America and the Caribbean), and Dr. William A. Overholt (A.I.D. Bureau of Science and Technology). We are grateful for their guidance and assistance.

We also are grateful for the very special and untiring efforts of CICP's founder and former Executive Director, Dr. Ray F. Smith. As Executive Director of CICP, Dr. Smith was the principal architect of A.I.D. efforts that emphasized environmentally less hazardous and economically efficient pest and pesticide management.

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ACRONYMS AND ABBREVIATIONS

ADI	-	Acceptable Daily Intake
A.I.D.	-	U.S. Agency for International Development
CFR	-	Code of Federal Regulations
CICP	-	Consortium for International Crop Protection
EA	-	Environmental Assessment
EIS	-	Environmental Impact Statement
EPA	-	U.S. Environmental Protection Agency
FAO	-	Food and Agriculture Organization of the United Nations
FDA	-	U.S. Food and Drug Administration
FIFRA	-	Federal Insecticide, Fungicide, and Rodenticide Act
IEE	-	Initial Environmental Examination
IPM	-	Integrated Pest Management
MRL	-	Maximum Residue Limit
U.S.	-	United States of America
WHO	-	World Health Organization of the United Nations

INTRODUCTION

The introduction after World War II of synthetic organic pesticides such as the insecticide DDT and the herbicide 2,4-D began a new era in pest control. Hundreds of synthetic organic insecticides, herbicides, fungicides, nematicides, rodenticides, and other chemical pesticides entered commercial markets.

The availability of modern pesticides led to widespread acceptance and reliance upon them. Chemical control soon became the predominant method of pest control in many countries. Current trends indicate that the use of pesticides in developing countries is increasing more rapidly than in developed countries. Pesticide use in Africa, Asia, and Latin America could double over the next ten years if trends continue.

Most pesticides being used in developing countries originate in industrialized nations. About 30% of total U.S. pesticide production is exported. The exports include pesticides not registered for any use, or considered too dangerous for unrestricted use, in the U.S.

Chemical pesticides have spread much faster in developing countries than the capability to ensure their effective and proper use. Many of these countries do not have laws to govern importation, use, and disposal of toxic chemicals. Even if they have laws, governments frequently lack the means to enforce them.

The U.S. Agency for International Development (A.I.D.) now requires a risk-benefit evaluation of pesticides and pest control practices used in the Agency's overseas assistance projects. A.I.D. policy is to encourage use of nonchemical pest control methods and practices that reduce reliance on chemical control. When pesticides are used, it is A.I.D. general policy to avoid using pesticide chemicals that the U.S. Environmental Protection Agency (EPA) has not registered or has registered with restriction because their toxicity warrants special handling. A.I.D. approves use of pesticides only if a review indicates a favorable benefit-risk ratio.

The purpose of this guide is to assist consultants of the Consortium for International Crop Protection (CICP), A.I.D. staff, and A.I.D. contractors when developing Environmental Assessments of pesticides in A.I.D. projects. The guide tells what is needed and how to proceed when conducting the Assessments. It will help to minimize time spent on the Assessments and avoid errors and omissions that can delay A.I.D. decision making.

WHAT IS AN ENVIRONMENTAL ASSESSMENT?

In the A.I.D. system, an Environmental Assessment is "a detailed study of the reasonably foreseeable significant effects, both beneficial and adverse, of a proposed action on the environment of a foreign country or countries."[1] The purpose of the EA is to alert A.I.D. and host country decision makers of the

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[1]International Development Cooperation Agency, Agency for International Development, 22 CFR Part 216, Environmental Procedures, §216.1(c)(3), October 9, 1980.

potential for significant environmental effects in A.I.D. projects and outline steps for avoiding or minimizing adverse effects. Procedures for the EA appear Title 22 of the Code of Federal Regulations, Part 216 (abbreviated as 22 CFR Part 216), known as Environmental Procedures, which appears as Annex 1.

Steps Leading to an Environmental Assessment

Need for an EA is determined as the A.I.D. project is developed (see Figure 1). The A.I.D. project document (Project Identification Document or Project Paper) includes an Initial Environmental Examination (IEE), which precedes the EA. The IEE is the first review of the foreseeable effects of a proposed action (e.g., use of pesticides) on the environment. Its function is to provide A.I.D. officials the basis for reaching a "Threshold Decision". A Positive Threshold Decision indicates that the proposed action may have a significant effect on the environment. A Negative Declaration indicates that the proposed action should not have a significant impact on the environment. A Positive Threshold Decision requires preparation of an EA or, rarely, Environmental Impact Statement (EIS). An EIS is similar to an EA except it requires a more rigorous review (by both U.S. and host country agencies) and usually public hearings on the proposed action.

The EAs may cover a range of proposed environmental actions, such as road building, etc. Some of the EAs are devoted entirely to pesticide use. This guide considers assessment of pesticides.

WHAT IS MEANT BY "PESTICIDE"?

"Pesticide," from the words "pest" and "cide" (a Latin derivative meaning killer), is a chemical agent that kills or in some other way diminishes the actions of pests. Pests include harmful insects and other invertebrate organisms, weeds, microorganisms, rodents, and birds.

Pesticides are classified according to their function -- insecticide to control insects, fungicide to control fungi, etc. The principal types of pesticides appear in Table 1.

In A.I.D. livestock production projects, it is important to distinguish pesticides used to control parasites that harm animals or cause disease from drugs used to combat disease directly. Drugs come under the jurisdiction of the U.S. Food and Drug Administration (FDA) and are handled differently. If in doubt about the status of a livestock chemical, contact EPA's Registration Division, Insecticides and Rodenticides, Washington, DC 20460 (telephone: 703-557-2400).

Sometimes a pesticide may appear to be the only method for controlling a pest. However, by assessing the situation it is often possible to find cheaper, longer lasting, and less hazardous methods. Integration of effective nonchemical control methods (Table 2) within an ecological framework may reduce or even eliminate the need for chemical pesticides.

Figure 1. Steps Leading to the Decision for an Environmental Assessment in A.I.D. Projects Per Title 22 of the Code of Federal Regulations, Part 216, Environmental Procedures

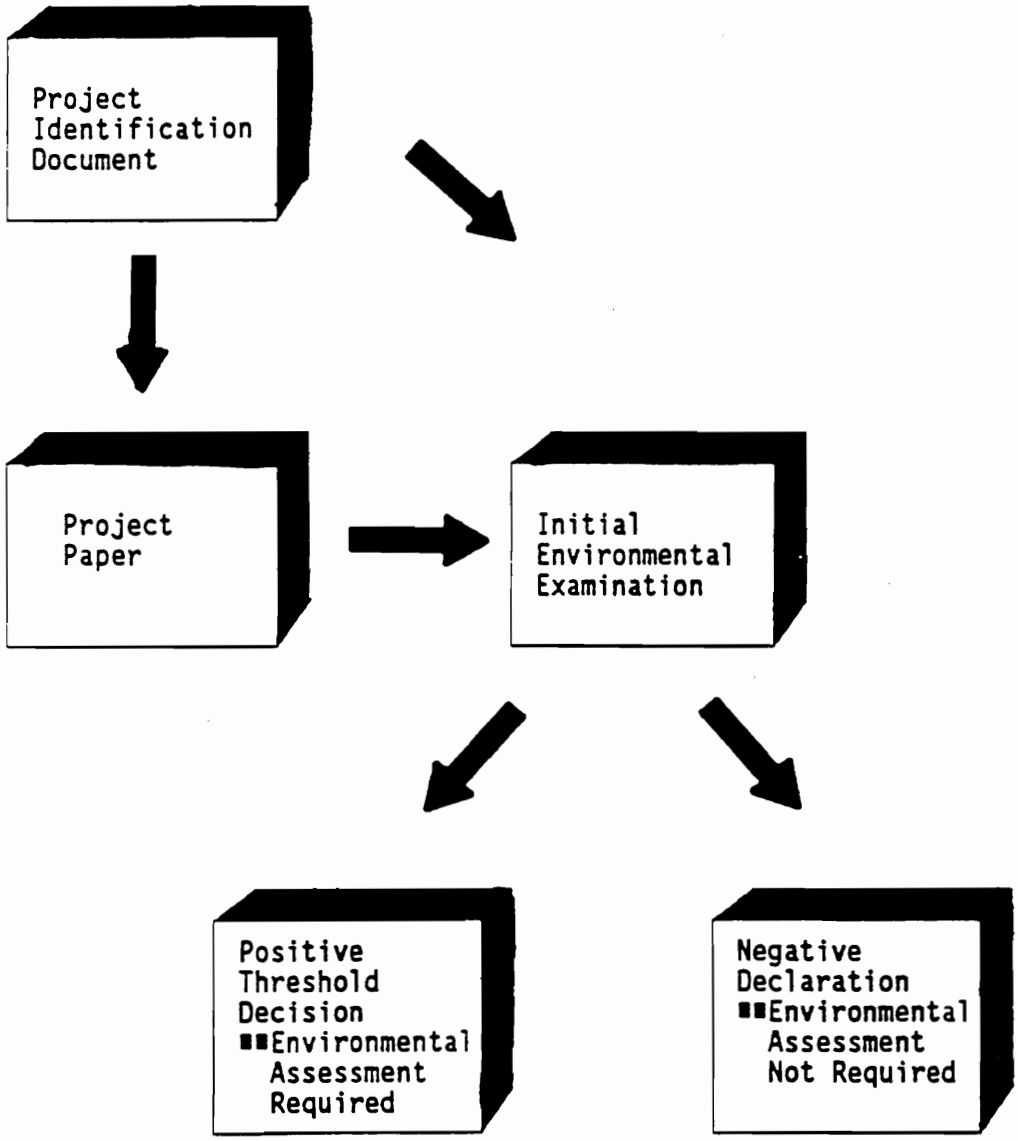


Table 1. Pesticides Classified According to Function

Pesticide	Pest group controlled or function of the pesticide
Acaricide	Mites, ticks, and spiders
Algicide	Algae
Attractant	Attracts pests (pheromones, baits, and miscellaneous chemicals)
Avicide	Birds
Bactericide	Bacteria
Defoliant	Removes plant foliage
Desiccant	Removes water from plants and arthropod pests
Fungicide	Fungi
Growth regulator	Regulates plant or animal growth
Herbicide	Weeds
Insecticide	Insects, mites, and related arthropods
Miticide	Mites
Molluscicide	Mollusks such as snails and slugs
Nematicide	Nematodes
Piscicide	Fish
Predacide	Vertebrate pests
Repellent	Repels animals
Rodenticide	Rodents
Silvicide	Trees and woody shrubs

WHAT IS NEEDED TO CONDUCT AN ASSESSMENT?

Conducting an Environmental Assessment of pesticide use requires access to a range of information appearing below. A check (√) appears by each of the essential documents.

A.I.D. Documents

- √ A.I.D. Environmental Procedures (22 CFR Part 216) (Source: A.I.D. Handbook No. 3, Appendix 2D). The Environmental Procedures appear in Annex 1 of this guide.

- √ The Project Identification Document, Project Paper, or other A.I.D. documents (Program Assistance Initial Proposal or Program Assistance Approval Document) that describe the proposed action (Source: A.I.D. Project Officer).

- √ The Initial Environmental Examination, if any (Source: A.I.D. Project Officer).

- √ Any earlier Environmental Assessments of the A.I.D. project (Source: A.I.D. Project Officer).

Table 2. Examples of Alternatives to Chemical Pesticides

Insects, mites, and other invertebrates	Plant diseases	Weeds	Vertebrate pests
Biological control Conservation, augmentation, inoculation, and habitat manipulation with parasites, predators, and pathogens Plant resistance Environmental manipulations Plant spacing Intercropping Timing of planting and harvesting Crop rotation Water management Fertilizer management Soil preparation Sanitation Trap crops Induced sexual sterility Physical and mechanical control Screens Traps Fly swatters Protective packaging Barriers Flaming and burning Hand picking Attraction and repellency Attractants Repellents Genetic manipulation of pest populations Lethal genes Male-producing genes Botanical insecticides	Disease resistance in host plants Reduction of losses by manipulations of plants and pathogens Control of plant pathogens by antagonists, hyperparasites, and natural enemies Disease- and nematode-free seed and propogating material Crop rotation and soil management Vector control Nematode attractants and repellents Sanitation Destruction of inoculum Roguing Intercropping Destruction of alternate hosts	Biological control Insects and other herbivores Diseases Environmental manipulation Choice of variety Seedbed preparation Method of seeding or planting Seeding rates and row spacing Fertilizer management Cultivation Irrigation and water management Erosion control Design of irrigation and drainage canals and ponds Managed grazing Sanitation Flaming and burning Natural stimulants and inhibitors Plant competition Revegetation of weed- and brush-infested grazing lands Breeding highly competitive forage species Oversowing Green manures and cover crops Crop rotations	Noise and physical repellents Chemical repellents Trapping and shooting Behavior Environmental manipulation Exclusion Visual repellents

Source: Modified from President's Science Advisory Committee. 1965. Restoring the quality of our environment. The White House. U.S. Government Printing Office, Washington, DC

- √ A.I.D.'s Endangered Species Act (Section 119 of the Foreign Assistance Act) (Source: A.I.D. Project Officer).

Technical References

- √ Local and international publications on pests, pesticides, alternative methods of control, and integrated pest management (Source: Libraries, universities, and host country ministries).

- √ Pesticide labels, container wrappers, or supplemental literature accompanying the proposed pesticides (Source: Pesticide manufacturers and dealers).

- √ Current Pesticide Chemical News Guide (updated periodically) (Source: Louis Rothschild, Jr., 1101 Pennsylvania Avenue, S.E., Washington, DC 20003, telephone: 202-544-1980).

- √ Title 40, Part 180 (pesticide tolerances for raw agricultural commodities) and Title 21, Part 193 (pesticide tolerances for processed foods) of the Code of Federal Regulations (updated periodically) (Source: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9371).

- √ Guide to Codex Maximum Limits for Pesticide Residues (updated periodically) (Source: Joint FAO/WHO Food Standards Programme, Codex Alimentarius Commission, Pesticide Residues, The Netherlands).

- √ Suspended, Cancelled, and Restricted Pesticides (updated periodically) (Source: Office of Pesticides and Toxic Substances, Office of Compliance Monitoring (EN-342), U.S. Environmental Protection Agency, Washington, DC 20460, telephone: 202-382-3807).

- √ Current Report on the Status of Chemicals in the Special Review Program and Registration Standards in the Reregistration Program (updated periodically) (Source: Public Information Branch, Field Operations Division, Office of Pesticide Programs [H7506C], U.S. Environmental Protection Agency, Washington, DC 20460, telephone: 703-557-2805).

- √ Recent publications and maps that describe the natural environment whe the proposed pesticides are to be used. A.I.D.'s environmental profiles of various developing countries are excellent references (Source: A.I.D. or host country).

- √ EPA Crop Groupings [40 CFR 180.34(f)(9)] (Source: Distribution [PM 215], U.S. Environmental Protection Agency, Washington, DC 20460, telephone: 202-382-2118).

- Current Farm Chemicals Handbook (updated annually) (Source: 37841 Euclid Ave., Willoughby, Ohio 44094, telephone: 216-942-2000, telex: 212556 MPCO, fax: 216-942-0662).

- Crop Protection Chemicals Reference (updated annually) (Source: MSDS Reference for Crop Protection Chemicals, c/o John Wiley & Sons, Inc., 605 Third Avenue, New York, New York 10157-0228).

- Recognition and Management of Pesticide Poisonings; 4th edition, March 1989 (Source: Public Information Branch, Field Operations Division, Office of Pesticide Programs [H7506C], U.S. Environmental Protection Agency, Washington, DC 20460, telephone: 703-557-2805).

Documents on Local Laws and Regulations

- √ Laws and regulations governing pesticide use in the host country (Source: Host country ministry of agriculture, ministry of natural

resources, or other ministry or office responsible for the laws and regulations).

- Laws and regulations on environmental protection, endangered species, or related environmental matters (Source: Host country ministry of natural resources or other ministry or office responsible for the laws and regulations).

- Lists of pesticides (by products) approved for use in country and (if available) quantities of pesticides imported to or produced in country for most recent year available (Source: Host country ministry of agriculture or other ministry or office responsible for compiling information on pesticides).

Other Sources

In addition, the following are useful and may be required to complete the assessment:

- Scientific publications on the impacts of pesticides on human health, environment, and socioeconomic factors (Source: Libraries).

- Residues in Foods (updated annually) (Source: U.S. Food & Drug Administration, Pesticide Program, 5600 Fishers Lane, Rockville, Maryland 20857, telephone: 301-443-1815).

- Health data on pesticide poisoning in country (Source: Host country ministry of health or other ministry or office responsible for health).

- PEST-BANK and CHEM-BANK databanks on CD-ROM (updated quarterly) (Source: SilverPlatter Information, Inc., One Newton Executive Park, Newton Lower Falls, Massachusetts 02162-1449, telephone: 800-343-0064, fax: 617-969-5554).

PEST-BANK and CHEM-BANK provide current information on pesticides registered by EPA. PEST-BANK provides information on residue tolerances for all EPA registered pesticides and is a good way to determine which pesticides are in EPA's restricted use category. CHEM-BANK provides toxicological data (human health and environmental effects) for some of the EPA-registered pesticides. The databanks are on CD-ROM disks accessed by computer.

Always Consult the Pesticide Label

The label includes all information printed on or attached to the pesticide container. The importance of the label cannot be stressed too often. If it is read and understood and all the directions are followed, the likelihood of misusing the material or of having an accident is greatly reduced. Unfortunately, many pesticides in developing countries are sold without labels, the labels are in a foreign language, or the labels are too difficult for applicators to understand. These problems are at the root of much of the pesticide misuse in developing countries.

Preparers of EAs must carefully assess all available label information. They must read and understand all directions on the label when developing the EA. They must determine if labels are understandable to farmers and other users.

A label for a pesticide registered by EPA includes the following information (see Glossary, page 28, for definition of terms):

- Brand name.
- Chemical name.
- Common name.
- Formulation.
- Ingredients.
- Contents.
- Manufacturer.
- Registration and establishment numbers.
- Signal word.
- Precautionary statements.
- Statement of practical treatment.
- Statement of use classification.
- Directions for use.
- Misuse statement.
- Reentry statement.
- Storage and disposal directions.
- Warranty.

GENERAL PROCEDURES

Briefing in Washington, DC

A briefing in Washington, DC is usually essential before beginning the EA. The briefing may be required to acquire critical A.I.D. documents. It is an opportunity to meet A.I.D. environmental officers, pest management advisors, and others who may be reviewing the EA. They will have made preliminary arrangements for the host country visit and usually can suggest useful contacts there.

Upon Arrival in Host Country

Upon arrival in the host country, contact the designated A.I.D. representative for briefing and instructions. The A.I.D. representative usually will identify host country counterparts or other collaborators. Give governmental and nongovernmental host country representatives ample opportunity to participate in developing the EA.

The Environmental Assessment's Content and Form

The Environmental Assessment should include the following:

1. Cover page: The cover shows the name of the A.I.D. project, mission, and country; name, professional discipline, and affiliation of each person responsible for conducting the EA; name and address of the contractor in charge of the EA; and date.

BEST AVAILABLE

2. Summary: The summary presents the major conclusions, areas of controversy, if any, and the issues to be resolved.

3. Introduction: This section describes why the Environmental Assessment was developed. The Initial Environmental Examination in the A.I.D. Project Identification Document or Project Paper describes why a positive Threshold Decision was reached and the EA is needed.

4. Pesticide Procedures: This section addresses the following factors, a. to l., in accordance with 22 CFR 216, §216.3(b)(1):

   a. The EPA registration status of the requested pesticide(s).

   b. The basis for selection of the requested pesticide(s).

   c. The extent to which the proposed pesticide use is part of an integrated pest management program.

   d. The proposed method or methods of pesticide application, including availability of appropriate application and safety equipment.

   e. Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed pesticide use and measures available to minimize such hazards.

   f. The effectiveness of the requested pesticide(s) for the proposed use.

   g. Compatibility of the proposed pesticide(s) with target and nontarget ecosystems.

   h. The conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils.

   i. The availability and effectiveness of other pesticides or nonchemical control methods.

   j. The requesting country's ability to regulate or control the distribution, storage, use, and disposal of the requested pesticide(s).

   k. The provisions made for training of users and applicators.

   l. The provision made for monitoring the use and effectiveness of the pesticide(s).

5. Summary of mitigative measures and requirements: This section summarizes measures to reduce negative environmental impacts and may include a budget of costs to implement the measures. Practical needs (training, research directed at finding nonchemical alternatives, safety equipment, storage facilities, pesticide enforcement procedures, new publications, etc.) should be emphasized.

6. References cited: This section should list citations of technical articles and other documents used as sources for all significant assertions and scientific data presented.

7. Collaborators and Persons Contacted: This section should list the names, disciplines, affiliations, and contributions of host country representatives, A.I.D. staff, EPA staff, and any others who provided information or were contacted about the EA.

8. Recommended Distribution: This section should identify the names and addresses of key host country representatives and A.I.D. contractors who should receive the approved Environmental Assessment. The list of persons to receive the EA should be compiled in consultation with designated A.I.D. personnel.

9. Annexes: If host country pesticide laws and regulations exist, they should be presented as annexes. Annexes should also include copies of labels of the proposed pesticides and a list of pesticides approved for use in country, if available.

Before Departing Host Country

The last step before departing the host country is to debrief designated A.I.D. personnel in the overseas mission. If the Environmental Assessment is not completed, inform them when it will be available. Also, determine if they expect any follow-up assistance in revising the EA, etc.

Debriefing in Washington, DC

A debriefing at A.I.D. in Washington, DC may be necessary or helpful.

STEP-BY-STEP PROCEDURES

Writing Style

When writing an EA:

- Clearly define words or terms that a lay person may not understand.
- Explain the dual naming systems used for both living things (Latin name and common name) and pesticides (common and trade names) and be consistent in use of names.
- Give a reference for all significant assertions and scientific data presented. The EA should have a list of references cited.
- Beware of making unfounded or possibly mistaken assertions.
- Do not use sexist language. When referring to farmers, for instance, use "they" instead of "he" or "she."

Pesticide Procedures

The Pesticide Procedures section (see page 9) of the Environmental Assessment should take the following form:

a. The EPA Registration Status of the Requested Pesticide(s).

This section should indicate for each proposed pesticide: (1) if EPA has registered the pesticide for the proposed use(s), (2) the EPA classification category, and (3) if EPA is presently reviewing the pesticide because of suspected problems. Copies of sample labels of the pesticides, obtained in the country of proposed use, should be attached as an annex of the EA.

EPA Registration Status

EPA is responsible under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) for registering pesticides. FIFRA requires EPA to take into account economic, social, and environmental costs and benefits in making decisions. EPA may classify a product for "restricted use" if its toxicity warrants special handling. Use of one formulation of a pesticide may not be restricted but another formulation may be. EPA registers a pesticide according to its formulation and intended use.

In the U.S., only pesticide applicators who have been certified by law can purchase restricted pesticides. The restricted materials have a high potential for causing harm to humans and/or environment. They are too hazardous for general use in A.I.D. projects, but in exceptional circumstances they may be approved if their use is determined essential and the project includes a training component to minimize hazards.

The EPA registration status of all proposed pesticides must be determined, using one of the following sources:

- Pesticide labels. The labels of pesticides sold in the U.S. include the EPA registration number and indicate all uses for which registered. Foreign labels of the same pesticide chemicals may, but usually do not, include information on EPA registration.

- PEST-BANK. PEST-BANK (updated every 3 months) will provide all information needed on registration.

- Pesticide Chemical News Guide. This Guide (updated periodically) lists EPA tolerances (or exception from tolerances) for pesticides on specific crops. Inclusion of an EPA tolerance in the Guide indicates that the pesticide has been registered for that specific crop use.

- Crop Protection Chemicals Reference. This publication compiles information appearing on labels of EPA-registered pesticides. However, it does not include information for many EPA-registered pesticides and is only published once per year.

- Suspended, Cancelled, and Restricted Pesticides. This EPA publication lists those pesticides that EPA has suspended, cancelled, or restricted. The publication's limitation is that it is updated infrequently.

- EPA's Office of Pesticide Programs, Registration Division (telephone: 703-557-7700).

A.I.D. policy is to use unclassified (general use) pesticide chemicals that EPA has registered for the same or similar uses in the U.S. "Similar" refers to crops in related botanical categories (e.g., tuber crops). EPA Crop Groupings [40 CFR 180.34(f)(9)] provides guidelines on crop groupings.

Pesticides not registered by EPA or registered in EPA's restricted use category may be considered for approval on human and animal food crops in A.I.D. projects if the following provisions are met:

- For restricted use pesticides, there must be a training component in the project to assure proper use.

- For pesticide chemicals without EPA tolerances, the chemicals must have an acceptable daily intake (ADI) and maximum residue limit (MRL) established by the FAO/WHO Codex Alimentarius Commission for the crop(s) in question and use patterns must assure that those tolerances will not be exceeded (see discussion under Tolerance Requirements).

- For all pesticides, the chemicals must not have been cancelled, withdrawn, or suspended in the U.S. because of health or environmental concerns.

However, in these cases approval will depend on current information about the chemicals in question and whether they can be used properly under the particular circumstances.

Tolerance Requirements

The tolerance of a pesticide is the minute trace permitted to remain in or on raw agricultural commodities or processed foods. Some pesticides are sufficiently low in hazard to be exempt from tolerance requirements. Tolerances are set by EPA for each individual crop or food type. Some pesticides have no tolerances because EPA has not established them yet.

The following sources indicate if EPA has established tolerances for specific pesticides on specific crops or other commodities:

- The labels of EPA registered pesticides.

- Title 40, Part 180 (raw agricultural commodities) and Title 21, Part 193 (processed foods) of the Code of Federal Regulations.

- Pesticide Chemical News Guide.

- PEST-BANK.

Tolerances are assigned by crop. EPA has established crop groupings that link major crops with minor crops (including many tropical crops) having similar growth and consumption patterns. A tolerance that applies to one crop in a group can be extended to the others. The crop groupings are given in 40 CFR 180.34(f)(9).

The Food and Drug Administration is mandated by law to monitor foods imported into the United States. One objective of the monitoring is to insure that EPA tolerances for pesticide residues are not exceeded and that residues of pesticides not registered by EPA for use on a particular product are not present. It is therefore important that only EPA-registered products are used on crops for export to the U.S. and that the rates and frequency of application, together with the prescribed harvest intervals, do not result in residues exceeding such tolerances.

The FAO/WHO publication, Guide to Codex Maximum Limits for Pesticide Residues, recommends tolerances for specific pesticides on specific crops. The Guide includes tolerances for pesticides on crops for which EPA tolerances do not exist. Pesticides with FAO/WHO-recommended tolerances may be used in A.I.D. projects, but treated crops should not be exported to the U.S. unless the FAO/WHO tolerances have been approved by EPA. EPA's Office of International Activities, telephone: 202-382-4870, should be contacted if there is a question about EPA-approval of FAO/WHO-recommended tolerances.

EPA Special Review Program

EPA's Special Review program (formerly called Rebuttable Presumption Against Registration) studies pesticides to determine if their use presents unacceptable risks. The criteria for initiating a Special Review of pesticide uses include:

- Potential acute toxicity to humans or domestic animals.
- Potential adverse chronic effects in humans.
- Hazards to nontarget organisms.
- Separate criteria for hazards to threatened or endangered species.
- Other adverse effects that would permit EPA to initiate a Special Review in circumstances where potential risks may not be anticipated by specific criteria.

The Special Review study may take several years. At the end of the study, EPA may decide to cancel (ban) the pesticide or restrict its use, or may take no action if the Special Review fails to confirm substantial risks. The use in A.I.D. projects of pesticides under Special Review should be avoided if acceptable alternatives are available. They may be harmful, and if they are canceled or restricted during the life of a project, alternatives will have to be found and substituted quickly.

The following EPA publication lists the pesticides in the Special Review program and why the pesticides are being reviewed:

- Report on the Status of Chemicals in the Special Review Program and Registration Standards in the Reregistration Program (updated periodically).

EPA's Office of Pesticide Programs, Registration Division (telephone: 703-557-7700) should be contacted about questions concerning the Special Review status of a pesticide or recent changes in its registration.

The EA should indicate if any of the proposed pesticides are in the Special Review program and why EPA has put them in Special Review, as indicated in the EPA publication above. The EPA rationale for the review may include one or more of, but not necessarily be limited to, the factors in Table 3 (see Glossary, page 28, for unfamiliar terms).

Format

Much of the data for section a. of the Pesticide Procedures can be summarized in a table such as Table 4. If EPA has not established tolerances for a pesticide on a crop but FAO/WHO has established ADI/MRL levels, indicate so in a table footnote.

b. The Basis for Selection of the Requested Pesticide(s).

This section should briefly explain what criteria were used to select the proposed pesticide(s), for example:

- Because of local availability, effectiveness, and past experience.
- Because small plot experiments showed the pesticide(s) to be promising.
- Because there are no known chemical or nonchemical alternatives.
- Because of low mammalian toxicity.

c. The Extent to Which the Proposed Pesticide Use Is Part of an Integrated Pest Management Program.

A.I.D. policy is to promote integrated pest management to the extent possible. Pesticides normally will be approved only if the EA shows that the proposed pesticide use will be in accordance with IPM principles.

IPM is a pest control system that uses the "best mix" of two or more control methods based on criteria of crop yield, profit, and safety. Pesticides are used only when cost-benefit analyses show that use is truly justified and will produce beneficial results.

IPM can decrease pest losses, pesticide use, and costs and increase crop yield and stability. Successful IPM programs have been developed for insects and mites, plant diseases, weeds, vertebrates, and snails and slugs attacking various crops. Some IPM technology as conceived by research workers is too complex for farmers in developing countries. However, numerous IPM systems developed in close collaboration with farmers have been widely adopted in many of these countries.

Table 3. Examples of Criteria that EPA Considers When Initiating a Special Review of Pesticide Uses

Oncogenicity	Acute toxicity
Mutagenicity	Thyroid effects
Teratogenicity	Acute and chronic toxicity to nontarget organisms
Fetotoxicity	Reduction in nontarget organisms
Reproductive effects	Testicular effects
Hazards to wildlife	Avian hazard
Toxic effects in liver and kidney	Hazard to aquatic organisms
Ecological effects	Neurotoxicity
Ground water contamination	Reduction in endangered species
No antidote	Bioaccumulation
Carcinogenicity	Chronic effects
Emergency treatment	

Table 4. Example of a Table for Summarizing the EPA Registration Use Category, Tolerances, and Special Review Status of Each of the Proposed Pesticides

Pesticide names[1]	EPA registration category		Status of tolerances for crops for which requested:[2]			EPA Special Review status
	General use	Restricted use	Millet[3]	Beans	Cabbage	
Fungicides						
Copper oxychloride (Cupravit)	X			E	E	
Herbicides						
Bentazon (Basagran)[4]	X			T		5
2,4-D (Acme), emulsifiable concentrate	X			NT[6]		7
Insecticides						
Bacillus thuringiensis (Dipel)	X		E		E	
Chlorpyrifos (Counter)	X		T			

[1]Approved common name in the Pesticide Chemical News Guide and (in parenthesis) the trade name. A pesticide may have one or more trade names.

[2]T=EPA Tolerance established; NT=No EPA tolerance; E=Exempt from EPA tolerance. (Pesticide Chemical News Guide 1988).

[3]Millet is in cereal grains crop category of EPA's Crop Grouping [40 CFR 180.34(f)(9)], which includes the commodity corn. Status of tolerances for millet is based on tolerances established for corn.

[4]Bentazon will be used only in research demonstration plots under careful supervision by project supervisors.

[5]Bentazon is under Special Review because of suspected ground water contamination.

[6]No FAO/WHO recommended tolerances either. Treated beans will not be consumed; 2,4-D is to be included only as a reference treatment in farmer field trials.

[7]2,4-D is under Special Review because of suspected oncogenicity.

The EA should encourage the development and use of IPM. It should descril the existing use of IPM and indicate any requirements (including budget) for IPM training, research, etc. The requirements should be described in the EA's summary of mitigative measures and requirements.

Guidelines for IPM Programs

The EA should briefly describe the IPM program and how the proposed pesticide use will be integrated into it. Use of monitoring, nonpesticidal methods, and other features of the IPM program should be discussed along with pesticide use.

Specifics of an IPM program will depend on the crop, cropping system, pest complex, economic values, social conditions, availability of personnel, and other factors. The general steps for developing an IPM program appear in the boxes on the following pages.

d. The Proposed Method or Methods of Pesticide Application, Including Availability of Appropriate Application and Safety Equipment.

This section should describe the method or methods of application, availability of application equipment, and need for and availability of safety equipment. Before developing this section, the EA preparer should visit project sites to observe how the farmers apply pesticides and the safety practices they use, and to determine needs.

The equipment should be suited to local conditions. Large, powerful, or expensive equipment usually is impractical in developing countries where farmers commonly use small, hand-operated sprayers or dusters. Indicate all needs for equipment and spare parts in the EA's summary of mitigative measures and requirements.

This section should also describe availability and additional need for clothing and equipment to protect applicators, others, and environment. The pesticide label is an excellent information source: it includes a precautionary statement of the pesticide's hazards and describes clothing and equipment that should be used to reduce the hazards. Table 5 is a protective clothing and equipment guide developed by the California Department of Food and Agriculture for pesticides in EPA toxicity categories I-III. Note, however, that local climatic or economic conditions may preclude the use of protective clothing. Protective clothing recommended for temperate areas may be physically unbearable in tropical climates. If the necessary protective clothing is physically unbearable, then pesticides requiring this clothing should not be proposed.

The EA should clearly summarize precautions and safety information indicated on the pesticide labels, such as:

- How to avoid drift to nontarget areas.
- The need to avoid smoking or eating while using pesticides.

- The need to prevent unprotected persons and livestock from entering treated areas until enough time has passed for them to be safe. The pesticide label indicates how much time is required.
- How to clean contaminated clothing.
- How to clean up pesticide spills.
- How to maintain the pesticide application equipment.
- How to dispose of unused pesticide and pesticide containers.
- How to store and transport the pesticides.

e. Any Acute and Long-Term Toxicological Hazards, Either Human or Environmental, Associated With the Proposed Pesticide Use and Measures Available to Minimize Such Hazards.

The purpose of this section is to point out potentially harmful acute (short-term) and long-term effects of the proposed pesticides and outline measures to reduce the effects. A table (see Table 6 for example) showing the pesticides' acute oral LD_{50} values, EPA toxicity categories, and signal words and reasons for EPA Special Review, if any, should be included. If any pesticides are under EPA Special Review, the reasons for the review should be discussed thoroughly in relation to their proposed use.

Acute Toxicological Hazards

Examples of acute effects on humans include problems related to absorption through skin, inhalation, or eye contact. Examples of acute environmental hazards include problems of toxicity to honey bees, fish, birds, or other wildlife. Other potential acute effects would include chemical explosions during fires. The pesticide label, CHEM-BANK, and Crop Protection Chemicals Reference are sources for information on the short-term effects.

A pesticide's acute oral LD_{50} is the best indication of its potential short-term toxicity to humans. It is the amount of the chemical necessary to kill 50% of the test animal population (usually laboratory rats). The acute oral LD_{50} is based on unit weight of pesticide per unit body weight of the test animal (mg/kg) when swallowed. Pesticides with the lowest LD_{50} values are potentially the most toxic to humans (see Table 7). Ingestion of just a few drops to a teaspoon of a pesticide with an oral LD_{50} of less than 50 might be sufficient to kill an adult person. An adult may have to consume 16 tablespoons to 0.5 kilogram or more of a pesticide with an oral LD_{50} of 5000 before dying.

However, the pesticide's formulation and percentage active ingredient and other factors such as health of the person determine its actual hazard level. A pesticide formulation with 15% active ingredient would be potentially more hazardous than a formulation of the same pesticide chemical with 5% active ingredient.

STEPS TO IPM

STEP 1: IDENTIFY THE MAJOR PESTS AND ESTABLISH ECONOMIC INJURY LEVELS

Dozens of potentially harmful species may infest a crop. However, only a few serious pest species normally recur regularly. The serious pests--known as key, primary, or chronic pests --that recur regularly at intolerable levels are the focal organisms for IPM programs.

The criterion that determines whether taking action to control a harmful species is profitable is called the "economic injury level". The economic injury level may be expressed in different ways depending on the crop and the pests. For example:

- Numbers of insects per plant.
- Percentage of fruit damaged by a given pest.
- Numbers of weeds per square meter.

The economic injury level is the "break even point" in pest management. Below this level, the cost of control is not justified. Above this level, control may be profitable.

Several factors will influence the economic injury level for a specific pest: crop variety and stage of development, economic value of crop, presence of natural enemies, cost of the control measure, external costs to health and environment, etc. The economic injury level depends on the damage function (the relationship between pest intensity and yield loss) as well as the economics of reducing the damage. It therefore will change as these variables

(continued)

EPA has grouped pesticides into four toxicity categories according to their potential for causing injury to people and assigned them signal words ("Danger", "Warning", or "Caution") corresponding to their toxicity categories (see Table 7). Category I pesticides are most toxic or hazardous and their use is normally restricted. These are too toxic for general use in A.I.D. projects. Many Category II pesticides are also too toxic. They are acceptable only if the EA indicates that project use patterns will adequately mitigate hazards.

The following sources can be used to determine a pesticide's oral LD_{50}, EPA toxicity category, and EPA signal word:

- Oral LD_{50}: Farm Chemicals Handbook and CHEM-BANK.
- EPA toxicity category: The pesticide label, Crop Protection Chemicals Reference, Farm Chemicals Handbook, and PEST-BANK or CHEM-BANK.
- EPA signal word: The pesticide label, Crop Protection Chemicals Reference, Farm Chemicals Handbook, and PEST-BANK.

The EA should highlight special needs for avoiding short-term hazards. Some general suggestions appear on the pesticide label, under:

- Precautionary Statements.
- Statement of Practical Treatment.

STEPS TO IPM

change. Economic injury levels developed in one area will not likely be appropriate for use in another area.

Research is needed to determine the initial economic injury levels. Then, before economic injury levels are recommended for wide-scale use, they should be tested on a few farmers' fields to verify their effectiveness. The levels can be refined as more information becomes available.

By inspecting fields regularly and basing pesticide applications on economic threshold criteria, pest control costs (and pesticide use) usually can be reduced and profits increased.

STEP 2: SELECT THE BEST MIX OF CONTROL TECHNIQUES

All methods and practices (see Table 2, page 5) should be considered for the IPM program. First consideration should be given to the use of preventive measures, namely:

- Resistant crop varieties.
- Biological control (conservation or augmentation of natural enemies already present or introduction of new natural enemies).
- Cultural control (cultivation, crop rotation, use of pest-free seed and planting stock, fertilizer management, intercropping, etc.).

(continued)

- Directions for Use.
- Reentry Statement (the amount of time that must elapse before a person enters an area treated with a pesticide).
- Storage and Disposal Directions (special instructions on storage and disposal).

Long-Term Toxicological Hazards

Examples of long-term (delayed) human health effects include oncogenicity, teratogenicity, carcinogenicity, and mutagenicity (see Glossary, page 28, for explanation). Examples of long-term ecological effects include decrease in biodiversity and ecological stability and contamination of aquifers. Years of continuous observation and complex research are often necessary before long-term effect on humans or ecosystems are known.

CHEM-BANK is a good source for information on long-term effects. The EPA Report on the Status of Chemicals in the Special Review Program and Registration Standards in the Reregistration Program identifies suspected long-term effects of those pesticides in EPA Special Review program.

STEPS TO IPM

Farmers may already be using one or more of these preventive measures. It is therefore important to survey the farmers before determining which measures are needed.

Pesticides should be used only if no practical, effective, and economic nonchemical control methods are available. Then they should be applied only to keep the pests from reaching economic injury levels. The pesticides and application techniques selected should cause minimal harm to humans, livestock, honey bees, natural enemies, and the environment.

STEP 3: MONITOR THE FIELDS REGULARLY

The growth of pest populations usually is related closely to stage of crop growth and weather conditions. However, it is difficult to predict severity of pest problems accurately in advance. The crops must be inspected regularly to determine the levels of pests, natural enemies, and crop damage.

Extension and commodity organization personnel can assist with field inspections. They can train the farmers how to separate pests from non-pests and natural enemies and to determine when crop protection measures, perhaps including pesticides, are necessary. This approach has been very effective in many developing countries.

(continued)

f. The Effectiveness of the Requested Pesticide(s) for the Proposed Use.

The effectiveness of a pesticide is its ability to produce a desired effect on a target organism. Effectiveness is difficult to measure and expert opinions are often biased. Weather conditions, level of resistance in the pest, methods of application, and other factors will determine how effective a pesticide is.

What to Report on Effectiveness

The EA should include the following for the proposed pesticides:

- Why the pesticides are being proposed. Are efficacy data available? Are the pesticides superior to nonchemical control measures or other pesticides? If efficacy data are not available, have pest control experts or farmers had experience using the pesticides?

- How will pesticide efficacy be monitored?

- Is pest resistance to pesticides a problem? Pesticide resistance is one of the most serious factors affecting pesticide use. Worldwide, over 600 species of pests have developed resistance to one or more chemical pesticides. The problem is so serious in some areas that effective pesticides are no longer available for some major pests, such as the diamondback moth attacking cabbages and other plants of the mustard family. Malaria eradication programs in many countries are in disarray because vector mosquitoes are no longer adequately controlled with available insecticides. Combatting resistant strains is not easy, and there may not always be solutions. The best strategy is to avoid the

STEPS TO IPM
STEP 4: USE ALL CONTROL METHODS CORRECTLY AND SAFELY
Each pest control method has both advantages and disadvantages. Extension personnel and others advising farmers should learn the advantages and disadvantages. They should develop educational programs to teach farmers how to use the control methods correctly and safely.
STEP 5: COMPLY WITH ALL LEGAL CONTROLS
Legal controls result from laws and regulations and include: ▪ Quarantines to prevent the entry and establishment of new pests. ▪ Local laws and regulations that govern pesticides. ▪ Pesticide restrictions and regulations in projects financed by outside donors. ▪ Laws relating to international transport and marketing of produce. All local pesticide laws and regulations as well as A.I.D. regulations must be followed. The EA should determine what laws and regulations exist, assess enforcement, and recommend appropriate changes.
STEP 6: DEVELOP EDUCATIONAL, TRAINING, AND DEMONSTRATION PROGRAMS FOR FARMERS AND EXTENSION WORKERS
Implementation of IPM depends heavily on education, training, and demonstrations to help farmers and extension workers develop and evaluate the IPM methods. Practical hands-on training conducted in farmers' fields (as opposed to classroom) is a must. Special training for extension workers and educational programs for government officials and the public are also important.

problem of resistance by using pesticides sparingly and as a last resort in IPM systems.

g. Compatibility of the Proposed Pesticide(s) With Target and Nontarget Ecosystems.

This section should point to potentially harmful effects of pesticide use in the target (crop) ecosystem itself or surrounding crops or natural ecosystems.

This section requires site visit work to assess potential hazards to nontarget organisms, water, and other elements in the target crop and associated environment. Nontarget organisms such as natural enemies, honey bees, and other pollinators that inhabit target crops especially may be vulnerable. However, pesticides sometimes drift long distances. Highly volatile pesticides discharged from high pressure sprayers with small nozzles during windy conditions are the most prone to drift long distances.

The potential hazards in the treated area and in other areas where drift may be a problem should be described clearly.

Table 5. Protective Equipment and Clothing Guidelines For Pesticides in EPA Toxicity Categories I-III

Summarized label statement	Mixer-loader		Applicator	
	I-II	III	I-II	III*
Precautions should be taken to prevent exposure	A,B,C,F,G,H,R **	A,B,C,F,G,H	B,C,F,G,H,R **	C,F,H,R, **
Protective clothing or protective equipment is to be worn	A,B,C,F,G,H,R **	B,C,F,G,H,4 **	B,C,F,G,H,R **	C,F,H,R **
Clean clothing is to be worn	C	C	C	C
Contact with clothing should be avoided	A,B,C	B,C	B,C	C
Contact with shoes should be avoided	B	B	B	B
Rubber boots or rubber foot coverings are to be worn	B	B	B	B
Contact with skin should be avoided	A,B,C,F,G,H	B,C,F,G,H	B,C,F,G,H	C,F,G,H **
A cap or hat is to be worn	H	H	H	H
An apron is to be worn	A	A		
Rubber gloves are to be worn	G	G	G	G
Contact with eyes should be avoided	F	F	F	F
Goggles or face shield are to be worn	F	F	F	F
Avoid inhalation	R	R	R **	R **
A respirator is to be worn	R	R	R **	R **

A Waterproof apron made from rubber or synthetic material. Use for mixing liquids.

B Waterproof boots or foot coverings made from rubber or synthetic material.

C A daily change of clean overalls or clean outer clothing. Wear waterproof pants and jacket if there is any chance of becoming wet with spray.

F Face shield, goggles, or full face respirator. Goggles with side shields or a full face respirator are required if handling or applying dusts, wettable powders, or granules or if being exposed to spray mist.

G Waterproof, unlined gloves made from rubber or synthetic material.

H Waterproof, wide-brimmed hat with nonabsorbent headband.

R Cartridge type respirator approved for pesticide vapors when label specifies another type of respirator such as a dust mask, canister type gas mask, or self-contained breathing apparatus.

* If the Category III pesticide application is being made in an enclosed area such as a greenhouse, or if the application consists of a concentrate spray of 100 gallons-per-acre or less in a grove, orchard, or vineyard, then use the guidelines for Category I-II pesticides.

** Use these guidelines when there is likelihood of exposure to spray mist, dust, or vapors.

Source: P. J. Marer (author), M. L. Flint (technical editor), M. W. Stimmann (Statewide Pesticide Coordinator, OPIC). The safe and effective use of pesticides. Pesticide Appl. Compendium 1. U. Calif. Statewide Integrated Pest Management Project, Div. Agr. Nat. Resources. Publ. 3324.

Table 6. Example of a Table for Summarizing Toxicities of the Proposed Pesticides

Pesticide names[1]	Acute oral LD_{50} (mg/kg)[2]	EPA Toxicity Category[3]	EPA Signal Word[3]	Reasons for EPA Special Review, if any
Fungicides				
Copper oxychloride (Cupravit)	ca. 1000	III	Caution	
Herbicides				—
Bentazon (Basagran)[4]	2063	II	Warning	Suspected ground water contamination
2,4-D (Acme), emulsifiable concentrate	1780	III	Caution	
Insecticides				
Bacillus thuringiensis (Dipel)	15000	III	Caution	

[1]Approved common name in the Pesticide Chemical News Guide and (in parentheses) the trade name. A pesticide may have one or more trade names. Only show trade names of products to be used.

[2]Based on toxicity to rats. LD_{50} values vary with formulation.

[3]See Table 7.

[4]Bentazon will be used only in research demonstration plots under careful supervision of the project supervisor.

Table 7. Criteria that EPA Uses to Establish Pesticide Toxicity Categories

Hazard indicators	Category I Danger	Category II Warning	Category III Caution	Category IV Caution
Oral LD_{50} of active ingredient	50 mg/kg or less	50-500 mg/kg	500-5000 mg/kg	>5000 mg/kg
Inhalation LD_{50}	0.2 mg/liter or less	0.2-2 mg/liter	2.0-20 mg/liter	>20 mg/liter
Dermal LD_{50}	200 mg/kg or less	200-2000 mg/kg	2000-20000 mg/kg	>20000 mg/kg
Eye Effects	Corrosive: corneal opacity not reversible within 7 days	Corneal opacity reversible within 7 days: irritation persisting for 7 days	No corneal opacity: irritation reversible within 7 days	No irritation
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours

Special Requirements to Preserve Endangered Species and Biodiversity

The EA must give special attention to A.I.D. policy on endangered species and biodiversity. Section 119 of the Foreign Assistance Act requires that proposed actions by A.I.D. do not endanger wildlife species or habitats critical for them, harm protected areas, or adversely affect biodiversity (species richness). The EA should identify any species that may be endangered or threatened by the proposed pesticide use. It should also point to any potential harm to wildlife habitat, protected areas (wildlife preserves, parks, etc.), or biodiversity. The appropriate host country ministry or government office should be contacted for information and regulations on endangered species, protected areas, and biodiversity. Advice from local environmental organizations should be sought also.

h. The Conditions Under Which the Pesticide Is to Be Used, Including Climate, Flora, Fauna, Geography, Hydrology, and Soils.

This section should describe the environment where proposed pesticides will be used. The description can be rather general except when detailing hazard situations. A.I.D.'s environmental profiles, available for some of the A.I.D. countries, are good sources for preparing this section. Host country universities and ministries and environmental organizations are other sources.

It is important to include a description of any protected areas such as wildlife preserves and parks. Include maps to show the exact locations.

i. The Availability and Effectiveness of Other Pesticides or Nonchemical Control Methods.

This section should discuss the availability and effectiveness of nonchemical alternatives such as shown in Table 2 (page 5). Explain to what degree, how, and where nonchemical alternatives are presently being used and how effective they are. Availability, costs, and feasibility for use in the project should be described.

The section should also discuss the availability and effectiveness of other pesticides. The reason for doing this is to alert A.I.D. and host country officials to potential alternatives that could be considered if use of the proposed pesticides is not approved, if stocks of project pesticides run low, or if a change in regulations renders them unacceptable. Identify the alternatives by both common and brand names. Information on their effectiveness should be included. If effectiveness is suspected but not determined for the target crop or pest, recommend needed trials.

j. The Requesting Country's Ability to Regulate or Control the Distribution, Storage, Use, and Disposal of the Required Pesticide(s).

The purpose of this section is to describe the preparedness of the host country to enforce effective pesticide management. The discussion should address appropriate pesticide laws and regulations and the roles of relevant institutions associated with the project in regulating and controlling pesticide use.

Pesticide regulatory and enforcement procedures vary considerably among developing countries. Many countries have pesticide laws on the books, but few have the means for effective enforcement.

This section should briefly summarize provisions of the pesticide laws and regulations (e.g., authority for pesticide registration, importation, manufacture, storage, transportation, sale, and use of pesticides) and indicate the government offices in charge of enforcement. Also, state whether the country is presently capable of adequately enforcing the laws and regulations and complying with correct pesticide practices. Attach copies of the laws and regulations as an annex to the EA. Use of pesticides should not be proposed unless a country is capable of enforcing the laws and regulations or unless all aspects of their use will be closely supervised by trained project personnel.

If the country is not likely to enforce the pesticide law, indicate what is needed to achieve enforcement at project level. Personnel, other needs, and budgeting requirements should be included in the summary of mitigative measures and requirements.

k. The Provisions Made for Training of Users and Applicators.

This section should include a detailed training plan showing who should be trained (farmers, extension officers, etc.), specific type of training (pesticide safety, IPM, biological control, etc.), how the training is to be done (where, when, and who will do the training), and cost requirements. Such plans can be included in the EA as mitigative action. Personnel and other resources necessary to implement the training should be identified in the summary of mitigative measures and requirements.

How much impact the EA has in promoting safer and improved pest and pesticide practices will depend heavily on the A.I.D. project's training component. Pay particularly close attention to this section.

l. The Provisions Made for Monitoring the Use and Effectiveness of the Pesticide(s).

This section should identify the needs and provisions being made for monitoring of the following:

- Use patterns (frequency of and interval between applications) of the requested pesticide(s).
- Pesticide safety practices during transportation, storage, application, and disposal.
- Pesticide effectiveness.
- Environmental impacts.
- Public health impacts.

The monitoring plan should include a description of the specific kinds of monitoring, who will do it, and who will be responsible for correcting any unsafe pesticide practices or problems found during monitoring.

HOW TO SUMMARIZE THE MITIGATIVE MEASURES AND REQUIREMENTS

This section should briefly summarize all mitigative measures needed to reduce negative environmental impacts. A budget of costs should be included. This is a critical section of the EA and should be written carefully and clearly. The following example shows the form that this section might take:

1. Nonchemical methods of control and IPM systems will be emphasized.

Project training and demonstrations will emphasize nonchemical methods of control and IPM systems. All project personnel and farmers using pesticides in the project will receive training on use of nonchemical methods and IPM. IPM will be demonstrated and evaluated on selected farms.

2. Selection of pesticides.

The pesticides to be used in the A.I.D. project:

- Have no acceptable nonchemical alternatives.
- Are EPA registered for the same or similar use or have the requisite tolerances established.
- Have low human toxicities, present no unacceptable acute or long-term toxicological hazards, and have not been classified by EPA for restricted use.
- Are relatively non-persistent in the environment and present no unacceptable hazards to the environment or nontarget organisms.
- Have not been withdrawn, suspended, or canceled in the U.S. and are not under EPA Special Review.

3. Provide pesticide training and protection to project personnel and participating farmers.

All project personnel and farmers using pesticides in the project will receive training on correct transportation, storage, application, and disposal of pesticides, worker and applicator protection, how to recognize and treat pesticide poisoning, and environmental protection. The training will include instruction on local laws and regulations regarding pesticides, human protection, and environmental protection.

A.I.D. will provide safety equipment and protective clothing to all persons who use pesticides in the project. The equipment and clothing will comply with recommendations on pesticide manufacturers' labels and be feasible for use in the particular climate and social setting.

4. Monitor pesticide use.

Project personnel will regularly monitor project use of pesticides on farmer's fields and demonstration sites and enforce their proper use.

5. Comply with local laws and regulations.

Project supervisors will enforce compliance with all relevant laws and regulations on pesticides, human safety, and environmental protection.

6. Cost requirements.

Include a budget to show the cost for each mitigative measure.

GLOSSARY OF TERMS COMMONLY ENCOUNTERED IN ENVIRONMENTAL ASSESSMENTS[1/]

Acaricide. A pesticide used to control mites.

Acceptable daily intake (ADI). The level of pesticide residue that may be consumed each day over the course of an average human life span without appreciable risk.

Active ingredient (a.i.). The material in the pesticide formulation responsible for the toxic (or other desired) effects on a target pest.

Acute dermal LD_{50}. The dose of a pesticide absorbed through the skin that kills 50% of a population of test animals; usually expressed in milligrams of pesticide per kilogram of body weight of test animal.

Acute effects. The immediate effects (as opposed to delayed effects) of a pesticide.

Acute oral LD_{50}. The dose of a pesticide ingested by mouth that kills 50% of a population of test animals; usually expressed in milligrams of pesticide per kilogram of body weight of test animal.

Acute (short-term) toxicological hazards. The immediate hazards of a pesticide.

Agroecosystem. The ecological community and physical environment in an agricultural land unit.

A.I.D. mission. The A.I.D. representation in a foreign country.

A.I.D. Endangered Species Act. Section 119 of the Foreign Assistance Act.

A.I.D. Environmental Procedures. Procedures of Title 22 of the Code of Federal Regulations, Part 216, to ensure that environmental factors and values are integrated into the A.I.D. decision making process.

A.I.D. Handbook 3. Project Assistance. A.I.D.'s official manual on the requirements for analysis, authorization, development, implementation/monitoring, and evaluation of projects supported by A.I.D.

Application equipment. Equipment for applying pesticides (may range from hand-held sprayers to aircraft sprayers).

Applicator (of pesticides). Any person who applies pesticides.

Aquatic. Pertaining to water.

[1/]The glossary is based, in part, on terms in the publication by Marer, Flint, and Stimmann (1988) cited in Table 5 (page 22).

Attractant. A substance that attracts a specific species of animal to it. When manufactured to attract pests to traps or poisoned bait, attractants are considered to be pesticides.

Avian. Relating to birds.

Avicide. A pesticide used to control pest birds.

Bait. A food or foodlike substance that is used to attract and, often, to poison pest animals.

Beneficial. Helpful in some way to people, such as a beneficial plant or insect.

Bioaccumulation. The gradual buildup of certain pesticides within the tissues of living organisms after they feed on lower organisms containing smaller amounts of these pesticides. Animals higher up on the food chain accumulate greater amounts of these pesticides in their tissues.

Biodiversity. The richness or abundance of species of organisms or biotic life forms.

Biological control. The use of natural enemies (predators, parasites, or disease agents) to control pests.

Brand name. See Trade name.

Broad-spectrum pesticide. A pesticide that is capable of controlling many different species or types of pests.

Calibration. The process for measuring the output of pesticide equipment so that the proper amount of pesticide can be applied to a given area.

Carcinogenicity. The cancer-causing potential of a substance.

Caution. The signal word on labels of pesticides in EPA toxicity Category III or IV; these pesticides have an oral LD_{50} greater than 500 and a dermal LD_{50} greater than 2000.

CD-ROM. Compact disk-read only memory.

CHEM-BANK. A database of SilverPlatter Information Services that provides environmental and toxicological data for some of the EPA-registered pesticides.

Chemical name. Name of the chemical ingredients of a pesticide.

Chronic. Pertaining to long duration or frequent recurrence.

Chronic effects. Long-term or recurring effects.

Climate. The prevailing or average weather conditions of a place as determined by temperature and meteorology over a period of years.

Common name. An approved nontechnical name of a pesticide product. An approved nontechnical name of an organism.

Compatibility. In A.I.D. Environmental Assessments, refers to the degree of known hazards to the target ecosystem (crops to be treated) or nontarget ecosystems (surrounding noncropping environment or crops not to be treated).

Contents. All that is contained in a pesticide container.

Corneal opacity. The eye's imperviousness to rays of light.

Corrosive. Having the power to corrode or wear away by chemical action.

Cultural controls. Crop management and other practices that make the environment less favorable for pests, e.g., field sanitation, crop rotation, diversification, harvesting practices, time of planting, trap crops.

Danger. The signal word used on labels of pesticides in EPA toxicity Category I pesticides with an oral LD_{50} of 50 or less or a dermal LD_{50} less than 200 or having specific, serious health or environmental hazards.

Delayed effects. Effects of pesticides that occur later (sometimes years later) and not immediately.

Dermal. Pertaining to the skin. One of the major ways pesticides can enter the body.

Dermal LD_{50}. See acute dermal LD_{50}.

Disposal (of pesticides). Destruction of left-over pesticides or pesticide containers.

Distribution (of pesticides). The process by which pesticides get from their point of entry (into a country, for example) to their final destination.

Dose. The measured quantity of a pesticide.

Directions for use. Statements on the pesticide labels describing use.

Drift. The movement of pesticide dust, spray, or vapor away from the application site.

Ecological. Consideration of the interrelationship between living organisms and the environment.

Economic damage. Damage caused by pests to plants, animals, or other resources that results in loss of income or a reduction of value.

Economic injury level. The point at which the value of the damage caused by a pest exceeds the cost of controlling the pest.

Ecosystem. An ecological community together with its physical environment.

Effectiveness (of pesticides). See efficacy.

Efficacy. The ability of a pesticide to produce a desired effect on a target organism.

Endangered species. A species in danger of extinction.

Environment. All of the living organisms and nonliving features of a defined area.

Environmental Assessments. In A.I.D. projects a detailed study of the reasonably foreseeable significant effects, both beneficial and adverse, of a proposed action on the environment of a foreign country or countries.

Environmental Impact Statement. A detailed study of the reasonably foreseeable environmental impacts, both positive and negative, of a proposed A.I.D. action and its reasonable alternatives on the United States, the global environment, or areas outside the jurisdiction of any nation.

EPA Signal Word. See Signal Word.

EPA Toxicity Category. Four categories used to indicate the potential hazard of EPA-registered pesticides; Category I uses the signal words "Danger" and "Poison" to signify highly toxic compounds (acute oral LD_{50} mg/kg), Category II uses the word "Warning" to signify moderately toxic compounds (acute oral LD_{50} 50-500 mg/kg), Category III uses the word "Caution" to signify slightly toxic compounds (acute oral LD_{50} 500-5000 mg/kg), and Category IV uses the word "Caution" and must state "Keep Out Of The Reach Of Children" (acute oral LD_{50} >5000 mg/kg).

Exempt from tolerance. Indicates that EPA has determined that minute amounts of pesticide residue on foods will cause no adverse effects to humans.

Fauna. Animal life.

Fetotoxicity. Pesticide toxicity to the unborn fetus.

FIFRA. The Federal Insecticide, Fungicide, and Rodenticide Act of 1947. Governs the licensing, or registration, of pesticide products.

Flora. Plant life.

Formulation. A mixture of active ingredients combined during manufacture with inert materials. Inert materials are added to improve the mixing and handling qualities of a pesticide.

Fumigant. Vapor or gas form of a pesticide used to penetrate porous surfaces for control of soil dwelling pests or pests in enclosed areas or storage.

Fungicide. A pesticide used for control of fungi.

General use (unclassified) pesticide. A pesticides that has been designated by EPA for use by the general public as well as by licensed or certified applicators.

Geography. The physical features (especially the surface features) of a region, area, or place.

Groundwater. Fresh water trapped in aquifers beneath the surface of the soil and used for drinking, irrigation, and manufacturing.

Habitat. The place where an organism lives.

Herbicide. A pesticide used to control weeds.

Host. A plant or animal species that provides sustenance for another organism.

Host country. The country hosting an A.I.D. project.

Host resistance. The ability of a host plant or animal to ward off or resist attack by pests or to be able to tolerate damage caused by pests.

Hydrology. The science dealing with water, its distribution, and the evaporation and precipitation cycle.

Inert ingredient. A substance (such as a solvent) contained in a pesticide formulation, which by itself does not add materially to the pesticide's effect on a pest.

Ingredients. The chemical composition of the pesticide. See Active ingredient and Inert ingredient.

Inhalation. Entering the body through breathing. One of the routes of entry of pesticides into the body.

Initial Environmental Examination. The first review of the reasonably foreseeable effects of a proposed action (in an A.I.D. project) on the environment.

Insecticide. A pesticide used to control insects. Some insecticides are also labeled for control of ticks, mites, spiders, and other arthropods.

Integrated pest management (IPM). Use of a variety of biological, cultural, and chemical control methods in a cohesive management scheme designed to maintain pest populations at levels below those causing economic injury.

Interval. The legal period of time that must elapse between the application of a pesticide and worker reentry into the treated field or the harvesting of produce. See Preharvest interval and Reentry interval.

Invertebrate. An animal that has no backbone (e.g., insect).

IPM. Integrated pest management.

Irreversible. An effect that is not reversible or cannot be repealed or annulled.

Knapsack sprayer. A small portable sprayer carried on the back of the person making a pesticide application. Some knapsack sprayers are hand-operated and others are powered by small gasoline engines.

Label signal words. See signal word.

LC_{50}. The lethal concentration of a pesticide in the air or in a body of water that will kill half of a test population. LC_{50} values are given in micrograms per milliliter of air or water.

LD_{50}. Abbreviation of median lethal dose, MLD. A dose of a pesticide that kills 50% of a population of test animals; usually expressed in milligrams of pesticide per kilograms of test animal body weight.

Lethal. Capable of causing death.

Long-term (delayed) toxicological hazards. Hazards occurring over or involving a relatively long period of time.

Manufacturer. The company manufacturing the pesticide product.

Maximum residue limit (MRL). The maximum residue level likely to arise when a pesticide is used according to recommendations reflecting good agricultural practices.

Misuse statement. Statement on a pesticide label that indicates when the pesticide is used incorrectly and the potential consequences.

Mites. Tiny, sometimes microscopic, relatives of insects that belong to the order Acari of the arthropod phylum.

Mitigative measure. Action taken to avoid, reduce, minimize, repair, or compensate for an adverse environmental impact.

MLD. Median lethal dose. See LD_{50}.

Mode of action. The way a pesticide reacts with a pest organism to destroy it.

Monitoring. Sampling or observations of pesticide use, pesticide residue, natural enemies, etc.

Mutagenic. A chemical that is capable of causing mutations in the cells of living organisms.

Mutagenicity. The degree to which a compound can cause a biological mutation.

Natural enemies. Predators, parasites, and microorganisms that cause the death of pests; biological control agents.

Negative Declaration. A finding that the proposed A.I.D. action will not have a significant effect on the environment.

Nematicide. A pesticide used to control nematodes.

Nematode. Elongated, cylindrical, nonsegmented worms. Nematodes are commonly microscopic; some are parasites of plants or animals.

Nonchemical method. Any method other than a chemical pesticide used to prevent or control a pest. Same as Nonpesticidal method.

Nonpesticidal method. Same as Nonchemical method.

Nontarget ecosystem. An ecosystem not intentionally receiving a pesticide application.

Nontarget organism. Animals or plants within or outside a pesticide treated area that are not intended to be killed or injured by the pesticide application.

Nozzle. A short tube at the end of a sprayer hose that breaks up a pesticide spray into small droplets and directs it toward the target area.

Oncogenicity. A measure of the tendency of a compound to cause tumors.

Oral. Through the mouth. One of the routes of entry of pesticides into the body.

Organism. Any living thing.

Parasite (parasitoid). An organism that grows and feeds in or on a host; often used in biological control programs to suppress pest populations.

Pathogen. A microorganism that causes a disease.

PEST-BANK. A database of SilverPlatter Information Services that allows access to information (registration status, residue tolerances, etc.) on EPA-registered pesticides.

Pest control practice. An action taken (such as plowing, rotating crops, etc.) to reduce a pest problem. Sometimes used interchangeably with Tactic.

Pest control tactic. See Tactic.

Pest management. Any deliberative action to prevent or reduce the density or harmful effects of a pest population.

Pesticide. Any substance or mixture of substances intended for harming, destroying, repelling, or mitigating the effects of pests (insects, rodents, nematodes, fungi, weeds, or any other forms of life declared to be pests); and any other substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

Pesticide formulation. The pesticide as it comes from its original container, consisting of the active ingredient blended with inert materials.

Pesticide label. Information on a pesticide container required by EPA.

Pesticide management. Deliberate actions to reduce the harmful effects of pesticides; includes legislation and regulations as well as safe application, storage, and disposal.

Pesticide resistance. Genetic qualities of a pest population that enable individuals to resist the effects of certain types of pesticides that are toxic to other members of that species.

Pheromone. A chemical substance given off by one individual that causes a specific reaction by other individuals of the same species, such as sex attractants.

Phytotoxic. Injurious to plants.

Positive Threshold Decision. A finding that the proposed A.I.D. action may have a significant effect on the environment.

Practice. See Pest control practice.

Precautionary statements. Statements on a pesticide label that give precautions for using the product.

Predator. An organism that lives by preying on animals (prey); often used in biological control programs to suppress pest populations.

Preharvest interval. A period of time set by law that must elapse between pesticide application to an edible crop and harvesting of the crop. Pesticide labels provide information on preharvest intervals.

Prey. Animals that serve as food for predators.

Product. A commercial formulation of a pesticide.

Project Identification Document. An internal A.I.D. document that initially identifies and describes a proposed project.

Project Paper. An internal A.I.D. document that provides the definitive description and appraisal of a project, particularly the implementation plan.

Rate. The quantity or volume of pesticide that is applied to an area over a specified period of time.

Reentry interval. The period of time specified by law that must elapse after a pesticide is applied before people can resume work in the treated area.

Reentry statement. Statement on the pesticide label concerning the time between application of the material and safe entry into the treated area.

Registration and establishment numbers. The registration number assigned to the product by EPA. For regular registrations, the number preceding the hyphen represents the registering company (establishment).

Reproductive effects. Effects of a pesticide on reproduction in animals.

Residue. Traces of pesticide that remain on treated surfaces after a period of time.

Resistance. See Pesticide resistance and Host resistance.

Respirator. A device worn over the nose and mouth to prevent inhalation of toxic substances.

Restricted-use pesticide. A pesticide, usually in EPA toxicity Category I, that is available for purchase and use only by applicators who have a valid Certified Pesticide Applicator license, or by persons under their direct supervision.

Reversible. Opposite of irreversible.

Rodenticide. A pesticide used to control rats and other rodents.

Rope wick applicator. A device used to apply contact herbicides onto target weed foliage with a saturated rope or cloth pad.

Safety equipment. Face masks, goggles, respirators, etc. to reduce exposure to and risks from pesticides.

Safety apparel. Clothing (coveralls, hat, boots, gloves, etc.) to reduce exposure to and risks from pesticides.

Selective pesticide. A pesticide that has a mode of action against only a single or small number of pest species.

Signal Word. The word "Danger", "Warning", or "Caution" that appears on the label of an EPA-registered pesticide to signify how toxic the pesticide is and what toxicity category it belongs to.

Significant effect. Significant harm to the environment.

Slugs. Any of the gastropod land mollusks with rudimentary internal shells in their mantles.

Snails. Gastroped mollusks living on land or in water and having a spiral protective shell.

Special Review. A process to determine if certain EPA risk criteria are exceeded by a particular registered pesticide. If the Review determines that a pesticide exceeds the risk criteria, the pesticide is presumed unsuitable for registration unless that presumption is rebutted.

Statement of practical treatments. Statement on a pesticide label of acceptable procedures for treating people poisoned by or contaminated with the material.

Statement of use classification. Statement on a pesticide label to make proper use of the material understandable.

Storage (of pesticides). The way pesticides are kept when not being used.

Tactic. Any method (pesticide, biological control agent, etc.) used to reduce a pest problem.

Target. Either the pest that is being controlled or surfaces within an area that the pest will contact.

Target ecosystem. An ecosystem intentionally receiving a pesticide application such as crop ecosystem.

Target pest. A harmful organism at which a pesticide or other pest control tactic or practice is directed.

Teratogenicity. A measure of a compound's tendency to cause physical birth defects in the offspring of exposed parents (male or female).

Testicular effects. Effects of a pesticide on male testes.

Threatened species. Any species of fish, wildlife, or plant listed as having its existance threatened.

Threshold Decision. A decision to determine if a proposed A.I.D. action will or will not have a significant impact on the environment.

Thyroid effects. Effects of a pesticide on the thyroid gland.

Tolerance. The pesticide residue level permitted in or on raw agricultural commodities or processed foods.

Toxicity Category. See EPA Toxicity Category.

Trade name. Trademark (brand) name of a pesticide, formulation, or other product.

Toxicity. A pesticide's potential for causing harm.

U. S. Environmental Protection Agency (EPA). The federal agency responsible for regulating pesticide use in the United States.

Ultra-low-volume (ULV). A pesticide application technique in which very small amounts of liquid spray are applied over a unit of area; usually 2 liters or less of spray per acre in row crops to about 20 liters of spray per acre in orchards and vineyards.

Unclassified (general use) pesticide. See General use pesticide.

User (of pesticides). Any person using (storing, mixing, applying, transporting, or disposing of) a pesticide.

Vertebrates. The group of animals that have an internal skeleton and segmented spine, such as fish, birds, reptiles, and mammals.

Virus. A very small organism that multiplies in living cells and is capable of producing disease symptoms in some plants and animals.

Volatile. Readily vaporizable at a relatively low temperature.

Warranty. The manufacturer's guarantee of the integrity of a pesticide product.

Warning. The signal word used on labels of pesticides in EPA toxicity Category II, having an oral LD_{50} between 50 and 500 and a dermal LD_{50} between 200 to 2000.

Annex G

USAID Pesticide Procedures
and
USEPA Pesticide Registration Status

Excerpted and slightly modified from: Appendix C: "Safe Pesticide Use Guidelines" in *Environmental Guidelines for Small-scale Activities in Africa*

Table G.1 **Classification of Candidate Pesticides for Specific Evaluation**

Table G.2 **Pesticides Canceled, Suspended or Restricted by USEPA**

Table G.3 **Pesticides Classified as Restricted Use by USEPA**

Table G.4 **Botanical Insecticides Registered by EPA**

Annex G. USAID's Pesticide Procedures

USAID's Pesticide Procedures derive from the only Environmental Impact Statement (EIS) thus far conducted on USAID's programs. The EIS was the result of a legal challenge to USAID's policies regarding the provision of pesticides, brought in 1975, by the Environmental Defense Fund and three other environmental NGOs. This EIS also stimulated the Agency to develop comprehensive regulations governing environmental assessment of all its activities, known as the Environmental Procedures (22 CFR 216), or Reg. 216.

If USAID's resources are proposed for any activities that will involve assistance for the procurement or use, or both, of pesticides, planners must take into account these procedures. "Use" is interpreted broadly to include the handling, transport, storage, mixing, loading, application, clean up of spray equipment, and disposal of pesticides. It also encompasses supplying fuel for transport of pesticides, and providing technical assistance in pesticide management. In contrast, support to limited pesticide research and pesticide regulatory activities are not subject to scrutiny under the pesticide procedures.

USAID finances pesticides only on a case-by-case basis (and not on the basis of an approved commodity list) and then only after specific additional evaluation that would consider the potential benefits conferred by the use of the proposed pesticide. The kinds of factors to be considered in such an assessment should include, but not necessarily be limited to, the following (22 CFR 216.3 (b)(1)(i)(a-l):

- USEPA's registration status of the requested pesticide(s);
- basis for selection of the requested pesticide(s);
- extent to which the proposed pesticide use is part of an IPM;
- proposed method or methods of application, including availability of appropriate application and safety equipment;
- any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use and measures available to minimize such hazards;
- effectiveness of the requested pesticide(s) for the proposed use;
- compatibility of the proposed pesticide(s) with target and nontarget ecosystems;
- conditions under which the pesticide(s) are to be used, including climate, flora, fauna, geography, hydrology, and soils;
- availability and effectiveness of other pesticides or nonchemical management methods;
- requesting country's ability to regulate or control the distribution, storage, use, and disposal of the requested pesticide(s);
- provisions made for training of users and applicators; and,
- provisions made for monitoring the use and effectiveness of the pesticide(s).

USAID's pesticide procedures require an IEE as a minimum for any proposed use of pesticides that are registered, without restrictions, for the same or similar uses in the U.S. by USEPA (Table G.1). Any proposed pesticide use that does not conform to such standards will require an Environmental Assessment or Environmental Impact Statement unless the restriction is based on user hazard only and other conditions are met. Table G.1 summarizes the review requirements of the various categories of pesticides. Pesticides **canceled or suspended** by USEPA (Table G.2) are highly unlikely to be approvable for use in a USAID project, even with an EA. On the other hand, products classified as **Restricted Use Pesticides** by USEPA (Table G.3)

conceivably could be approved for use in USAID projects, with full justification through an EA, but this is not advised, and is rather unlikely to happen in practice.

As an example, if a country requested financing for pesticides, it would be encouraged to use products registered for the same or similar uses in the United States. If no such products existed, the environmental review requirements would become progressively more stringent as one moved from previously registered to never registered pesticides (see Table G.1).

It is important to understand that in Table G.2, "canceled" means that a pesticide product's sales, distribution and use have been stopped. "Suspended" products have at least some formulations and registrations which are at least temporarily halted due to perceived hazards. The term "restricted" in Table G.2 refers to changes in product uses required by the USEPA as a condition to renew or reregister a product. In contrast, the **"Restricted Use"** pesticides (RUPs) listed in Table G.3 are those which, *in the United States,* may only be purchased or applied by well-trained and officially *certified* applicators or under their direct supervision on the basis of health and/or environmental risk criteria. This designation is assigned to a pesticide product because of its relatively high level of potential human and/or environmental hazard.

USAID recognizes that pesticides have a potential (though not necessarily primary) role in managing pests in developing countries. This observation has particular relevance to Africa. Many of its farmers use either no pesticides or egregiously "inappropriate" pesticides. Consequently, the availability of even small amounts of environmentally appropriate pesticides, used properly, might contribute to meaningful increases in production in a region that is especially prone to pest-related crop losses. Moreover, USAID's financing of selected pesticides in the context of an IPM system would help assure that USAID would have the opportunity to influence pest management strategies by remaining an actor in the process.

USAID also recognizes that pest problems in developing countries do not mirror exactly those found in the United States. Whereas some pesticides might be entirely inappropriate for use in the United States and thus not registered with the USEPA, these pesticides might be ideal for tsetse flies or desert locusts in Africa. Similarly, developing countries have crops, diseases, habitats, and other pests that are not found in the United States. The implication, of course, is that the registration status of pesticides in the United States should not routinely or automatically apply to developing countries because conditions are often considerably different from conditions in the United States.

IPM is placed at the heart of USAID's intended pest management strategies. Other elements of USAID's strategy include: the strengthening of pest-management infrastructures in developing countries, improvements in schemes for regulation of pesticide usage, the monitoring of the human and environmental effects of pesticides, and efforts to exert a greater degree of U.S. leadership among the international community. Finally, USAID does not finance the procurement of pesticides through nonproject assistance (i.e., through its Commodity Import Program).

The use of *plant-derived pesticides* not registered with USEPA, such as nicotine-based commercial products, may not be promoted under a USAID project. Some botanical insecticides, such as infusions of ground rope tobacco and soap can result in a highly toxic product and should not be extended to smallholder farmers (Fisher et al. 1994). A list of botanical insecticides currently registered by USEPAas of 1994 is shown in Table G.4.

Table G.1. Classification of Candidate Pesticides for Specific Evaluation

Categorization in terms of Proposed Use and USEPA Regulatory Status	Review Requirements in accordance with USAID Regulation 216
1. Pesticide to be used for research or limited field evaluation purposes only, irrespective of its current regulatory status in United States.	IEE[b]
2. Projects involving demonstration or use of pesticides for specified use:	IEE[b]
(a) Pesticide registered for same or similar uses[a] in the United States without restrictions.	IEE[b]
(b) Pesticide registered for same or similar uses [a] in United States, restricted on basis of user hazard.	IEE and, if approved, user hazard warning to and certification of awareness from recipient[b]
(c) Pesticide registered for same or similar uses[a] in the United States, restricted on basis of environmental hazard.	IEE plus EA or EIS[c]
(d) Pesticide registered for same or similar uses[a] but currently under presumption against reregistration, notice of intent to cancel, or subsequent notice of intent to suspend issued by USEPA.	IEE plus EA or EIS,[c] and, if approved, notice of impending action to recipient.
(e) Pesticide previously registered for same or similar uses[a] but canceled for environmental hazard.	IEE plus EA or EIS[c]
(f) Pesticide previously registered for same or similar uses[a] but canceled for health reasons.	IEE plus EA or EIS[c]
(g) Pesticide registered for a different use in United States.	IEE plus EA or EIS[c]
(h) Pesticide not registered for any use in United States, but tolerances established.	IEE plus EA or EIS[c]
(i) Pesticide not registered for any use in United States, no tolerances established.	IEE plus EA or EIS[c]

[a] Similar use is defined to include the use of a substantially similar formulation in a comparable use pattern. The term use pattern includes target pest, crop or animals treated, application site, and application technique, rate, and frequency.
[b] Pesticides in this category will not ordinarily be subject to further analysis; however, the decision to undertake such analysis will be made on a case-by-case basis.
[c] Pesticides in this category will, following the IEE, automatically trigger an EA as a minimum or an EIS, the choice of which will continue to be governed by USAID Regulation 216.
Abbreviations: IEE: Initial environmental examination; EA: Environmental assessment; EIS: Environmental impact statement; USEPA: U.S. Environmental Protection Agency
Source: USAID 1976a in Tobin 1994

Table G.2. Pesticides Canceled, Suspended or Restricted by USEPA

The following is a list of generic or accepted common names for pesticides—at least some of whose uses are suspended, canceled, or restricted[1] in the United States by the U.S. Environmental Protection Agency (USEPA). Note that thousands of trade names exist, few of which appear on this list. Carefully examine the label of any pesticide to ascertain whether the accepted common (or generic) name appears on this list. Note: **A generic products name's presence on this list does not necessarily mean that all registered uses are limited.**

Alar
Aldrin
Amitraz
Arsenic Trioxide
Benomyl
BHC
Bromoxynil
Bromoxynil Butyrate
Cadmium
Calcium Arsenate
Captafol
Captan
Carbon Tetrachloride
Chloranil
Chlordane
Chlordimeform
Chlorbenzilate
Copper Arsenate
Creosote [some registered uses]
Cyanazine
Cyhexatin
Daminozide
DBCP
DDD (TDE)
DDT
2,4-D [some registrated uses]
Diallate
Dicofol
Dieldrin
Dimethoate
Dinocap
Dinoseb
EBDCs
EDB
Endrin
EPN
Fluoroacetamide
Heptachlor
Kepone
Lead Arsenate
Lindane
Mercury
Metaldehyde
Mirex
Monocrotophos
OMPA
10,10' Oxybisphenoxarsine
Oxyfluorfen
Parathion
PCNB
Pentachlorophenol
Phenarsazine Chloride
PCBs
Polychlorinated Terphenyls
Pronamide
Safrole
Silvex
Sodium Arsenate
Sodium Arsenite
Sodium Cyanide
Sodium Fluoride
Sodium Monofluoroacetate
Strobane
Strychnine
2,4,5-T
2,4,5-TCP
Thallium Sulfate
TOK
Toxaphene
Tributyltin
Trifluralin
Vinyl Chloride
Wood Preservatives: Calcium Arsenate, Creosote, Pentachlorophenol, Sodium Arsenate, and Sodium Arsenite

Source: USEPA, 1990.

[1] "Restricted" refers to limitations on product uses as a condition to register or re-register.

Table G.3. Pesticides Classified as Restricted Use by USEPA*

Acetamide
Acetic acid
Acetochlor
Acrolein
Arylonitrile
Alachlor
Adicarb
Allyl alcohol
Alpha-clorohydrin
Aluminum phosphide
Amitraz
Amitrole
Arsenic acid
Arsenic pentoxide
Atrazine
Avermectin
Avitrol
Azinphos methyl
Bendiocarb
Benzoic acid
Biphentrhin
Bis (Tributyltin) oxide
Brodifacoum
Butylate
Cadmium chloride
Calcium cyanide
Carbofuran
Carbon dioxide
Carbon tetrachloride
Chlordane
Chlordimeform
Chlorfenvinphos
Chlorobenzilate
Chlorophacinone
Chloropicrin
Chlorothalonil
Chlorothoxyfos
Chlorpyrifos (EC on wheat)
Chromic acid
Clofentezine
Coal tar
Coal tar creosote
Copper oxychloride
Coumaphos
Creosote
Creosote oil
Cubé resins other than rote
Cupric oxide
Cuprous oxide
Cyanazine
Cycloheximide
Cyfluthrin
Cyhalothrin
Cypermethrin
DBCP
Deltamethrin
Demeton
Diallate
Diazinon
Dichloropropene
Diclofop methyl
Dicrotophos
Diflubenzuron
Dioxathion
Diphacinone
Disulfoton
Dodemorph
Endrin
EPN
EPTC
Ethion
Ethoprop
Ethyl parathion
Ethylene dibromide
Ethylene dichloride
Fenamiphos
Fenbutatin-oxide
Fenitrothion
Fenpropathrin
Fensulfothion
Fenthion
Fenvalerate
Flucythrinate
Fluoroacetamide
Fluvalinate
Fonofos
Hydrocyanic acid
Hydrogen cyanamide
Imazaquin
Isazofos
Isofenphos
Lambda-cyhalothrin
Lindane
Magnesium phosphide
Methamidophos
Methidathion
Methiocarb
Methomyl
Methyl bromide
Methyl isothiocyanate
Methyl parathion
Metolachlor
Mevinphos
Monocrotophos
Niclosamide
Nicotine
Nitrogen, liquid
Oxamyl
Oxidemeton methyl
Paraquat
Pentachlorophenol
Permethrin
Phorate
Phosacetim
Phosalone
Phosphamidon
Phostebupirin
Picloram
Picloram, isooctyl ester
Picloram, potassium salt
Picloram, triiosopropanolam
Piperonyl butoxide
Potassium pentachlorophenate
Profenophos
Pronamide
Propanoic acid
Propetamphos
Resmethrin
Rotanone
S-Fenvalerate
Simazine
Sodium arsenate
Sodium cyanide
Sodium dichromate
Sodium fluoroacetate
Sodium hydroxide
Sodium methyldithiocarbamate
Sodium pyroarsenate
Starlicide
Strychnine
Sulfotepp
Sulfuric acid
Sulfuryl fluoride
Sulprofos
Tefluthrin
TEPP
Terbufos
Tergitol
TFM
Toxaphene
Tralomethrin
Tributyltin fluoride
Tributyltin methacrylate
Trifluralin
Triphenyltin hydroxide
Zinc phosphide

* From USEPA's Restricted Use Pesticide (RUP) List 12/06/95. This list contains only accepted common generic names. Trade names are far more numerous.

Table G.4. Botanical Insecticides Registered by EPA*

Insecticide name	Derivation	Registration	Toxicity Category	LD50 Oral/Dermal (mg/kg)
Azadirachtin	*Azadirachta indica*	'Align' on fruits/vegs roots, tubers; "Margosan" & others on ornamentals	IV	>5000/>2000
Capsaicin	*Capsicum frutescens*	'Hot Sauce' animal repellant	III	-/-
Garlic	*Allium sativum*	'Garlic Barrier' on vegs, citrus	-	-/-
Sesame oil	*Sesamum indicum*	'Sesamex': a pyrethrum synergist	III	2000 to 2270/-
Pyrethrum	*Chrysanthemum cinerariaefolium*	many products: stored food grains, pets	III	1500/.>1800
Ryania	*Ryania speciosa*	many products: citrus thrips, Eur. corn borer, codling moth	III	1200/-
Sabadilla	*Schoenocaulon* sp.		III	-/-
Rotenone	*Derris, Tephrosia, Lonchocarpus*	many products, garden dusts, animal ticks	III I	132 to 1500/- EC formulation

*From Fisher et al. 1994: Supplemental Environmental Assessment of Pesticide Use by PVOs in Mozambique. USAID/Mozambique and USAID/AFR/SD.

Note: Hyphens indicate data are not available. See Table C.10 in Knausenberger et al. 1996 (p. 160) for the definitions of each toxicity category.

Module 17

17. Plenary - Capacity Building for Environmental Impact Assessment

Description/Objectives

On the basis of what has been learned from the course, participants are asked to consider how efforts to develop environmental capacity might be further strengthened at the local, national and regional level.

1. What are the needs?
   Different audiences with different needs

2. What are the different ways and tools to strengthen capacity building?

3. What are the resources?

Module 18

18. Course Evaluation, Synthesis, and Recommendations for Follow-up Activities

Description/Objectives

This module is designed to solicit your comments and opinions on the course, which are essential for further development and improvement of the course design and materials. The course contains up to three components: 1) the completion and collection of evaluation forms; 2) the delivery of a synthesis presentation by course participants; and 3) a discussion of recommended follow-up activities. You are requested to fill out the attached course evaluation form on a daily basis (if possible). If sufficient time is available, approximately 20 minutes should be set aside during this session to complete the forms.

Course Evaluation Form

Participant Evaluation of EA Training Course

Course Venue: Tarangire National Park, Tanzania

Course Dates: October 4-8, 1999

FEEL FREE TO USE THE LAST PAGE OR EXTRA SHEETS TO ELABORATE ON YOUR RESPONSES

OVERALL COURSE ASSESSMENT	***Rated Value*** ***5 = highest*** ***1= lowest***	***Comments and Suggestions***
How would you assess the overall quality of the course content?		
Please rate and comment on the extent to which this course improved your understanding of environmental assessment.		
Please comment on the extent to which you now feel prepared to undertake or assist in the preparation of an ~~IEE~~. Env. Review	N/A	

DETAILED COURSE ASSESSMENT (5 = highest, 1 = lowest)	***Rated Value of Session/ Material***	***Rated Quality of Presentation or Discussion***	***Should this item get more/less emphasis in the future? Why?***	***Other Comments and Suggestions***
MATERIALS/ ARRANGEMENTS				
Course Scheduling and Organization		N/A		
Course Logistics and Venue		N/A		
Content of Participants' Sourcebook		N/A		
Value of Suggested Readings		N/A		
MODULES				
1. Introductory Session				
2. Why Assess Environmental Impacts? The Big Picture				
3. Environmentally Sound Design and Implementation				
4. Assessing Environmental Impacts: Basic Concepts				
5. Awareness of Host Country Environmental Issues				

DETAILED COURSE ASSESSMENT (5 = highest, 1 = lowest)	***Rated Value of Session/ Material***	***Rated Quality of Presentation or Discussion***	***Should this item get more/less emphasis in the future? Why?***	***Other Comments and Suggestions***
8. Overview of Tiered Environmental Procedures: The USAID Example				
9. Environmental Screening and Review for Small-Scale Activities				
10. Work Group Exercise: Using the Environmental Screening Process				
11. Simple Tools and Methods for Environmental Assessment				
12. Role Playing Exercise: The Great Debate				
13. Basic Tools and Methods for Environmental Assessment				
14. The Agro-ecological Setting in the Tarangire Area				
15. The Socio-Cultural Setting in the Tarangire area				
16. Case Site Field Visit				
17. Introduction to Writing the Environmental Review				
18. Workgroup: Drafting Environmental Reviews				
19. Plenary: Presenting and Discussing Environmental Reviews				

DETAILED COURSE ASSESSMENT (5 = highest, 1 = lowest)	***Rated Value of Session/ Material***	***Rated Quality of Presentation or Discussion***	***Should this item get more/less emphasis in the future? Why?***	***Other Comments and Suggestions***
20. Mitigation and Monitoring: (More on Issues and Methods)				
21. Workgroup: Drafting Mitigation and Monitoring Plans				
22. Plenary: Presentation of Mitigation and Monitoring Plans				
23. Special Issue - Pesticides				
24. Going Beyond and Environmental Review: What If I Have To Do a Full EA?				

Please add additional general comments and suggestions about the course below:

APPENDICES

Appendix A

Appendix A: Text of Regulation 22 CFR Part 216 ("Reg 16")

22 CFR Part 216
Effective Date: October 9, 1980
ENVIRONMENTAL PROCEDURES

INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
Agency for International Development

22 CFR Part 216
Environmental Procedures

§ 216.1 Introduction
(a) Purpose. In accordance with sections 118(b) and 621 of the Foreign Assistance Act of 1961, amended, (the FAA) the following general procedures shall be used by A.I.D. to ensure that environmental factors and values are integrated into the A.I.D. decision making process. These procedures also assign responsibility within the Agency for assessing the environmental effects of A.I.D.'s actions. These procedures are consistent with Executive Order 12114, issued January 4, 1979, entitled Environmental Effects Abroad of Major Federal Actions, and the purposes of the National Environmental Policy Act of 1970, as amended (42 U.S.C. 4371 et seq.) (NEPA). They are intended to implement the requirements of NEPA as they effect the A.I.D. program.
(b) Environmental Policy. In the conduct of its mandate to help upgrade the quality of life of the poor in developing countries, A.I.D. conducts a broad range of activities. These activities address such basis problems as hunger, malnutrition, overpopulation, disease, disaster, deterioration of the environment and the natural resources base, illiteracy as well as the lack of adequate housing and transportation. Pursuant to the F.A.A., A.I.D. provides development assistance in the form of technical advisory services, research, training, construction and commodity support. In addition, A.I.D. conducts programs under the Agricultural Trade Development and Assistance Act of 1954 (Pub. L.480) that are designed to combat hunger, malnutrition and to facilitate economic development assistance programs are carried out under the foreign policy guidance of the Secretary of State and in cooperation with the governments of sovereign states. Within this framework, it is A.I.D. policy to:
(1) Ensure that the environmental consequences of A.I.D.-financed activities are identified and considered by A.I.D. and the host country prior to a final decision to proceed and that appropriate environmental safeguards are adopted;
(2) Assist developing countries to strengthen their capabilities to appreciate and effectively evaluate the potential environmental effects of proposed development strategies and projects, and to select, implement and manage effective environmental programs:
(3) Identify impacts resulting from A.I.D.'s actions upon the environment, including those aspects of the biosphere which are the common and cultural heritage of all mankind; and
(4) Define environmental limiting factors that constrain development and identify and carry out activities that assist in restoring the renewable resource base on which sustained development depends.
(c) Definitions.-- (1) CEQ Regulations.
Regulations promulgated by the President's Council on Environmental Quality (CEQ) (Federal Register, Volume 43, Number 230, November 29, 1978) under the authority of NEPA and Executive Order 11514, entitled Protection and Enhancement of Environmental Quality (March 5, 1970) as amended by Executive Order 11991 (May 24, 1977).
(2) Initial Environmental Examination. An Initial Environmental Examination is the first review of the reasonably foreseeable effects of a proposed action on the environment. Its function is to provide a brief statement of the factual basis for a Threshold Decision as to whether an Environmental Assessment or an Environmental Impact Statement will be required.
(3) Threshold Decision. A formal Agency decision which determines, based on an Initial Environmental Examination, whether a proposed Agency action is a major action significantly affecting the environment.
(4) Environmental Assessment.
A detailed study of the reasonably foreseeable significant effects, both beneficial and adverse, of a proposed action on the environment of a foreign country or countries.
(5) Environmental Impact Statement.

A detailed study of the reasonably foreseeable environmental impacts, both positive and negative, of a proposed A.I.D. action and its reasonable alternatives on the United States, the global environment or areas outside the jurisdiction of any nation as described in § 216.7 of these procedures. It is a specific document having a definite format and content as provided in NEPA and the CEQ Regulations. The required form and content of an Environmental Impact Statement is further described in § 216.7 infra.

(6) Project Identification Document (PID). An internal A.I.D. document which initially identifies and describes a proposed project.

(7) Program Assistance Initial Proposal (PAIP). An internal A.I.D. document used to initiate and identify proposed non-project assistance, including commodity import programs. It is analogous to the PID.

(8) Project Paper (PP). An internal A.I.D. document which provides a definitive description and appraisal of the project and particularly the plan or implementation.

(9) Program Assistance Approval Document (PAAD). An internal A.I.D. document approving non-project assistance. It is analogous to the PP.

(10) Environment. The term environment, as used in these procedures with respect to effects occurring outside the United States, means the natural and physical environment. With respect to effects occurring within the United States see § 216.7(b).

(11) Significant Effect. With respect to effects on the environment outside the United States, a proposed action has a significant effect on the environment if it does significant harm to the environment.

(12) Minor Donor. For purposes of these procedures, A.I.D. is a minor donor to a multi-donor project when A.I.D. does not control the planning or design of the multi-donor project and either (i) A.I.D.'s total contribution to the project is both less than $1,000,000 and less than 25 percent of the estimated project cost, or (ii) A.I.D.'s total contribution is more than $1,000,000 but less than 25 percent of the estimated project cost and the environmental procedures of the donor in control of the planning of design of the project are followed, but only if the A.I.D. Environmental Coordinator determines that such procedures are adequate.

§ 216.2 Applicability of procedures.

(a) Scope. Except as provided in §216.2(b), these procedures apply to all new projects, programs or activities authorized or approved by A.I.D. and to substantive amendments or extensions of ongoing projects, programs, or activities.

(b) Exemptions. (1) Projects, programs or activities involving the following are exempt from these procedures:

(i) International disaster assistance;

(ii) Other emergency circumstances; and

(iii) Circumstances involving exceptional foreign policy sensitivities.

(2) A formal written determination, including a statement of the justification therefore, is required for each project, program or activity for which an exception is made under paragraphs (b) (1) (ii) and (iii) of this section, but is not required for projects, programs or activities under paragraph (b) (1) (i) of this section. The determination shall be made either by the Assistant Administrator having responsibility for the program, project or activity, or by the Administrator, where authority to approve financing has been reserved by the Administrator. The determination shall be made after consultation with CEQ regarding the environmental consequences of the proposed program, project or activity.

(c) Categorical Exclusions.

(1) The following criteria have been applied in determining the classes of actions included in § 216.2(c)(2) for which an Initial Environmental Examination, Environmental Assessment and Environmental Impact Statement generally are not required;

(i) The action does not have an effect on the natural or physical environment;

(ii) A.I.D. does not have knowledge of or control over, and the objective of A.I.D. in furnishing assistance does not require, either prior to approval of financing or prior to implementation of specific activities, knowledge of or the specific activities that have an effect on the physical and natural environment for which financing is provided by A.I.D.;

(iii) Research activities which may have an affect on the physical and natural environment but will not have a significant effect as a result of limited scope, carefully controlled nature and effective monitoring.

(2) The following classes of actions are not subject to the procedures set forth in § 216.3, except to the extent provided herein;

(i) Education, technical assistance, or training programs except to the extent such programs include activities directly affecting the environment (such as construction of facilities, etc.);
(ii) Controlled experimentation exclusively for the purpose of research and field evaluation which are confined to small areas and carefully monitored;
(iii) Analyses, studies, academic or research workshops and meetings;
(iv) Projects in which A.I.D. is a minor donor to a multidonor project and there is no potential significant effects upon the environment of the United States, areas outside any nation's jurisdiction or endangered or threatened species or their critical habitat.
(v) Document and information transfers;
(vi) Contributions to international, regional or national organizations by the United States which are not for the purpose of carrying out a specifically identifiable project or projects;
(vii) Institution building grants to research and educational institutions in the United States such as those provided for under Section 122(d) and Title XII of Chapter 2 or Part I of the FAA (22 USCA § § 2151 p.(b) 2220s. (1979));
(viii) Programs involving nutrition, health care or population and family planning services except to the extent designed to include activities directly affecting the environment (such as construction of facilities, water supply systems waster water treatment, etc.)
(ix) Assistance provided under a Commodity Import Program when, prior to approval A.I.D. does not have knowledge of the specific commodities to be financed and when the objective in furnishing such assistance requires neither knowledge, at the time the assistance is authorized, nor control, during implementation, of the commodities or their use in the host country.
(x) Support for intermediate credit institutions when the objective is to assisting the capitalization of the institution or part thereof and when such support does not involve reservation of the right to review and approve individual loans made by the institution;
(xi) Programs of maternal or child feeding conducted under Title II of Pub. I.480;
(xii) Food for development programs conducted by food recipient countries under Title III of Pub. L. 480. when achieving A.I.D.'s objectives in such programs does not require knowledge of or control over the details of the specific activities conducted by the foreign country under such program:
(xiii) Matching, general support and institutional support grants provided to private voluntary organizations (PVOs) to assist in financing programs where A.I.D.'s objective in providing such financing does not require knowledge of or control over the details of the specific activities conducted by the PVO;
(xiv) Studies, projects or programs intended to develop the capability of recipient countries to engage in development planning, except to the extent designed to result in activities directly affecting the environment (such as construction of facilities, etc.); and
(xv) Activities which involve the application of design criteria or standards developed and approved by A.I.D.
(3) The originator of a project, program or activity shall determine the extent to which it is within the classes of actions described in paragraph (c) (2) of this section. This determination shall be made in writing and be submitted with the PID, PAIP or comparable document. This determination, which must include a brief statement supporting application of the exclusion shall be reviewed by the bureau Environmental Officer in the same manner as a Threshold Decision under § 216.3(a)(2) of these procedures. Notwithstanding paragraph (c)(2) of this section, the procedures set forth in § 216.3 shall apply to any project, program or activity included in the classes of actions listed in paragraph (c)(2) of this section, or any aspect or component thereof, if at any time in the design, review or approval of the activity it is determined that the project, program or activity, or aspect or component thereof, if subject to the control of A.I.D. and may have a significant effect on the environment.
(d) Classes of Actions Normally Having a Significant Effect on the Environment. (1) The following classes of actions have been determined generally to have a significant effect on the environment and an Environmental Assessment or Environmental Impact Statement, as appropriate, will be required:
(i) Programs of river basin development
(ii) Irrigation or water management projects, including dams and impoundments;
(iii) Agricultural land leveling;
(iv) Drainage projects;
(v) Large scale agricultural mechanization;
(vi) New lands development;

(vii) Resettlement projects;
(viii) Penetration road building or road improvement projects;
(ix) Powerplants;
(x) Industrial plants;
(xi) Portable water and sewerage projects other than those that are small-scale.
(2) An Initial Environmental Examination normally will not be necessary for activities with the classes described in § 216.2(d), except when the originator of the project believes that the project will not have a significant effect on the environment. In such cases, the activity may be subjected to the procedures set forth in § 216.3.
(e) Pesticides. The exemptions of § 216.2(b)(1) and the categorical exclusions of § 216.2(c)(2) are not applicable to assistance for the procurement or use of pesticides.

§ 216.3 Procedures.
(a) General Procedures -

(1) Preparation of the Initial Environmental Examination. Except as otherwise provided, an Initial Environmental Examination is not required for activities identified in § 216.2(b)(1), (c) (2), and (d). For all other A.I.D. activities described in § 216.2(a) an Initial Environmental Examination will be prepared by the originator of an action. Except as indicated in this section, it should be prepared with the PID or PAIP. For projects including the procurement or use of pesticides, the procedures set forth in § 216.3(b) will be followed, in addition to the procedures in this paragraph. Activities which cannot be identified in sufficient detail to permit the completion of an Initial Environmental Examination PID or PAIP, shall be described by including with the PID or PAIP: (i) an explanation indicating why the Initial Environmental Examination cannot be completed; (ii) an estimate of the amount of time required to complete the Initial Environmental Examination; and
(iii) a recommendation that a Threshold Decision be deferred until the Initial Environmental Examination is completed. The responsible Assistant Administrator will act on the request for deferral concurrently with action on the PID or PAIP and will designate a time for completion of the Initial Environmental Examination. In all instances, except as provided in §216.3(a)(7), this completion date will be in sufficient time to allow for the completion of an Environmental Assessment or Environmental Impact Statement, if required, before a final decision is made to provide A.I.D. funding for the action.
(2) Threshold decision. (i) The Initial Environmental Examination will include a Threshold Decision made by the officer in the originating office who signs the PID or PAIP. If the Initial Environmental Examination is completed prior to or at the same time as the PID or PAIP, the Threshold Decision will be reviewed by the Bureau Environmental Officer concurrently with approval of the PID or PAIP. The Bureau Environmental Officer will either concur in the Threshold Decision or request reconsideration by the officer who made the Threshold Decision, stating the reasons for the request. Differences of opinion between these officers shall be submitted for resolution to the Assistant Administrator at the same time that the PID is submitted for approval.
(ii) An Initial Environmental Examination, completed subsequent to approval of the PID or PAIP, will be forwarded immediately together with the Threshold Determination to the Bureau Environmental Officer for action as described above.
(iii) A Positive Threshold Decision shall result from a finding that the proposed action will have a significant effect on the environment. An Environmental Impact Statement shall be prepared if required pursuant to § 216.7. If an impact statement is not required, an Environmental Assessment will be prepared in accordance with § 216.6. The cognizant Bureau or Office will record a Negative Determination if the proposed action will not have a significant effect on the environment.
(3) Negative Declaration. The Assistant Administrator, or the Administrator in actions for which the approval of the Administrator, or the Administrator in actions for which the approval of the Administrator is required for the authorization of financing, may make a Negative Declaration in writing, that the Agency will not develop an Environmental Assessment or an Environmental Impact Statement regarding an action found to have a significant effect on the environment when (i) a substantial number of Environmental Assessments or Environmental Impact Statements relating to similar activities have been prepared in the past, if relevant to the proposed action, (ii) the Agency has previously prepared a programmatic Statement or Assessment covering the activity in question which has been considered in the development of such activity, or (iii) the Agency has developed design criteria for such an action

which, if applied in the design of the action, will avoid a significant effect on the environment.

(4) Scope of Environmental Assessment or Impact Statement--(i) Procedure and Content. After a Positive Threshold Decision has been made, or a determination is made under the pesticide procedures set forth in § 216.3(b) that an Environmental Assessment or Environmental Impact Statement is required, the originator of the action shall commence the process of identifying the significant issues relating to the proposed action and of the issues to be addressed in the Environmental Assessment or Environmental Impact Statement. The originator of an action within the classes of actions described in §216.2(d) shall commence this scoping process as soon as practicable. Persons having expertise relevant to the environmental aspects of the proposed action shall also participate in this scoping process. (Participants may include but are not limited to representatives of host governments, public and private institutions, the A.I.D. Mission staff and contractors.) This process shall result in a written statement which shall include the following matters:

(a) A determination of the scope and significance of issues to be analyzed in the Environmental Assessment or Impact Statement, including direct and indirect effects of the project on the environment.

(b) Identification and elimination from detailed study of the issues that are not significant or have been covered by earlier environmental review, or approved design considerations, narrowing the discussion of these issues to a brief presentation of why they will not have significant effect on the environment.

(c) A description of (1) the timing of the preparation of environmental analyses, including phasing if appropriate, (2) variations required in the format of the Environmental Assessment, and (3) the tentative planning and decision making schedule; and,

(d) A description of how the analysis will be conducted and the disciplines that will participate in the analysis.

(ii) These written statements shall be reviewed and approved by the Bureau Environmental Officer.

(iii) Circulation of Scoping Statement.

To assist in the preparation of an Environmental Assessment, the Bureau Environmental Office may circulate copies of the written statement, together with a request for written comments, within thirty days, to selected federal agencies if that Officer believes comments by such federal agencies will be useful in the preparation of an Environmental Assessment. Comments received from reviewing federal agencies will be considered in the preparation of the Environmental Assessment and in the formulation of the design and implementation of the project, and will, together with the scoping statement, will be included in the project file.

(iv) Change in Threshold Decision. If it becomes evident that the action will not have a significant effect on the environment (i.e., will not cause significant harm to the environment), the Positive Threshold Decision may be withdrawn with the concurrence of the Bureau Environmental Officer. In the case of an action included in §216.2(d)(2), the request for withdrawal shall be made to the Bureau Environmental Officer.

(5) Preparation of Environmental Assessments and Environmental Impact Statement. If the PID or PAIP is approved, and the Threshold Decision is positive, or the action is included in § 216.2(d), the originator of the action will be responsible for the preparation of an Environmental Assessment or Environmental Impact Statement as required. Draft Environmental Impact Statements will be circulated for review and comment as part of the review of Project Papers and as outlined further in § 216.7 of those procedures. Except as provided in §216.3(a)(7), final approval of the PP or PAAD and the method of implementation will include consideration of the Environmental Assessment of final Environmental Impact Statement.

(6) Processing and Review Within A.I.D. (i) Initial Environmental Examinations, Environmental Assessments and final Environmental Impact Statements will be processed pursuant to standard A.I.D. procedures for project approval documents. Except as provided in §216.3(a)(7), Environmental Assessments and final Environmental Impact Statements will be reviewed as an integral part of the Project Paper or equivalent document. In addition to these procedures. Environmental Assessments will be reviewed and cleared by the Bureau Environmental Officer. They may also be reviewed by the Agency's Environmental Coordinator who will monitor the Environmental Assessment process.

(ii) When project approval authority is delegated to field posts, Environmental Assessments shall be reviewed and cleared by the Bureau Environmental Officer prior to the approval of such actions.

(iii) Draft and final Environmental Impact Statements will be reviewed and cleared by the Environmental Coordinator and the Office of the General Counsel.

(7) Environmental Review After Authorization of Financing. (i) Environmental review may be performed after authorization of a project program or activity only with respect to subprojects or significant aspects of the project, program or activity that are unidentified at the time of authorization. Environmental review shall be completed prior to

authorization for all subprojects and aspects of a project, program or activity that are identified.
(ii) Environmental review should occur at the earliest time in design or implementation at which a meaningful review can be undertaken, but in no event later than when previously unidentified subprojects or aspects of projects, programs or activities are identified and planned. To the extent possible, adequate information to undertake deferred environmental review should be obtained before funds are obligated for unidentified subprojects or aspects of projects, programs or activities (Funds may be obligated for the other aspects for which environmental review has been completed). To avoid irreversible commitment of resources prior to the conclusion of environmental review, the obligation of funds can be made incrementally as subprojects or aspects of projects, programs or activities are identified: or if necessary while planning continues, including environmental review, the agreement or other document obligating funds may contain appropriate covenants or conditions precedent to disbursement for unidentified subprojects or aspects of projects, programs or activities.
(iii) When environmental review must be deferred beyond the time some of the funds are to be disbursed (e.g. long lead times for the delivery of good or services), the project agreement or other document obligating funds shall contain a covenant or covenants requiring environmental review, including an Environmental Assessment or Environmental Impact Statement, when appropriate, to be completed and taken into account prior to implementation of those subprojects or aspects of the project, program or activity for which environmental review is deferred. Such covenants shall ensure that implementation plans will be modified in accordance with environmental review if the parties decide that modifications are necessary.
(iv) When environmental review will not be completed for an entire project, program or activity prior to authorization, the Initial Environmental Examination and Threshold Decision required under §216.3(a)(1) and (2) shall identify those aspects of the project, program or activity for which environmental review will be completed prior to the time financing is authorized. It shall also include those subprojects or aspects for which environmental review will be deferred, stating the reasons for deferral and the time when environmental review will be completed. Further, it shall state how an irreversible commitment of funds will be avoided until environmental review is completed. The A.I.D. officer responsible for making environmental decisions for such projects, programs or activities shall also be identified (the same officer who has decision making authority for the other aspects of implementation). This deferral shall be reviewed and approved by the officer making the Threshold Decision and the officer who authorizes the project, program or activity. Such approval may be made only after consultation with the Office of General Counsel for the purpose of establishing the manner in which conditions precedent to disbursement or covenants in project and other agreements will avoid an irreversible commitment of resources before environmental review is completed.
(8) Monitoring. To the extent feasible and relevant, projects and programs for which Environmental Impact Statements or Environmental Assessments have been prepared should be designed to include measurement of any changes in environmental quality, positive or negative, during their implementation. This will require recording of baseline data at the start. To the extent that available data permit, originating offices of A.I.D. will formulate systems in collaboration with recipient nations, to monitor such impacts during the life of A.I.D's involvement. Monitoring implementation of projects, programs and activities shall take into account environmental impacts to the same extent as other aspects of such projects, programs and activities. If during implementation of any project, program or activity, whether or not an Environmental Assessment or Environmental Impact Statement was originally required, it appears to the Mission Director, or officer responsible for the project, program or activity, that it is having or will have a significant effect on the environment that was not previously studied in an Environmental Assessment or Environmental Impact Statement, the procedures contained in this part shall be followed including, as appropriate, a Threshold Decision. Scoping and an Environmental Assessment or Environmental Impact Statement.
(9) Revisions. If, after a Threshold Decision is made resulting in a Negative Determination, a project is revised or new information becomes available which indicates that a proposed action might be "major" and its effects "significant", the Negative Determination will be reviewed and revised by the cognizant Bureau and an Environmental Assessment or Environmental Impact Statement will be prepared, if appropriate. Environmental Assessments and Environmental Impact Statements will be amended and processed appropriately if there are major changes in the project or program, or if significant new information becomes available which relates to the impact of the project, program or activity on the environment that was not considered at the time the Environmental Assessment or Environmental Impact Statement was approved. When on-going programs are revised to incorporate a change in scope or nature, determination will be made as to whether such change may have an environmental impact not previously assessed. If so, the procedures outlined in this part will be followed.

(10) Other Approval Documents.
These procedures refer to certain A.I.D documents such as PIDs, PAIPs, PPs and PAADs as the A.I.D. internal instruments for approval of projects, programs or activities. From time to time, certain special procedures, such as those in §216.4, may not require the use of the aforementioned documents. In these situations, these environmental procedures shall apply to those special approval procedures, unless otherwise exempt, at approval times and levels comparable to projects, programs and activities in which the aforementioned documents are use.

(b) Pesticide Procedures

(1) Project Assistance. Except as provided in § 216.3(b)(2), all proposed projects involving assistance for the procurement or use, or both, of pesticides shall be subject to the procedures prescribed in § 216.3(b)(1) (i) through (v) below. These procedures shall also apply, to the extent permitted by agreements entered into by A.I.D. before the effective date of these pesticide procedures, to such projects that have been authorized but for which pesticides have not been procured as of the effective date of these pesticide procedures.
(i) When a project includes assistance for procurement or use, or both of pesticides registered for the same or similar uses by USEPA without restriction, the Initial Environmental Examination for the project shall include a separate section evaluating the economic, social and environmental risks and benefits of the planned pesticide use to determine whether the use may result in significant environmental impact. Factors to be considered in such an evaluation shall include, but not be limited to the following:

(a) The USEPA registration status of the requested pesticide;
(b) The basis for selection of the requested pesticide;
(c) The extent to which the proposed pesticide use is part of an integrated pest management program;
(d) The proposed method or methods of application, including availability of appropriate application and safety equipment;
(e) Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use and measures available to minimize such hazards;
(f) The effectiveness of the requested pesticide for the proposed use;
(g) Compatibility of the proposed pesticide with target and non-target ecosystems;
(h) The conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils;
(i) The availability and effectiveness of other pesticides or non-chemical control methods;
(j) The requesting country's ability to regulate or control the distribution, storage, use and disposal of the requested pesticide;
(k) The provisions made for training of users and applicators; and,
(l) The provisions made for monitoring the use and effectiveness of the pesticide.

In those cases where the evaluation of the proposed pesticide use in the Initial Environmental Examination indicates that the use will significantly affect the human environment, the Threshold Decision will include a recommendation for the preparation of an Environmental Assessment or Environmental Impact Statement, as appropriate. In the event a decision is made to approve the planned pesticide use, the Project Paper shall include to the extent practicable, provisions designed to mitigate potential adverse effects of the pesticide. When pesticide evaluation section of the Initial Environmental Examination does not indicate a potentially unreasonable risk arising from the pesticide use, an Environmental Assessment or Environmental Impact Statement shall nevertheless be prepared if the environmental effects of the project otherwise require further assessment.
(ii) When a project includes assistance for the procurement or use, or both, of any pesticide registered for the same or similar uses in the United States but the proposed use is restricted by the USEPA on the basis of user hazard, the procedures set forth in §216.3(b)(1)(i) above will be followed. In addition, the Initial Environmental Examination will include an evaluation of the user hazards associated with the proposed USEPA restricted uses to ensure that the implementation plan which is contained in the Project Paper incorporates provisions for making the recipient government aware of these risks and providing, if necessary, such technical assistance as may be required to mitigate these risks. If the proposed pesticide use is also restricted on a basis other than user hazard, the procedures in §

216.3(b)(1)(iii) shall be followed in lieu of the procedures in this section.
(iii) If the project includes assistance for the procurement or use, or both of:
(a) Any pesticide other than one registered for the same or similar uses by USEPA without restriction or for restricted use on the basis of user hazard: or
(b) Any pesticide for which a notice of rebuttable presumption against registration, notice of intent to cancel, or notice of intent to suspend has been issued by USEPA.

The Threshold Decision will provide for the preparation of an Environmental Assessment or Environmental Impact Statement, as appropriate (§ 216.6(a). The EA or EIS shall include, but not be limited to, an analysis of the factors identified in §216.3(b)(1)(i) above.
(iv) Notwithstanding the provisions of § 216.3(b)(1) through (iii) above, if the project includes assistance for the procurement or use, or both, of a pesticide against which USEPA has initiated a regulatory action for cause, or for which it has issued a notice of rebuttable presumption against registration, the nature of the action or notice, including the relevant technical and scientific factors will be discussed with the requesting government and considered in the IEE and, if prepared, in the EA or EIS. If USEPA initiates any of the regulatory action above against a pesticide subsequent to its evaluation in an IEE, EA or EIS, the nature of the action will be discussed with the recipient government and considered in an amended IEE or amended EA or EIS, as appropriate.
(v) If the project includes assistance for the procurement or use, or both of pesticides but the specific pesticides to be procured or used cannot be identified at the time the IEE is prepared, the procedures outlined in § 216.3(b) (i) through (iv) will be followed when the specific pesticides are identified and before procurement or use is authorized. Where identification of the pesticides to be procured or used does not occur until after Project Paper approval neither the procurement nor the use of the pesticides shall be undertaken unless approved, in writing, by the Assistant Administrator (or in the case of projects authorized at the Mission level, the Mission Director) who approved the Project Paper.
(2) Exceptions to Pesticide Procedures. The procedures set forth in § 216.3(b)(1) above shall not apply to the following projects including assistance for the procurement or use, or both of pesticides.
(i) Projects under emergency conditions.
Emergency conditions shall be deemed to exist when it is determined by the Administrator, A.I.D., in writing that:
(a) A pest outbreak has occurred or is imminent; and
(b) Significant health problems (either human or animal) or significant economic problems will occur without the prompt use of the proposed pesticide; and
(c) Insufficient time is available before the pesticide must be used to evaluate the proposed use in accordance with the provisions of this regulation.
(ii) Projects where A.I.D. is a minor donor, as defined in §216.1(c)(12) above, to a multi-donor project.
(iii) Projects including assistance for procurement or use, or both, of pesticides for research or limited field evaluation purposes by or under the supervision of project personnel. In such instances, however, A.I.D. will ensure that the manufacturers of the pesticides provide toxicological and environmental data necessary to safeguard the health or research personnel and the quality of the local environment in which the pesticides will be used. Furthermore, treated crops will not be used for human or animal consumption unless appropriate tolerances have been established by EPA or recommended by FAO/WHO, and the rates and frequency of application, together with the prescribed preharvest intervals, do not result in residues exceeding such tolerances. This prohibition does not apply to the feeding of such crops to animals for research purposes.
(3) Non-Project Assistance. In a very few limited number of circumstances A.I.D. may provide non-project assistance for the procurement and use of pesticides. Assistance in such cases shall be provided if the A.I.D. Administrator determines in writing that (i) emergency conditions, as defined in §216.3(b)(2)(i) above exists; or (ii) that compelling circumstances exist such that failure to provide the proposed assistance would seriously impede the attainment of U.S. foreign policy objectives or the objectives of the foreign assistance program. In the latter case, a decision to provide the assistance will be based to the maximum extent practicable, upon a consideration of the factors set forth in § 216.3(b)(1)(i) and, to the extent available, the history of efficacy and safety covering the past use of the pesticide in the recipient country.

§ 216.4 Private applicants.

Programs, projects or activities for which financing from A.I.D. is sought by private applicants, such as PVOs and educational and research institutions, are subject to these procedures. Except as provided in §216.2(b),(c) or (d), preliminary proposals for financing submitted by private applicants shall be accompanied by an Initial Environmental Examination or adequate information to permit preparation of an Initial Environmental Examination. The Threshold Decision shall be made by the Mission Director for the country to which the proposal relates, if the preliminary proposal is submitted to the A.I.D Mission, or shall be made by the officer in A.I.D. who approves the preliminary proposal. In either case, the concurrence of the Bureau Environmental Officer is required in the same manner as in § 216.3(a)(2), except for PVO projects approved in A.I.D. Missions with total life of project costs less than $500,000. Thereafter, the same procedures set forth in § 216.3 including as appropriate scoping and Environmental Assessments or Environment Impact Statements, shall be applicable to programs, projects or activities submitted by private applicants. The final proposal submitted for financing shall be treated, for purposes of these procedures, as a Project Paper. The Bureau Environmental Officer shall advise private applicants of studies or other information foreseeably required for action by A.I.D.

§ 216.5 Endangered species.

It is A.I.D. policy to conduct its assistance programs in a manner that is sensitive to the protection of endangered or threatened species and their critical habitats. The Initial Environmental Examination for each project, program or activity having an effect on the environment shall specifically determine whether the project, program or activity will have an effect on an endangered or threatened species, or critical habitat. If the proposed project, program or activity will have the effect of jeopardizing an endangered or threatened species or of adversely modifying its critical habitat, the Threshold Decision shall be a Positive Determination and an Environmental Assessment or Environmental Impact Statement completed as appropriate, which shall discuss alternatives or modifications to avoid or mitigate such impact on the species or its habitat.

§ 216.6 Environmental assessments.

(a) General Purpose. The purpose of the Environmental Assessment is to provide Agency and host country decision makers with a full discussion of significant environmental effects of a propose action. It includes alternatives which would avoid or minimize adverse effects or enhance the quality of the environment so that the expected benefits of development objectives can be weighed against any adverse impacts upon the human environmental or irretrievable commitment of resources.

(b) Collaboration with Affected Nation on Preparation. Collaboration in obtaining data, conducting analyses and considering alternatives will help build an awareness of development associated environmental problems in less developed countries as well as assist in building an indigenous institutional capability to deal nationally with such problems. Missions, Bureaus and Offices will collaborate with affected countries to the maximum extent possible, in the development of any Environmental Assessments and consideration of environmental consequences as set forth therein.

(c) Content and Form. The Environmental Assessment shall be based upon the scoping statement and shall address the following elements, as appropriate:

(1) Summary. The summary shall stress the major conclusions, areas of controversy. If any, and the issues to be resolved.

(2) Purpose. The Environmental Assessment shall briefly specify the underlying purpose and need to which the Agency is responding in proposing the alternatives including the proposed action.

(3) Alternatives Including the Proposed Action. This section should present the environmental impacts of the proposal and its alternatives in comparative form, thereby sharpening the issues and providing a clear basis for choice among options by the decision maker. This section should explore and evaluate reasonable alternatives and briefly discuss the reasons for eliminating those alternatives which were not included in the detailed study, devote substantial treatment to each alternatives considered in detail including the proposed action so that reviewers may evaluate their comparative merits; include the alternative of no action; identify the Agency's preferred alternative or alternatives, if one or more exists; include appropriate mitigation measures not already included in the proposed action or alternatives.

(4) Affected Environment. The Environmental Assessment shall succinctly describe the environment of the area(s)

to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in the Environmental Assessment shall be commensurate with the significance of the impact with important material summarized, consolidated or simply referenced.

(5) Environmental Consequences. This section forms the analytic basis for the comparisons under paragraph(c)(3) of this section. It will include the environmental impacts of the alternatives including the proposed action; any adverse effects that cannot be avoided should the proposed action be implemented; the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity; and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented. It should not duplicate discussions in paragraph (c)(3) of this section. This section of the Environmental Assessment should include discussion of direct effects and their significance; possible conflicts between the proposed action and land use plans, policies and controls for the areas concerned; energy requirements and conservation potential of various alternatives and mitigation measures; natural or depletable resource requirements and conservation potential of various requirements and mitigation measures; urban quality; historic and cultural resources and the design of the built environment, including the re-use and conservation potential of various alternatives and mitigation measures; and means to mitigate adverse environmental impacts.

(6) List of Preparers. The Environmental Assessment shall list the names and qualifications (expertise, experience, professional discipline) of the persons primarily responsible for preparing the Environmental Assessment or significant background papers.

(7) Appendix. An Appendix may be prepared.

(d) Program Assessment. Program Assessments may be appropriate in order to assess the environmental effects of a number of individual actions and their cumulative environmental impact in a given country or geographic area, or the environmental impacts that are generic of common to a class of agency actions, or other activities which are not country-specific. In these cases, a single, programmatic assessment will be prepared in A.I.D./Washington and circulated to appropriate overseas Mission, host governments, and to interested parties within the United States. To the extent practicable, the form and content of the programmatic Environmental Assessment will be the same as for project Assessments. Subsequent Environmental will be the same as for project Assessments. Subsequent Environmental Assessments on major individual actions will only be necessary where such follow-on or subsequent activities may have significant environmental impacts on specific countries where such impacts have not been adequately evaluated in the programmatic Environmental Assessment. Other programmatic evaluations of classes of actions may be conducted in an effort to establish additional categorical exclusions or design standards or criteria for such classes that will eliminate or minimize adverse effects of such actions, enhance the environmental effect of such action or reduce the amount of paperwork or time involved in these procedures. Programmatic evaluations conducted for the purpose of establishing additional categorical exclusions under §216.2(c) or design considerations that will eliminate significant effects for classes of actions shall be made available for public comment before the categorical exclusions or design standards or criteria are adapted by A.I.D. Notice of the availability of such document shall be published in the Federal Register. Additional categorical exclusions or design standard or criteria are adopted by A.I.D. Notice of the availability of such document shall be published in the Federal Register. Additional categorical exclusions shall be adopted by A.I.D. upon the approval of the Administrator, and design consideration in accordance with usual agency procedures.

(e) Consultation and Review. (1) When Environmental Assessments are prepared on activities carried out within or focused on specific developing countries, consultation will be held between A.I.D. staff and the host government both in the early stages of preparation and on the results and significance of the completed Assessment before the project is authorized.

(2) Missions will encourage the host government to make the Environmental Assessment available to the general public of the recipient country. If Environmental Assessments are prepared on activities which are not country-specific, the Assessment will be circulated by the Environmental Coordinator to A.I.D.'s Overseas Missions and interested governments for information, guidance and comment and will be made available in the U.S. to interested parties.

(f) Effect in Other Countries. In a situation where an analysis indicates that potential effects may extend beyond the national boundaries of a recipient country and adjacent foreign nations may be affected. A.I.D. will urge the recipient country and adjacent foreign nations may be affect. A.I.D. will urge the recipient country to consult with such countries in advance of project approval and to negotiate mutually acceptable accommodations.

(g) Classified Material. Environmental Assessments will not normally include classified or administratively controlled material. However, there may be situations where environmental aspects cannot be adequately discussed

without the inclusion of such material. The handling and disclosure of classified or administratively controlled will be made available to persons outside the Agency as provided for in 22 CFR Part 212.

§ 216.7 Environmental Impact Statements.

(a) Applicability. An Environmental Impact Statement shall be prepared when agency actions significantly affect:
(1) The global environment or areas outside the jurisdiction on any nation (e.g. the oceans);
(2) The environment of the United States; or
(3) Other aspects of the environment at the discretion of the Administrator.
(b) Effects on the United States:
Content and Form. An Environmental Impact Statement relating to paragraph (a)(2) of this section shall with the CEO Regulations. With respect to effects on the United States, the terms environment and significant effect whenever used in these procedures have the same meaning as in the CEQ Regulations rather than as defined in §216.1(c)(12) and (13) of these procedures.
(c) Other Effects: Content and Form.
An Environmental Impact Statement relating to paragraphs (a)(1) and (a) (3) of this section will generally follow the CEQ Regulations, but will take into account the special considerations and concerns of A.I.D Circulation of such Environmental Impact Statements in draft form will precede approval of a Project Paper or equivalent and comments from such circulation will be considered before final project authorization as outlined in § 216.3 of these procedures. The draft Environmental Impact Statement will also be circulated by the Missions to effected foreign governments for information and comment. Draft Environmental Impact Statements generally will be made available for comment to Federal agencies with jurisdiction by law or special expertise with respect to any environmental impact involved, and to public and private organizations and individuals for not less than forty-five (45) days. Notice of availability of the draft Environmental Impact Statements will be published in the Federal Register. Cognizant Bureaus and Offices will submit these drafts for circulation through the Environmental Coordinator who will have the responsibility for coordinating all such communications with persons outside A.I.D. Any comments received by the Environmental Coordinator will be forwarded to the originating Bureau or Office for consideration in final policy decisions and the preparation of a final Environmental Impact Statement. All such comments will be attached to the final Statement, and those relevant comments not adequately discussed in the draft Environmental Impact Statement will be appropriately dealt with in the final Environmental Impact Statement. Copies of the final Environmental Impact Statement, with comments attached, will be sent by the Environmental Coordinator to CEQ and to all other Federal, state, and local agencies and private organizations that made substantive comments on the draft, including effected foreign governments. Where emergency circumstances or considerations of foreign policy make it necessary to take an action without observing the provisions of § 1506.10 of the CEQ Regulations, or when there are overriding considerations of expense to the United States or foreign governments, the originating Office will advise the Environmental Coordinator who will consult with Department of State and CEQ concerning appropriate modification of review procedures.

§ 216.8 Public hearings.

(a) In most instances AID will be able to gain the benefit of public participation in the impact statement process through circulation of draft statements and notice of public availability in CEQ publications. However, in some cases the Administrator may wish to hold public hearings on draft Environmental Impact Statements. In deciding whether or not a public hearing is appropriate, Bureaus in conjunction with the Environmental Coordinator should consider:
(1) The magnitude of the proposal in terms of economic costs, the geographic area involved, and the uniqueness or size of commitment of the resources involved:
(2) The degree of interest in the proposal as evidenced by requests from the public and from Federal, state and local authorities, and private organizations and individuals, that a hearing be held:
(3) The complexity of the issue and likelihood that information will be presented at the hearing which will be of assistance to the Agency, and
(4) The extent to which public involvement already has been achieved through other means, such as earlier public hearings, meetings with citizen representatives, and/or written comments on the proposed action.
(b) If public hearings are held, draft Environmental Impact Statements to be discussed should be made available to the

public at least fifteen (15) days prior to the time of the public hearings, and notice will be placed in the FEDERAL REGISTER giving the subject, time and place of the proposed hearings.

§ 216.9 Bilateral and multilateral studies and concise reviews of environmental issues.

Notwithstanding anything to the contrary in these procedures, the Administrator may approve the use of either of the following documents as a substitute for an Environmental Assessment (but not a substitute for an Environmental Impact Statement) required under these procedures.
(a) Bilateral or multilateral environmental studies, relevant or related to the proposed action, prepared by the United States and one or more foreign countries or by an international body or organization in which the United States is a member or participant; or
(b) Concise reviews of the environmental issues involved including summary environmental analyses or other appropriate documents.

§ 216.10 Records and reports.

Each Agency Bureau will maintain a current list of activities for which Environmental Assessments and Environmental Impact Statements are being prepared and for which Negative Determinations and Declarations have been made. Copies of final Initial Environmental Examinations, scoping statements, Assessments and Impact Statements will be available to interested Federal agencies upon request. The cognizant Bureau will maintain a permanent file (which may be part of its normal project files) of Environmental Impact Statements, Environmental Assessments, final Initial Environmental Examinations, scoping statements, Determinations and declarations which will be available to the public under the Freedom of Information Act. Interested persons can obtain information or status reports regarding Environmental Assessments and Environmental Impact Statements through the A.I.D. Environmental Coordinator.

(22) U.S.C. 2381: 42 U.S.C. 4332 - Dated October 9, 1980. - Joseph C. Wheeler, Acting Administrator.

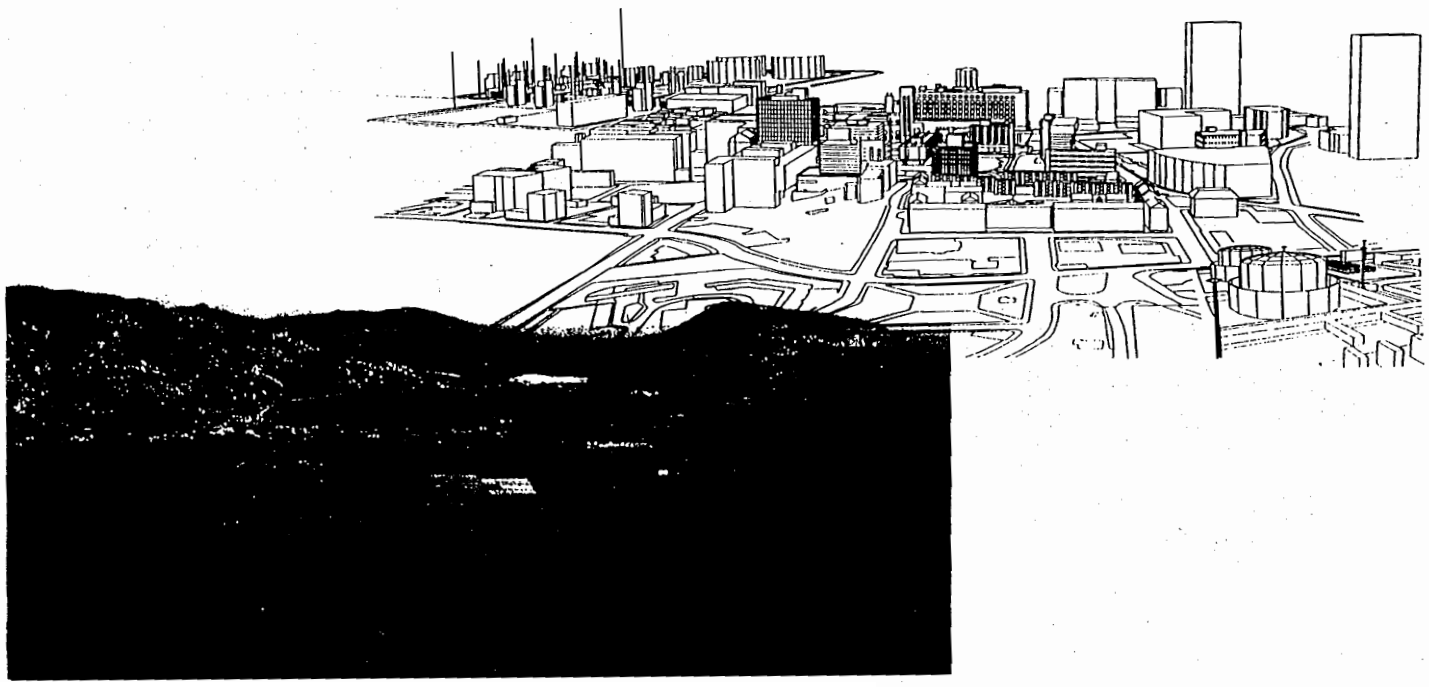
Appendix B

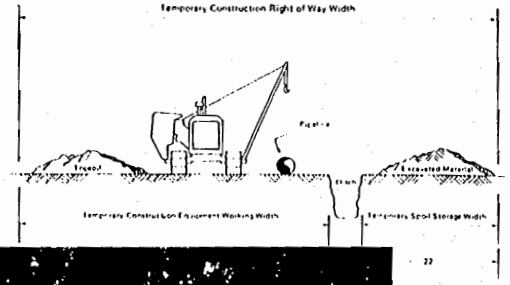
Appendix B: Background Readings on Environmental Assessment

UNITED NATIONS
ENVIRONMENT PROGRAMME

Environmental Impact Assessment

Basic procedures for developing countries





What is Environmental Impact Assessment?

Environmental Impact Assessment, or 'EIA' for short, is a formal study process used to predict the environmental consequences of a proposed major development project. Such projects may include, for example, building a hydroelectric dam or a factory, irrigating a large valley, or developing a harbour.

An EIA concentrates on problems, conflicts or natural resource constraints that could affect the viability of a project. It also examines how the project might cause harm to people, their homeland or their livelihoods, or to other nearby developments. After predicting potential problems, the EIA identifies measures to minimise the problems and outlines ways to improve the project's suitability for its proposed environment.

The aim of an EIA is to ensure that potential problems are foreseen and addressed at an early stage in the project's planning and design. To achieve this aim, the assessment's findings are communicated to all the various groups who will make decisions about the proposed project: the project developers and their investors, as well as regulators, planners and politicians. (In some countries, a report – called an Environmental Impact Statement – is prepared at the end of the EIA study, and this is submitted to a Government department as part of a permit application for the project.) Having read the conclusions of an Environmental Impact Assessment, project planners and engineers can shape the project so that its benefits can be achieved and sustained without causing inadvertent problems.

The EIA is an important phase in the process of deciding about the final shape of a proposed project. It helps officials make decisions about a project and it helps the project's proponents achieve their aims more successfully:

- A project that has been designed to suit the local environment is more likely to be completed on time and within budget, and is more likely to avoid difficulties along the way.
- A project that conserves the natural resources it relies upon will continue to be sustained by the environment for years to come.
- A project that yields its benefits without causing serious problems is more likely to bring credit and recognition to its proponents.

In summary, an Environmental Impact Assessment:

- Predicts the likely environmental impacts of projects
- Finds ways to reduce unacceptable impacts and to shape the project so that it suits the local environment
- [illegible] options to decision-makers.

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EIA is a management tool

Like economic analysis and engineering feasibility studies, EIA is a management tool for officials and managers who must make important decisions about major development projects.

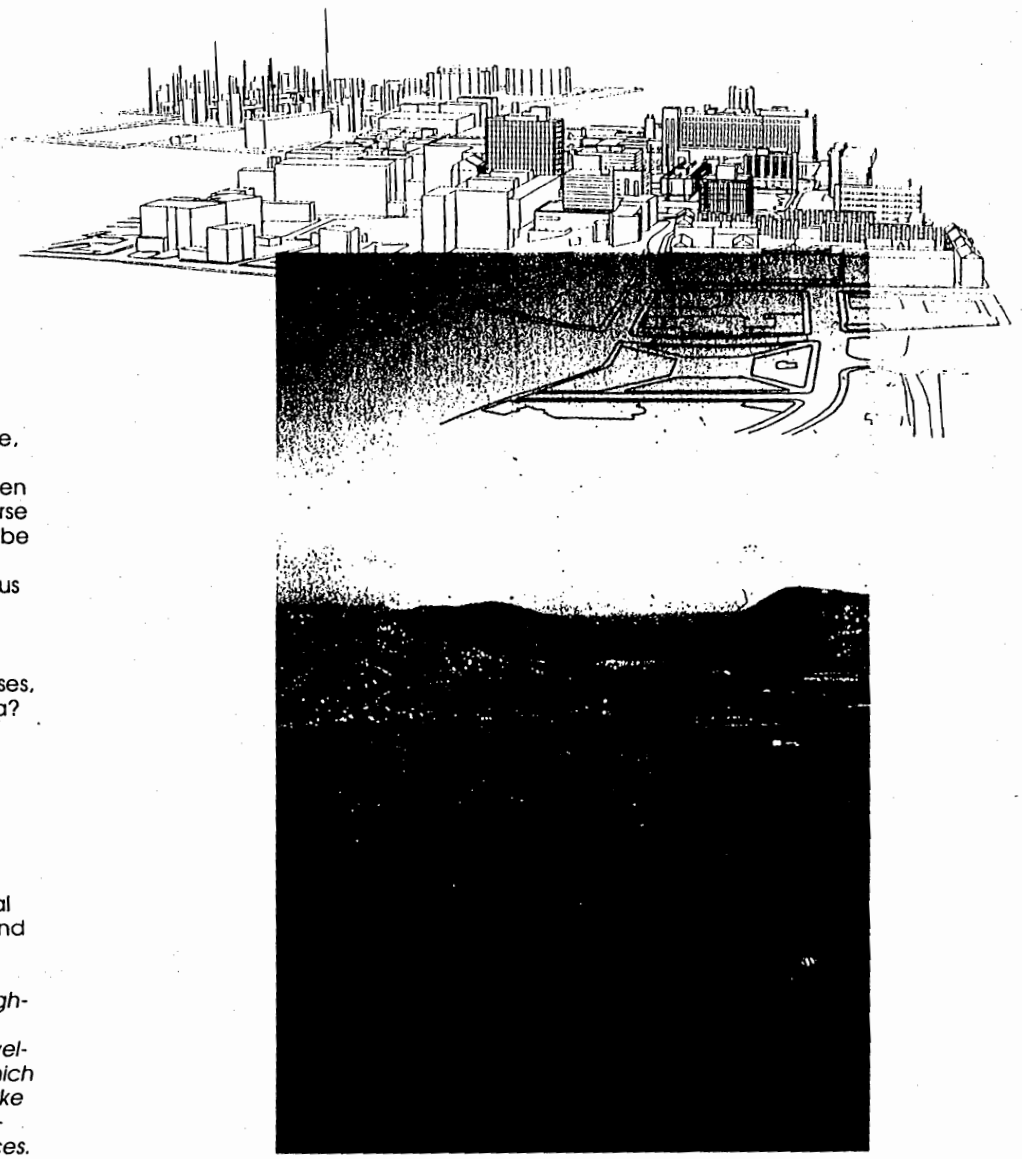
All developers are familiar with economic and engineering studies. These tools provide the basis for designing robust, economically-viable projects. EIA is now seen as an equally important tool in designing a viable project.

In recent years, major projects have encountered serious difficulties because insufficient account has been taken of their relationship with the surrounding environment. Some projects have been found to be unsustainable because of resource depletion. Others have been abandoned because of public opposition, financially encumbered by unforeseen costs, held liable for damages to natural resources and even been the cause of disastrous accidents.

Given this experience, it is clearly very risky to undertake, finance, or approve a major project without first taking into account its environmental consequences - and then siting and designing the project so as to minimise adverse impacts. For instance, the following questions need to be asked about any major project:

- Can it operate safely, without serious risk of dangerous accidents or long-term health effects?
- Can the local environment cope with the additional waste and pollution it will produce?
- Will its proposed location conflict with nearby land uses, or preclude later developments in the surrounding area?
- How will it affect local fisheries, farms or industry?
- Is there sufficient infrastructure, such as roads and sewers, to support it?
- How much water, energy and other resources will it consume, and are these in adequate supply?
- What human resources will it require or replace, and what social effects may this have on the community?
- What damage may it inadvertently cause to national assets such as virgin forest, tourism areas, or historical and cultural sites?

The illustration to the right, and similar illustrations throughout this booklet, visually represent the relationship between an existing environment and a proposed development plan. This particular plan is for a new town, which is to include gas works and storage. These images evoke questions like the ones above about the project's compatibility with its surroundings and the available resources.



Who is involved in the EIA process?

An EIA review is normally undertaken by those responsible for the development – the 'developer'. In some cases, the developer is a private company; in other cases, the developer is the government authority responsible for the relevant sector (eg, transportation or agriculture).

Increasingly, governments and international agencies are adopting regulations that legally require developers to undertake EIAs. In such cases, the EIA report may need to be submitted as part of the application to a permit-granting government department – the 'competent authority'. But many developers, on their own initiative, are incorporating the EIA process into their routine project cycle. They recognise that environmental problems not only lead to risks and costly liabilities, but that they also cause concern about the developer's effectiveness across the full range of its responsibilities. A prudent developer uses all the management tools available to ensure a project's success in advance.

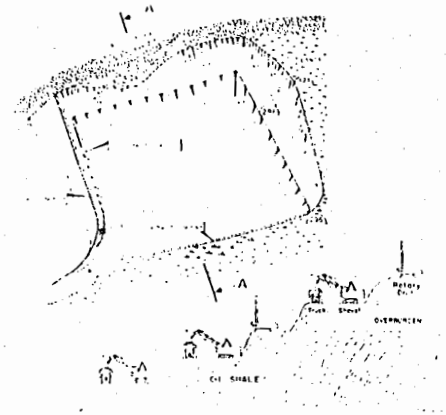
Although the developer is usually responsible for undertaking the EIA, the 'competent authority' also has a role to play:

- By providing general guidance, past EIA formats or examples to follow
- After the EIA is done, using its results to reach a decision on the project, and later ensuring that all the mitigation measures are implemented.

The concerns and points-of-view of all the various groups interested in and affected by the project should be taken into account throughout the EIA process. Each of these participants will have a different use for the results of the EIA:

- The *developer* needs to know where to site a project and how to reduce adverse environmental impacts
- The *investor* needs to know how the impacts will affect the viability of the project, and what liabilities are incurred
- The *competent authority* uses the EIA's results to decide on a response to the permit application
- Other *government authorities* will want to know the implications of the project's adverse impacts for other projects they may wish to promote
- The *regulator* needs to know the extent of environmental impacts and whether they are acceptable
- The *regional planner* needs to know how the impacts will interfere with adjacent developments and land uses
- The *local community* or its representatives will need to know how the proj[illegible] impacts will affect their quality of life

[illegible] who is affected and in what way, and w[illegible]



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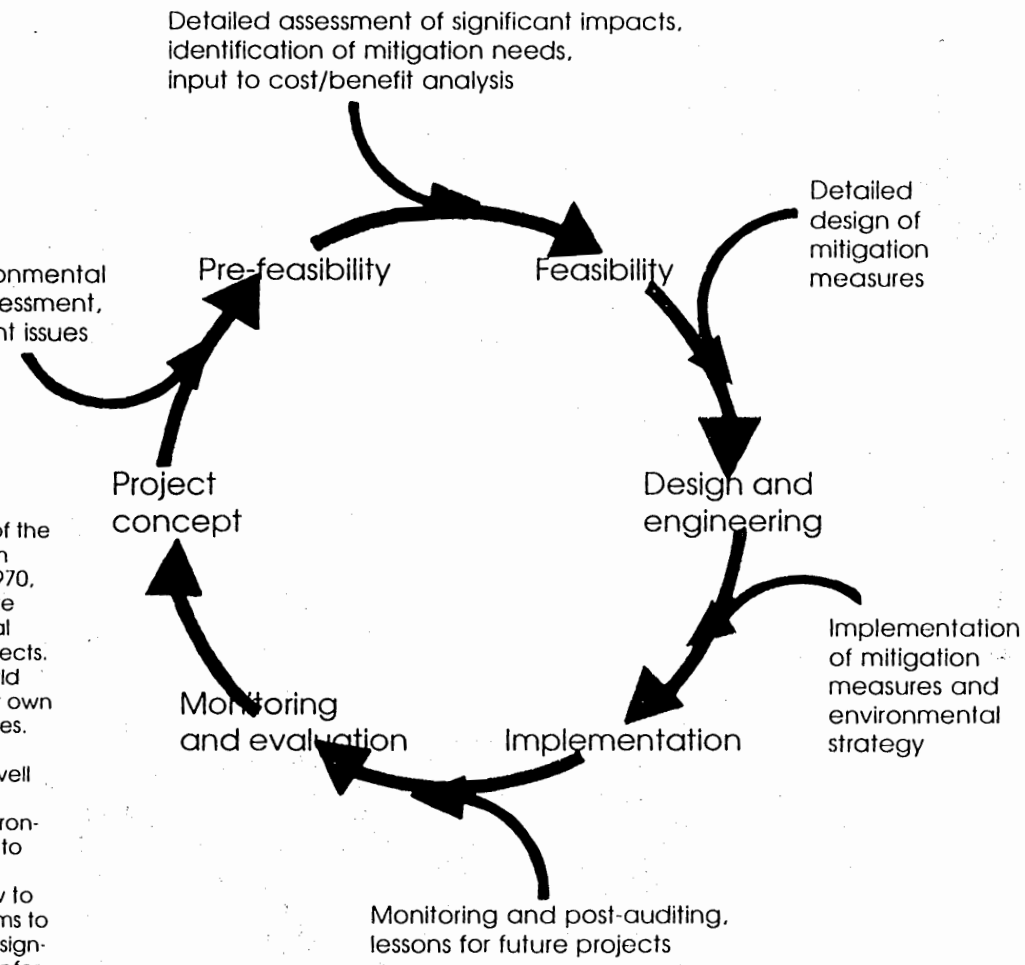
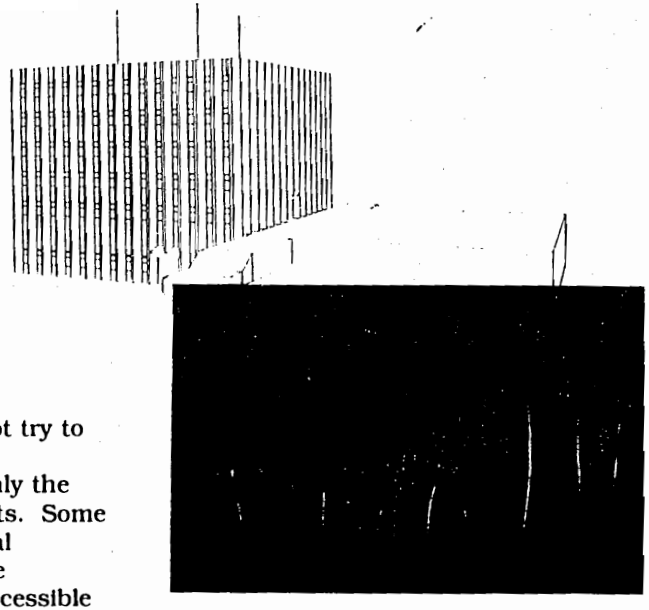


EIA should be integrated with the project cycle

Most governments are now well aware of the possibility of undesirable side-effects from large scale industrial development. In 1970, the USA became the first country to make Environmental Impact Assessment a legal requirement for major development projects. Since then, countries throughout the world have enacted similar laws, suited to their own constitutions, economies and social values.

Governments of all these countries -- as well as international lending agencies and organisations like the United Nations Environment Programme – are still learning how to make EIA a practical management tool, useful in day-to-day decisions about how to build a country's economy. The key seems to lie in the management of the EIA: by designing the process so that it provides useful information to decision-makers at just the right time in the project cycle, EIA can have a real effect on projects. In other words, EIA should enhance and augment the project planning process. Only by actually shaping projects can EIA become an important instrument for protecting the environment and ensuring sustainable economic success.

Illustrated here is a generalised project cycle, showing when and how an Environmental Impact Assessment can contribute positively to the cycle's progress.



Important principles in managing an EIA

Principle 1
Focus on the main issues.
It is important that an Environmental Impact Assessment does not try to cover too many topics in too much detail.

At an early stage, the scope of the EIA should be limited to only the most likely and most serious of the possible environmental impacts. Some EIAs have resulted in large and complex reports running to several thousand pages. Such extensive work is unnecessary, and can be counter-productive, because the EIA's findings must be readily accessible and immediately useful to decision-makers and project planners.

When mitigation measures are being suggested, it is again important to focus the study only on workable, acceptable solutions to the problems. It is easy for the study to waste time considering measures that are impractical or totally unacceptable to the developer or to the Government.

When it is time to communicate the conclusions, the EIA should provide a summary of information relevant to the needs of each group for making its decision. Supporting data should be provided separately.

Principle 2
Involve the appropriate persons and groups.
Just as it is important not to waste time and effort on irrelevant issues, it is also important to be selective when involving people in the EIA process. Generally, three categories of participants are needed to carry out an EIA:

- Those appointed to manage and undertake the EIA process (usually a co-ordinator and a staff of experts)
- Those who can contribute facts, ideas or concerns to the study, including scientists, economists, engineers, policy makers, and representatives of interested or affected groups
- Those who have direct authority to permit, control or alter the project – that is, the decision-makers – including for example the developer, aid agency or investors, competent authorities, regulators and politicians.

Principle 3
Link information to decisions about the project.
An EIA should be organised so that it directly supports the many decisions that need to be taken about the proposed project. It should start early enough to provide information to improve basic designs, and should progress through the several stages of project planning. In a typical sequence:

- When the developer and investors first broach the project concept, they consider likely environmental issues
- Wh[illegible] the developer is looking for sites or routes, environmental consid[illegible]

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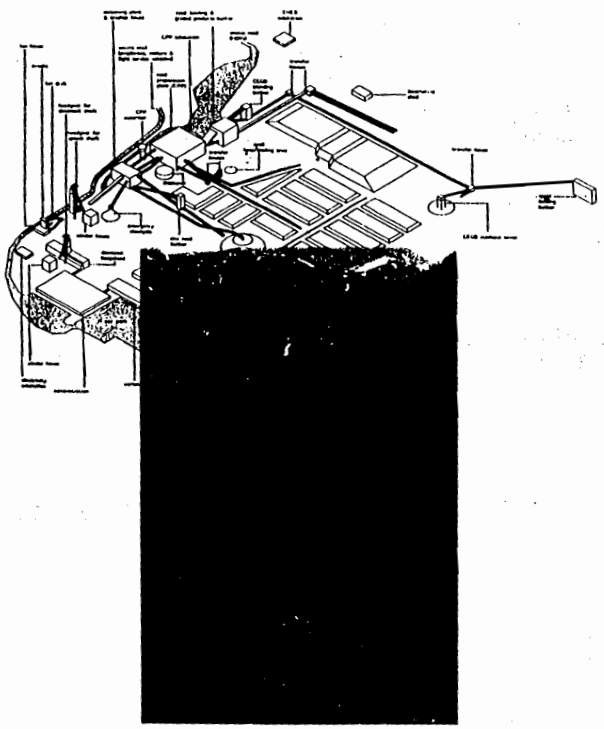
an EIA is in progress, helping them to anticipate problems
- When engineers are creating the project design, the EIA identifies certain standards for the design to meet
- When a permit is requested, a completed EIA report is submitted, and also published for general comment
- When the developer implements the project, monitoring or other measures provided for in the EIA are undertaken.

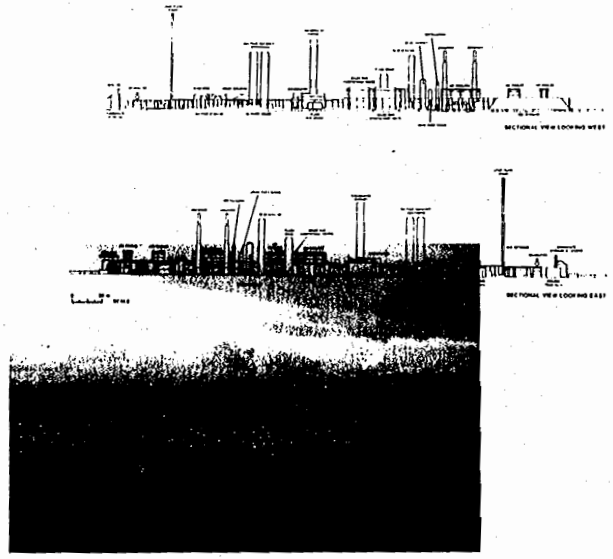
Principle 4
Present clear options for the mitigation of impacts and for sound environmental management.
To help decision-makers, the EIA must be designed so as to present clear choices on the planning and implementation of the project, and it should make clear the likely results of each option. For instance, to mitigate adverse impacts, the EIA could propose:
- Pollution control technology or design features
- The reduction, treatment or disposal of wastes
- Compensation or concessions to affected groups.

To enhance environmental compatibility, the EIA could suggest:
- Several alternative sites
- Changes to the project's design and operation
- Limitations to its initial size or growth
- Separate programmes which contribute in a positive way to local resources or to the quality of the environment.

And to ensure that the implementation of an approved project is environmentally sound, the EIA may prescribe:
- Monitoring programmes or periodic impact reviews
- Contingency plans for regulatory action
- The involvement of the local community in later decisions.



Principle 5
Provide information in a form useful to the decision-makers.
The objective of an EIA is to ensure that environmental problems are foreseen and addressed by decision-makers. To achieve this, decision-makers must fully understand the EIA's conclusions. Most decision-makers are unlikely to use information, no matter how important it is, unless it is presented in terms and formats immediately meaningful:
- Briefly present 'hard' facts and predictions about impacts, comment on the reliability of this information, and summarise the consequences of each of the proposed options
- Write in the terminology and vocabulary that is used by the decision-makers and the community affected by the project
- Present the essential findings in a concise document, supported by separate background materials where necessary
- Make the document easy to use, providing visuals whenever possible.



The Environmental Impact Assessment process

Before starting the EIA

Despite its usefulness in finding ways to make projects more successful, the full EIA process is not necessary for every kind of development project. For a major project, an EIA may use considerable resources and expertise. If a detailed EIA is not really needed, these resources can be put to better use elsewhere.

There are two 'tiers' of assessment which should be applied to the project before proceeding with a full EIA: *screening* and *preliminary assessment*. Where these first tiers of assessment are a regulatory requirement, the developer normally does the work and submits the results to the regulatory agency. The agency may then decide:

- There is nothing to be concerned about, or
- The evaluation should proceed to the next tier.

The advantage of a tier approach is that the extent of the inquiry expands with the advancing development of the project plans. 'Screening' is appropriate when the project is only a rough concept. Later, when the project is under more general discussion, a 'preliminary assessment' can look deeper into possible sites and potential impacts. Then, just before the preliminary stages of feasibility and design work get underway, a full 'EIA study' can commence, so that it can influence the detailed decisions to come. This tier approach also ensures that impacts are examined at a very early stage in the project planning, and not later when sites or designs are already decided by other factors.

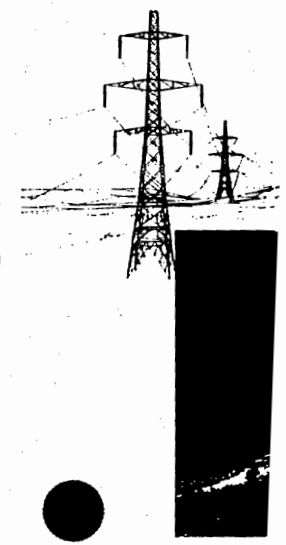
Screening

Screening is the first and simplest tier of project evaluation. Screening helps to clear types of projects which in past experience are not likely to cause serious environmental problems. The exercise may take one of several forms:

- Measuring against simple criteria such as size or location
- Comparing the proposal with lists of project types rarely needing an EIA (eg. schools) or definitely needing one (eg. coal mines)
- Estimating general impacts (eg. increased infrastructure needed) and comparing these impacts against set thresholds
- Doing complex analyses, but using readily available data.

Preliminary Assessment

If [illegible]ng does not automatically clear a project, the developer may be [illegible]



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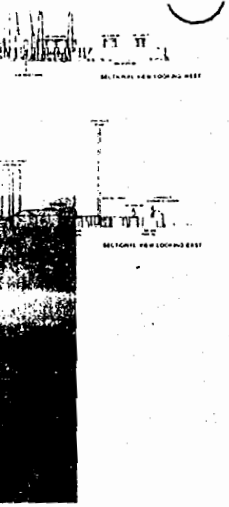


research and expert advice to:
- Identify the project's key impacts on the local environment
- Generally describe and predict the extent of the impacts
- Briefly evaluate their importance to decision-makers.

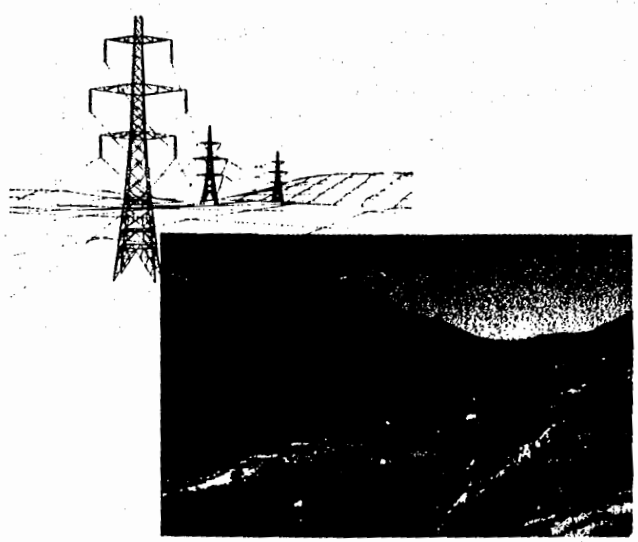
The preliminary assessment can be used to assist early project planning – for instance, to narrow the discussion of possible sites – and it can serve as an early warning that the project may have serious environmental difficulties. It is in the developer's interest to do a preliminary assessment, since in practice, this step can clear projects of the need for a full EIA.

Organisation

If after reviewing a preliminary assessment the competent authority deems that a full EIA is needed, the next step for the project developer is the *Organisation* of the EIA study. This entails:
- Commissioning and briefing an independent co-ordinator and expert study team (the disciplines that will be represented are decided after the 'scoping' stage, but the team always includes a communications expert)
- Identifying the key decision-makers who will plan, finance, permit and control the proposed project, so as to characterise the audience for the EIA
- Researching laws and regulations that will affect these decisions
- Making contact with each of the various decision-makers
- Determining how and when the EIA's findings will be communicated.

Scoping

The first task of the EIA study team is '*Scoping*' the EIA. The aim of scoping is to ensure that the study addresses all the issues of importance to the decision-makers. First the study team's outlook is broadened – by discussions with the project developers, decision-makers, the regulatory agency, scientific institutions, local community leaders, and others – to include all the possible issues and concerns raised by these various groups. Then the study team selects primary impacts for the EIA to focus on, choosing on the basis of magnitude, geographical extent, significance to decision-makers, or because of special local sensitivities (eg, soil erosion, the presence of an endangered species, or a nearby historical site).



The EIA study

After 'scoping', the EIA study itself begins. Simply put, the EIA study attempts to answer five questions:

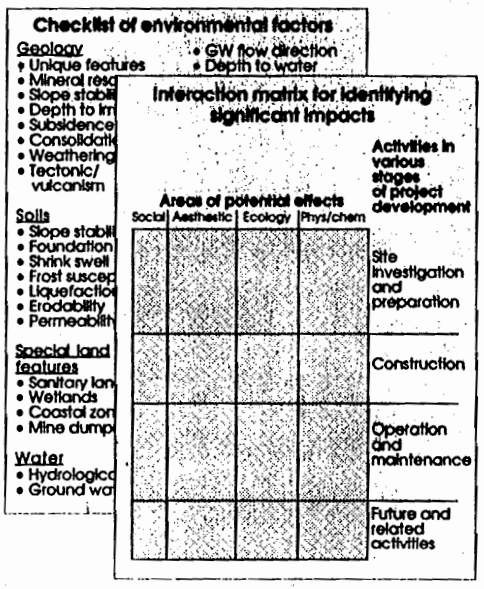
i) *What will happen as a result of the project?*
ii) *What will be the extent of the changes?*
iii) *Do the changes matter?*
iv) *What can be done about them?*
v) *How can decision-makers be informed of what needs to be done?*

After controls on the project's impacts are proposed in answer to question *(iv)*, the study team may again ask: 'What will happen as a result of the (now revised) project?' Thus the EIA often becomes a cyclical process of asking and re-asking the first four questions, until decision-makers can be offered workable solutions.

Identification

The answer to the first question – *'What will happen as a result of the project?'* – has already been partly addressed, but only in general terms: if a 'preliminary assessment' has been done, it will have broadly reviewed the project's effects; also, 'scoping' will have focused the study on the most important issues for decision-makers. Taking these findings into account, the full EIA study now formally identifies those impacts which should be assessed in detail. This *Identification* phase of the study may use these or other methods:

- Compile a candidate list of key impacts – such as changes in air quality, noise levels, wildlife habitats, species diversity, landscape views, social and cultural systems, settlement patterns and employment levels – from other EIAs for similar projects. This should draw on as many examples of similar projects as possible.
- Name all the project's 'sources' of impacts (eg, smoke emissions, water consumption, construction jobs) using checklists or questionnaires; then list possible 'receptors' in the environment (eg, crops, communities using the same water for drinking, migrant labourers) by surveying the existing environment and consulting with interested parties. Where the 'sources' may affect the 'receptors', a potential impact is suspected.
- Identify impacts themselves through the use of checklists, matrices, networks, overlays, models and simulations.

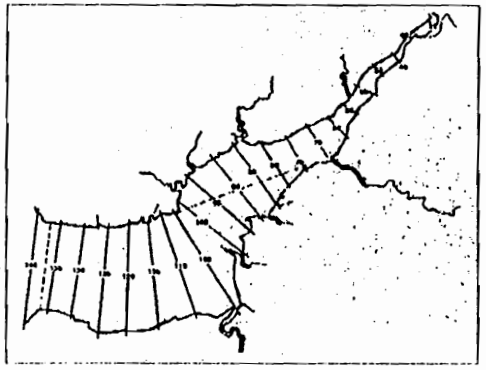


Checklist and matrix as used for impact identification.

Prediction

The next step, called *Prediction*, answers the EIA's second question: *'What will be the extent of the changes?'* As far as is practicable, prediction scientifically characterises the impact's causes and effects, and its secondary and synergistic consequences for the environment and the local community. Prediction follows an impact within a single environmental parameter (eg, a toxic liquid effluent) into its subsequent effects in many disciplines (eg, reduced water quality, adverse impacts on fisheries, economic effects on fishing villages, and resulting socio-cultural changes). Prediction draws on physical, biological, socio-economic, and anthropological data and techniques. In quantifying impacts, it may employ mathematical models, photomontages, physical models, socio-cultural models, economic models, experiments or expert judgements.

To prevent unnecessary expense, the sophistication of the prediction methods used should be kept in proportion to the 'scope' of the EIA. For instance, a complex mathematical model of atmospheric dispersion should



Water quality model, based on a one-dimensional segmenting of a river system.

not be used if only a small amount of relatively harmless pollutant is emitted. Simpler models are available and are sufficient for the purpose. Also, it is unnecessary to undertake expensive analyses if they're not required by the decision-makers for whom the EIA is being done.

All prediction techniques, by their nature, involve some degree of uncertainty. So along with each attempt to quantify an impact, the study team should also quantify the prediction's uncertainty in terms of probabilities or 'margins of error'.

It has been a shortcoming of many EIAs that social and cultural impacts are not given the prominence they deserve in describing the extent of changes expected to result from a major development project. This has probably been due to the bias of physical and biological scientists against the comparatively younger disciplines of cultural anthropology and sociology. This is an unfortunate bias, since socio-cultural impacts are the ones that the local community will feel most acutely in their everyday lives. A consideration of socio-cultural impacts should be integrated, wherever possible, into every discussion of physical/biological change, and not just treated separately in a minor chapter or appendix.

Examples of standards used in the evaluation of predicted impacts.

National ambient air quality standards

Sulfur dioxide	80 µg/m³ annual arithmetic mean 365 µg/m³ max 24 hr concen
Particulate matter	75 µg/m³ annual geometric mean
Hydrocarbons	160 µg/m³ (0.24 ppm) max 3 hr concen
Nitrogen dioxide	100 µg/m³ annual arithmetic mean
Ozone	235 µg/m³ (0.12 ppm) concen
	(9ppm) concen
	arterly avg

Quality required for shellfish waters

pH: between 7-9	Qtrly by electrometry
Temperature: discharges must not cause rise > 2°C	Qtrly by thermometry measures *in situ* at the time of sampling
Coloration (after filtration) mg Pt/l: discharges must not cause deviation > 10 mg Pt/l	Qtrly, filter through 0.45 µm membrane, photometric method using platinum/cobalt scale
Suspended solids (mg/l): discharges must not cause solid content to increase more than 30%	Qtrly, filter through 0.45 µm membrane, dry at 105°C, and weigh; centrifuge, dry, weigh

Evaluation

The third question addressed by the EIA – *'Do the changes matter?'* – is answered in the next step, *Evaluation*, so called because it evaluates the predicted adverse impacts to determine whether they are significant enough to warrant mitigation. This judgement of significance can be based on one or more of the following:

- Comparison with laws, regulations or accepted standards
- Consultation with the relevant decision-makers
- Reference to pre-set criteria such as protected sites, features or species
- Consistency with government policy objectives
- Acceptability to the local community or the general public.

Mitigation

If the answer to the third question is 'Yes, the changes do matter', then the EIA proceeds to answer the fourth question – *'What can be done about them?'* In this phase, the study team formally analyses *Mitigation*. A wide range of measures are proposed to prevent, reduce, remedy or compensate for each of the adverse impacts 'evaluated' as significant. Possible mitigation measures include:

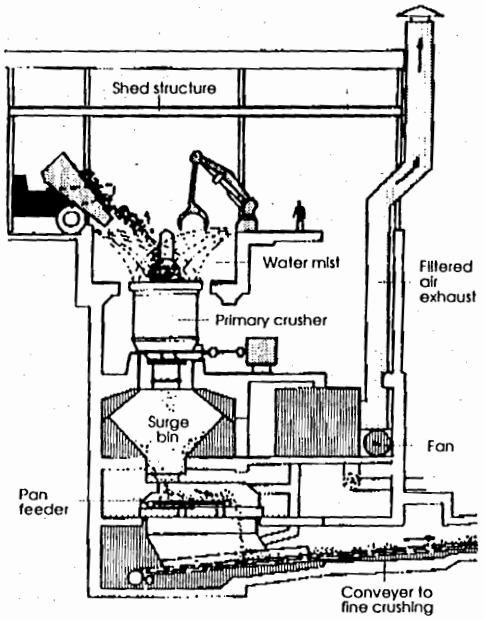
- Changing project sites, routes, processes, raw materials, operating methods, disposal routes or locations, timing, or engineering designs
- Introducing pollution controls, waste treatment, monitoring, phased implementation, landscaping, personnel training, special social services or public education
- Offering (as compensation) restoration of damaged resources, money to affected persons, concessions on other issues, or off-site programmes to

enhance some other aspect of the environment or quality of life for the community.

All mitigation measures cost something, and this cost must be quantified too.

These various measures are then compared, trade-offs between alternative measures are weighed, and the EIA study team proposes one or more 'action plans', usually combining a number of measures. The action plan may include technical control measures, an integrated management scheme (for a major project), monitoring, contingency plans, operating practices, project scheduling, or even joint-management (with affected groups). The study team should explicitly analyse the implications of adopting different alternatives, to help make the choices clearer for decision-makers. Several analytical techniques are available for this purpose:

- Cost/benefit analysis, in which all quantifiable factors are converted to monetary values, and actions are assessed for their effect on project costs and benefits (Be cautioned, however, that the unquantifiable and qualitative aspects can be equally important, and often need to be taken into account in the decision-making process.)
- Explaining what course of action would follow from various broad 'value judgements' (eg, that social impacts are more important than resources)
- A simple matrix of environmental parameters versus mitigation measures, containing brief descriptions of the effects of each measure
- Pairwise comparisons, whereby the effects of an action are briefly compared with the effects of each of the alternative actions, one pair at a time.

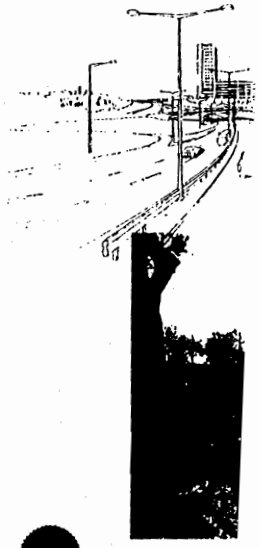


Example of mitigation technology: designs for dust control in a primary crusher, used in mining industries.

Documentation

The last step in the EIA process, which responds the last question – '*How can decision-makers be informed of what needs to be done?*' – is the *Documentation* of the process and the conclusions. Recall that the purpose of an EIA is to ensure that potential problems are foreseen and addressed in the project's design. Many technically first-rate EIA studies fail to exert their importance and usefulness because of poor documentation. The EIA can achieve its purpose only if its findings are well communicated to decision-makers.

Generally, to produce effective communications, one must identify the target audience or audiences, and then shape and style the publication to meet their specific needs. In documenting an EIA, this means identifying the key decision-makers, perceiving the questions they will be asking, and providing them with straightforward answers, formatted for easy interpretation in relation to their decision-making (eg, tables, graphs, summary points). Successful EIA documentation is more readily produced if the audience and their needs are established at the start of the EIA, and then made to affect how the research is focused and reported. It is the job of the study team's communications expert to make this happen.



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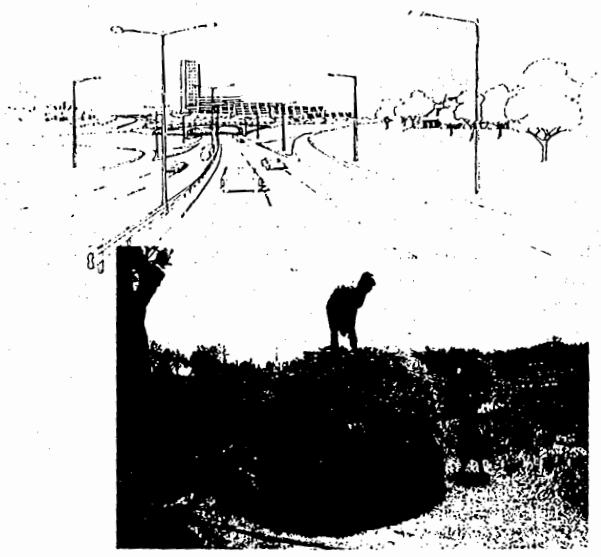
So that decision-makers can look more deeply into particular issues, the EIA report should also include a record of the EIA process and the judgements made by the study team. An EIA report typically contains:

- An executive summary of the EIA findings
- A description of the proposed development project
- The major environmental and natural resource issues that needed clarification and elaboration
- The project's impacts on the environment (in comparison with a baseline environment as it would be without the project), and how these impacts were identified and predicted
- A discussion of options for mitigating adverse impacts and for shaping the project to suit its proposed environment, and an analysis of the trade-offs involved in choosing between alternative actions
- An overview of gaps or uncertainties in the information
- A summary of the EIA for the general public.

All of this should be contained in a very concise, easy-to-read document, with cross references to background documentation, which is provided in an appendix. (The short document is sometimes called an 'Environmental Impact Statement', especially when it is submitted as part of a permit application.)

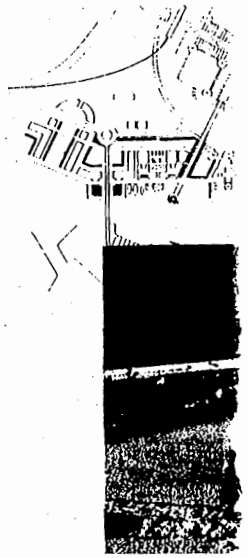


Using the results

Decisions based on the EIA are usually made by persons who have not been closely involved with the day-to-day progress of the EIA study. Their first consideration of the project may well be the moment they pick up and skim through the EIA report. The EIA will hopefully tell them all they need to know about 'what will happen as a result of the project', 'the extent of the changes', 'whether the changes matter', and 'what can be done about them'. But the decision-makers themselves must also consider political realities when selecting a course of action. Only decision-makers are in a position to balance the project's needs and problems with the other needs and problems over which they have jurisdiction. They must take into account not only the facts of the situation, but also people's perceptions.

If the project is accepted, perhaps with recommended modifications, then the decision-maker may need to take two further actions:

- Prepare a plan for reducing conflicts about the project; this may include public participation in planning, public education, and actions to compensate affected groups
- Allocate institutional responsibilities for overseeing the developer's adherence to its environmental requirements, for incorporating environmental management into further planning, and for enforcing any restrictions or carrying out any monitoring.

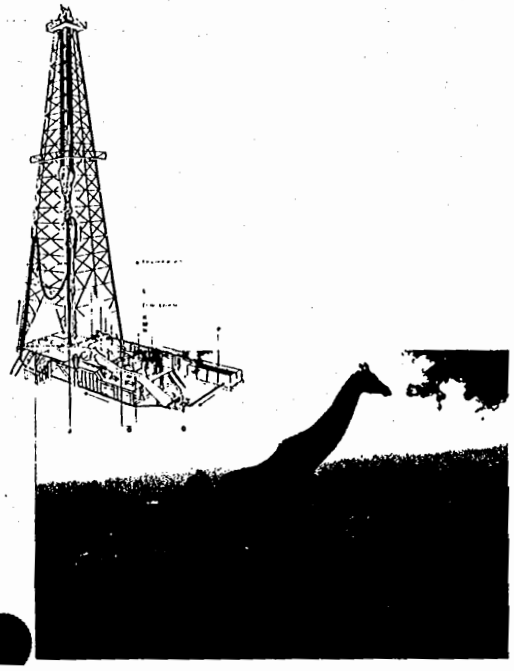


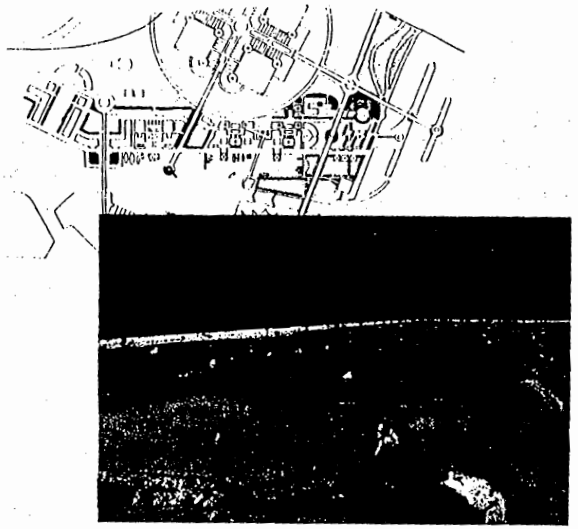
Sometimes, the competent authority sends the EIA to a review panel for comment on its adequacy and quality, before reaching its decision. The decision-maker may call for further study to answer additional questions about the project. The decision-maker may also ask that an opportunity be provided for public review and involvement. The competent authority simply places copies of the report on public display, and invites the public to comment. The EIA team may then be asked to re-draft the EIA to take account of the comments made, before a decision is taken. In cases where the decision-maker chooses to reject the proposed project altogether, there should be an appeal process open to the project developers.

The EIA's usefulness does not end with the decision on a course of action about the project. It still has several further contributions to make to the project's success:

- If the project goes ahead with recommended changes, the EIA's findings should be used to help shape the project to suit the environment, by influencing engineering designs
- Decisions that need to be made in the latter phases of project planning, such as precisely where to route supporting road or rail links, should be based on the EIA
- The EIA's precautions on environmental impacts can be part of the brief for tendering on contracts, and should be re-drafted as environmental safety guidance for workers.

Lastly, after the project is completed, a 'post audit' can be done to determine how close the EIA's predictions were to the project's real impacts. This forms a valuable record for others doing EIAs on similar projects in the future.



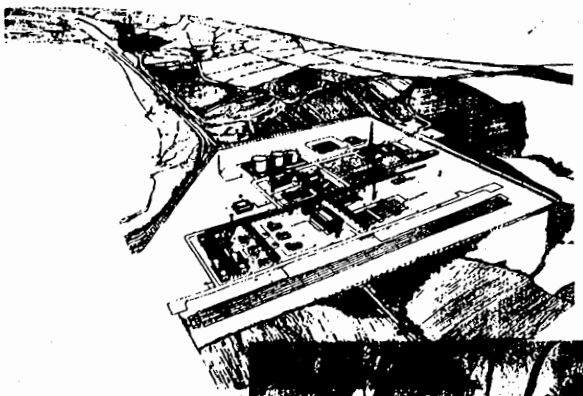


Resources needed for an EIA

Because of the EIA's acknowledged importance in planning a country's sustainable economic growth, EIAs are now undertaken throughout the world, even in places with very few resources to give to planning initiatives. There are, however, certain minimum resources needed to perform EIAs that can successfully shape major projects:

- **Qualified multi-disciplinary staff.** This includes a skilled manager (to co-ordinate the activities, communicate with decision-makers, and motivate the study team), trained specialists (in fields such as environmental science, rural and urban planning, economics, waste and pollution control, process engineering, landscape design, sociology and cultural anthropology), and a communications expert.
- **Technical guidelines, agreed with the competent authority,** for carrying out the various phases of the EIA process, especially screening, scoping, prediction, evaluation and mitigation.
- **Information about the environment** (especially relating to the impacts being considered after 'scoping') which can be sorted and evaluated.
- **Analytical capabilities** for doing field work, laboratory testing, library research, data processing, photomontage, surveys and predictive modelling.
- **Administrative resources** for the day-to-day running of the EIA process, including office staff, meeting rooms and support, communications facilities and records management.
- **Institutional arrangements,** including a formal procedure for consultation with the decision-makers and other interested groups, the authority to obtain the necessary information of the proposed project, and a formal process for integrating the EIA into decision-making about projects.
- **Review, monitoring and enforcement powers,** to ensure that accepted mitigation measures are included in the development.

Among the resources needed to perform an EIA, not least are **money** and **time**. As concerns time, the following are averages for a sampling of recent EIAs: preliminary assessments take between 2 and 10 weeks to complete; full EIAs may last between 3 months and 2 years. Regarding costs, officials often balk at some of the figures they hear, but developers and investors will realise that they represent but a very small percentage of the costs of any major development project – nearly always less than 1%. Indeed, it is a relatively small price to pay to prevent costly unforeseen problems, to promote development that can be sustained, to help prevent potentially ruinous environmental catastrophes, and to obtain approval and acceptance. EIAs mean better, more successful projects; they are a good investment in the future, for both the developer and the economy as a whole.



What to do next

If you want to know more about Environmental Impact Assessments done in your own country, consult these likely sources:

- The Ministry in charge of environmental protection
- Authorities empowered to grant building or other permits
- Environmental research centres
- Universities and related research establishments.

To find out more about how to do Environmental Impact Assessment, contact the United Nations Environment Programme (UNEP) at one of the following addresses:

- **United Nations Environment Programme**
  Regional Office for Asia and the Pacific
  The United Nations Building, Rajadamnern Avenue
  Bangkok 10200, Thailand
- **United Nations Environment Programme**
  Industry and Environment Office
  Tour Mirabeau
  39-43, Quai Andre Citroen
  75739 Paris Cedex 15, France
- **United Nations Environment Programme Headquarters**
  PO Box 30552, Nairobi, Kenya

UNEP can provide guidelines on the EIA process, examples of EIAs done throughout the world, reference materials on EIA techniques, and assistance finding the necessary resources, including expert advice.

The Governing Council of UNEP has adopted 'Goals and Principles of Environmental Impact Assessment'. In brief, the goals are:

- To take environmental effects into account in decisions by competent authorities
- To promote beneficial EIA procedures in all countries
- To encourage consultation between States on projects involving impacts across national boundaries.

First among UNEP's principles for EIA is that environmental effects should be considered before doing any project, and that EIAs should be done when significant effects are expected. The other principles cover many of the points about the EIA process which are discussed in this booklet: who to involve, how to focus the process, and how to integrate it with decision-making about the proposed project.

Environmental Impact Assessment
Basic procedures for developing countries
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Appendix C

Appendix C: Background Readings on Global and Regional Environmental Issues

[Reproduced with permission from "Agenda for Change", Keating, M., 1993, Center for Our Common Future]

Foreword

The United Nations Conference on Environment and Development (UNCED), which took place in Rio de Janeiro in June 1992, was a milestone event which brought together Heads of State and government officials from around the globe together with delegates from United Nations agencies, international organizations and many representatives from non-governmental organizations.

The Conference made it plain that we can no longer think of environment and economic and social development as isolated fields. The Declaration of Rio contains fundamental principles on which States must base their future decisions and policies, considering the environmental implications of socio-economic development.

Agenda 21, a vast work programme for the 21st century, represents the consensus reached by 179 States in Rio. It is a blueprint for a global partnership aimed at reconciling the twin requirements of a high quality environment and a healthy economy for all peoples of the world.

This historic document is 700 pages long and embraces all areas of sustainable development. Because this document concerns each and every one of us, it is essential that it is accessible to all.

This effort by the Centre for Our Common Future to transform this mammoth document into a plain language version is aimed at facilitating access to the very important material contained in Agenda 21. We hope that this plain language version can contribute to enhancing public interest in the future of our planet and encourage individuals to become an active part of the search for sustainable development.

Philippe Roch
Director
Swiss Federal Office of Environment, Forests and Landscape

The Road to Rio

During the last two decades, people began to realize that we cannot have a healthy society or economy in a world with so much poverty and environmental degradation. Economic development cannot stop, but it must change course to become less ecologically destructive. The challenge of the 1990s is to put this understanding into action, and make the transition to sustainable forms of development and lifestyles. From the farm field to the boardroom, from the shopping cart to the national budget, we will have to make major changes.

A road map to sustainable development is now taking shape. Agenda 21 is a guide for business and government policies and for personal choices into the next century. It was endorsed by the 1992 Earth Summit in Rio de Janeiro, Brazil, the largest-ever meeting of world leaders. This meeting took place during the United Nations Conference on Environment and Development which brought together the heads or senior officials of 179 governments. They were joined by hundreds of officials from United Nations organizations, municipal governments, business, scientific, non-government and other groups. Nearby, the '92 Global Forum held a series of meetings, lectures, seminars and exhibits on environment and development issues for the public. This drew 18,000 participants from 166 countries, as well as 400,000 visitors. There were 8,000 journalists covering the Rio meetings, and the results were seen, heard and read about around the world.

The foundations for the Rio process were laid in 1972, when 113 nations gathered for the Stockholm Conference on the Human Environment, the first global environmental meeting. In 1983, the United Nations created the World Commission on Environment and Development. Four years later its landmark report, *Our Common Future*, warned that people had to change many of the ways in which they did business and lived or the world would face unacceptable levels of human suffering and environmental damage.

The Commission said that the global economy had to meet people's needs and legitimate desires, but growth had to fit within the planet's ecological limits. The Commission, known as the Brundtland Commission after its chairman, called for "a new era of environmentally sound economic development". It said that: "Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."

In 1989, the United Nations began planning a Conference on Environment and Development to spell out how to achieve sustainable development. For two years, experts from around the world hammered out difficult agreements along the road to Rio. The international negotiating system was opened up as never before. Thousands of people from non-governmental organizations, businesses, education, women's groups, indigenous groups and others contributed to the Rio process.

The Five Rio Documents

Rio produced two international agreements, two statements of principles and a major action agenda on world-wide sustainable development. The five are:

- The Rio Declaration on Environment and Development. Its 27 principles define the rights and responsibilities of nations as they pursue human development and well-being.
- Agenda 21, a blueprint on how to make development socially, economically and environmentally sustainable.
- A statement of principles to guide the management, conservation and sustainable development of all types of forests, which are essential to economic development and the maintenance of all forms of life.

Two major international Conventions were negotiated separately from but in parallel with preparations for the Earth Summit and were signed by most governments meeting at Rio.

- The aim of the United Nations Framework Convention on Climate Change is to stabilize greenhouse gases in the atmosphere at levels that will not dangerously upset the global climate system. This will require a reduction in our emissions of such gases as carbon dioxide, a by-product of the use of burning fuels for energy.
- The Convention on Biological Diversity requires that countries adopt ways and means to conserve the variety of living species, and ensure that the benefits from using biological diversity are equitably shared.

Agenda 21 explains that population, consumption and technology are the primary driving forces of environmental change. It lays out what needs to be done to reduce wasteful and inefficient consumption patterns in some parts of the world, while encouraging increased but sustainable development in others. It offers policies and programmes to achieve a sustainable balance between consumption, population and the Earth's life-supporting capacity. It describes some of the technologies and techniques that need to be developed to provide for human needs while carefully managing natural resources.

Agenda 21 provides options for combating degradation of the land, air and water, conserving forests and the diversity of species of life. It deals with poverty and excessive consumption, health and education, cities and farmers. There are roles for everyone: governments, business people, trade unions, scientists, teachers, indigenous people, women, youth and children. Agenda 21 does not shun business. It says that sustainable development is the way to reverse both poverty and environmental destruction.

We currently gauge the success of economic development mainly by the amount of money it produces. Accounting systems that measure the wealth of nations also need to count the full value of natural resources and the full cost of environmental degradation. The polluter should, in principle, bear the cost of pollution. To reduce the risk of causing damage, environmental assessment should be carried out before starting projects that carry the risk of adverse impacts. Governments should reduce or eliminate subsidies that are not consistent with sustainable development.

A major theme of Agenda 21 is the need to eradicate poverty by giving poor people more access to the resources they need to live sustainably. By adopting Agenda 21, industrialized countries recognized that they have a greater role in cleaning up the environment than poor nations, who produce relatively less pollution. The richer nations also promised more funding to help other nations develop in ways that have lower environmental impacts. Beyond funding, nations need help in building the expertise – the capacity – to plan and carry out sustainable development decisions. This will require the transfer of information and skills.

Agenda 21 calls on governments to adopt national strategies for sustainable development. These should be developed with wide participation, including non-governmental organizations and the public. Agenda 21 puts most of the responsibility for leading change on national governments but says that they need to work in a broad series of partnerships with international organizations, business, regional, state, provincial and local governments and non-governmental and citizens' groups.

As Agenda 21 says, only a global partnership will ensure that all nations will have a safer and more prosperous future.

Background Information

Developing Countries

The phrase "developing countries" is used throughout the Rio documents. There is no single definition for this term, but it generally refers to economic income. Depending on whose definition you use, the term can include more than 140 countries

Further Reading

The *Earth Summit's Agenda for Change* condenses nearly 180,000 words from the five Rio documents into a form that allows you to understand the key points.

The full text of Agenda 21 is available as *Agenda 21: The United Nations Programme of Action from Rio*. This 310 page UN Publications document also contains the Rio Declaration on Environment and Development and the Statement of Principles on Forests. It can be obtained from: UN Publications, Sales Section, Room DC2-0853, United Nations, New York, NY 10017, USA.

The texts of the climate and biodiversity Conventions can be obtained from: Project Manager for Sustainable Development, Department of Public Information, Room S-894, United Nations, New York, NY 10017, USA.

Based on the final text of Agenda 21, *The Global Partnership for Environment and Development: A Guide to Agenda 21*, provides a comprehensive understanding of the issues underlying Agenda 21. It can be obtained from: UN Publications, Sales Section, Room DC2-0853, United Nations, New York, NY 10017, USA.

Rio Declaration on Environment and Development

Recognizing the integral and interdependent nature of the Earth, our home, the nations meeting at the Earth Summit in Rio de Janeiro adopted a set of principles to guide future development. These principles define the rights of people to development, and their responsibilities to safeguard the common environment. They build on ideas from the Stockholm Declaration at the 1972 United Nations Conference on the Human Environment.

The Rio Declaration states that the only way to have long-term economic progress is to link it with environmental protection. This will only happen if nations establish a new and equitable global partnership involving governments, their people and key sectors of societies. They must build international agreements that protect the integrity of the global environment and the development system.

The Rio principles include the following ideas:

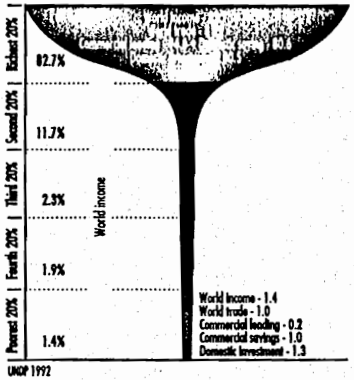
- People are entitled to a healthy and productive life in harmony with nature.
- Development today must not undermine the development and environment needs of present and future generations.
- Nations have the sovereign right to exploit their own resources, but without causing environmental damage beyond their borders.
- Nations shall develop international laws to provide compensation for damage that activities under their control cause to areas beyond their borders.
- Nations shall use the precautionary approach to protect the environment. Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation.
- In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process, and cannot be considered in isolation from it.
- Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and meet the needs of the majority of people.
- Nations shall cooperate to conserve, protect and restore the health and integrity of the Earth's ecosystem. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.
- Nations should reduce and eliminate unsustainable patterns of production and consumption, and promote appropriate demographic policies.
- Environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available.
- Nations shall enact effective environmental laws, and develop national law regarding liability for the victims of pollution and other environmental damage. Where they have authority, nations shall assess the environmental impact of proposed activities that are likely to have a significant adverse impact.
- Nations should cooperate to promote an open international economic system that will lead to economic growth and sustainable development in all countries. Environmental policies should not be used as an unjustifiable means of restricting international trade.
- The polluter should, in principle, bear the cost of pollution.
- Nations shall warn one another of natural disasters or activities that may have harmful transboundary impacts.
- Sustainable development requires better scientific understanding of the problems. Nations should share knowledge and innovative technologies to achieve the goal of sustainability.
- The full participation of women is essential to achieve sustainable development. The creativity, ideals and courage of youth and the knowledge of indigenous people are needed too. Nations should recognize and support the identity, culture and interests of indigenous people.
- Warfare is inherently destructive of sustainable development, and Nations shall respect international laws protecting the environment in times of armed conflict, and shall cooperate in their further establishment.
- Peace, development and environmental protection are interdependent and indivisible.

Preamble to Agenda 21

Humanity stands at a defining moment in history. The world is confronted with worsening poverty, hunger, ill health, illiteracy, and the continuing deterioration of the ecosystems on which we depend for our well-being. The disparities between the rich and poor continue.

The only way to assure ourselves of a safer, more prosperous future is to deal with environment and development issues together in a balanced manner. We must fulfil basic human needs, improve living standards for all and better protect and manage ecosystems. No nation can secure its future alone; but together we can — in a global partnership for sustainable development.

Agenda 21, adopted at the Earth Summit in Rio de Janeiro, reflects a global consensus and political commitment at the highest level on development and environment cooperation. The Agenda deals with both the pressing problems of today and the need to prepare for the challenges of the next century.

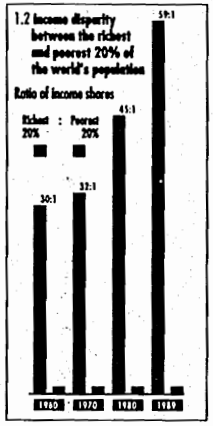


1.1 **Global income and economic disparities**

Distribution of world income and economic activity, 1989 - percentage of world total (Quintiles of population ranked by income)

UNDP 1992

It recognizes that sustainable development is primarily the responsibility of governments, and this will require national strategies, plans and policies. The efforts of nations need to be linked by international cooperation through such organizations as the United Nations. The broadest public participation, and the active involvement of the non-governmental organizations and other groups should also be encouraged.



1.2 **Income disparity between the richest and poorest 20% of the world's population**

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The objectives of Agenda 21 require substantial new financial assistance for developing countries. They need this additional support to cover the incremental costs of actions to deal with global environmental problems, and to accelerate sustainable development. Money is also needed to allow international bodies to implement the recommendations of Agenda 21.

Special attention should be given to nations whose economies are in transition, including eastern Europe and the former Soviet Union, where countries are transforming economies, sometimes in the midst of considerable social and political tension.

2

International Cooperation

A partnership of the world's nations is essential for an efficient and equitable global economy that can help all countries to achieve sustainable development.

A trading system that favours the optimal distribution of global production can contribute to sustainable development, as long as this is done under sound environmental policies.

The world trading system should allow efficient producers, especially those in developing countries, to market their products successfully. If poorer nations could earn more from exports, they would have more resources to invest in sustainable forms of development.

The export earnings of many developing countries dropped substantially during the 1980s, due to very low and declining prices for most commodities on international markets. In some cases, competition came from subsidized products. There is a need for agreement between producers and consumers that establishes fair prices for commodities, including those such as cocoa, coffee, sugar and tropical timber.

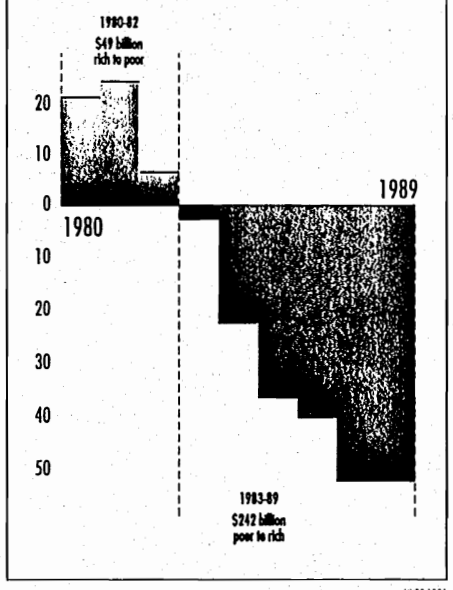
This drop in revenues, combined with heavy foreign debts, left many developing nations with little to invest in sustainable development.

Developing countries critically need investments to stimulate economic growth and meet the basic needs of their people in a sustainable manner. They should diversify exports and cooperate more among themselves in economic development plans.

During the past decade, many developing countries paid out more in debt repayments to

2.1

Debt-related net transfers



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developed nations than the total amount they received from exports and development assistance. These developing nations had to reduce imports, investment and consumption, and they were less able to fight poverty at home. In some cases, the financial drain resulted in cuts in health care, education and environmental

protection. As a result, some developing countries are in a state of economic stalemate, and face increasing social and environmental problems.

An international strategy is needed to reverse these trends. Countries need to:

- Halt and reverse protectionism, including unilateral trade barriers that harm developing nations, and promote trade liberalization.
- Reduce subsidies that lead to unequal forms of competition.
- Ensure that environment and trade policies support sustainable types of development.
- See that environmental regulations, including those related to health and safety standards, do not constitute a means of arbitrary or unjustifiable discrimination, or a disguised restriction on trade.
- Ensure public input in the formation, negotiation and implementation of trade policies.

The strategy should involve both additional investment from abroad, the return of flight capital that left poor nations, and efficient utilization of resources. The world needs to provide financial assistance and find ways of reducing the foreign debt of many developing nations, particularly of the poorest countries.

The world also needs to offer assistance to developing nations in managing and diversifying their economies, and in managing natural resources for sustainability. Market forces such as interest and foreign exchange rates need to be stable. The prices of commodities in all nations need to reflect the environmental and social costs of their production.

In order to encourage investment, nations need to eradicate corruption and ensure effective, efficient, honest, equitable and accountable public administrations, along with individual rights and opportunities. They need to provide price stability, realistic foreign-exchange rates and efficient tax systems, and to foster the development of private business.

☛ *For more information on this subject, please see Chapter 33: Financing Sustainable Development.*

UNDP 1992

2.2

Widening economic gaps between regions

Percentage of global economic activity

	Global GNP		Global trade		Global commercial bank lending		Foreign private investment	
	1960	1989	1970	1989	1970	1989	1970	1989
Sub-Saharan Africa	1.9	1.2	3.8	1.0	0.3	0.3	24.8	15.0
South Asia	3.1	2.8	1.3	0.9	0.1	0.1	1.5	3.1
East and South-East Asia (excl. China)	1.7	2.9	4.1	8.1	5.7	12.8	11.7	33.3
China	3.0	2.0	0.8	1.9	0.4	0.2	11.8	7.0
Arab States	1.5	2.5	3.3	4.1	1.5	2.4	9.8	13.2
Latin America and the Caribbean	4.7	4.4	5.6	3.3	0.8	6.4	40.4	28.4
Developing countries	15.9	15.8	18.9	19.3	8.8	22.2	100.0	100.0
Least developed countries	1.0	0.5	0.8	0.4	0.2	0.1	1.7	2.2
Industrial countries	84.1	84.2	81.1	80.7	91.2	77.8		

3

Combating Poverty

Poverty has so many causes that no one solution will solve all the problems in every country.

Each nation needs its own programme to eradicate such root causes of poverty as hunger, illiteracy, inadequate medical and child care, lack of employment and population pressures. The actions of individual governments must receive support, including financial assistance, because the struggle against poverty is the shared responsibility of all countries.

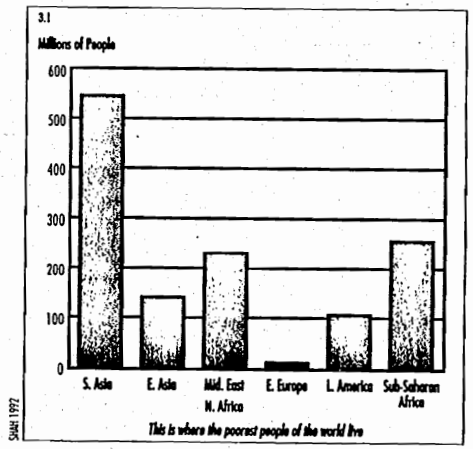
The United Nations and its member nations should make the reduction of poverty a major priority.

The aim of anti-poverty programmes is to make people better able to earn a living in a sustainable way. The poor need to become more self-sufficient, rather than having to depend on foreign aid and food shipments. Economic development is needed in poor nations to provide jobs for today's unemployed and under-employed and for the growing work forces.

To be sustainable over the long term, development plans must deal with the conservation and protection of resources. A development policy that focuses mainly on increasing the production of goods without ensuring the sustainability of the resources on which production is based will sooner or later run into declining productivity. This could increase poverty.

One way that national governments can encourage development is to give more responsibility and resources to local groups and to women. Peoples' organizations, women's groups and non-governmental organizations are

Measured in terms of dollars, the world has 157 billionaires, some 2 million millionaires and more than 1.1 billion people with an income of less than US$ 1 per day.



important sources of innovation and action at the local level. They have a proven ability to promote sustainable livelihoods.

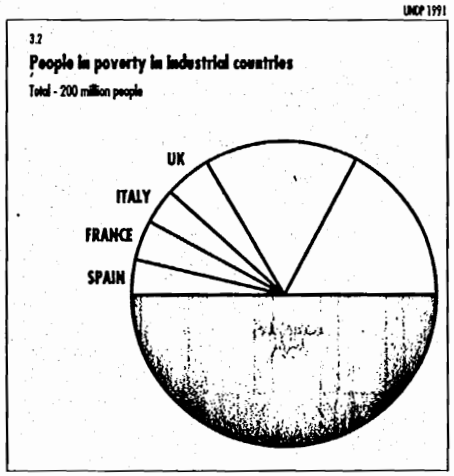
Local people need to participate in the protection and sustainable management of natural resources. They need access to land, natural resources and enough money to become productive. They also need to share in the benefits of natural resources from their regions. Many people need more education and training in order to become more productive. This can be

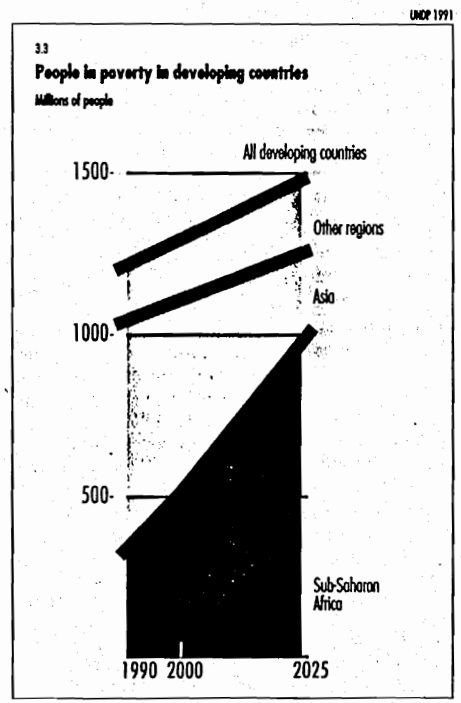
achieved through community-based learning centres for sustainable development. These need to be linked, so that communities can share their expertise.

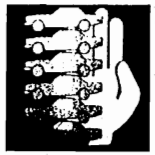
There is an urgent need for family planning in parts of the world. Women and men need the same right to decide freely and responsibly on the number and spacing of their children. They need access to information, education and appropriate means to enable them to exercise this right. Governments should provide health programmes and facilities, which include women-centred, women-managed, safe and effective reproductive health care and affordable, accessible services for responsible family planning. They should provide the opportunity for all women to breast-feed fully, at least during the first four months post partum.

Poverty-stricken nations will not be able to develop if they are burdened with huge foreign debts, are unable to finance their development, and if prices for their commodities remain low on world markets. Financial assistance needs to be provided in ways that deal with environmental concerns and maintain basic services to the poor and needy.

The struggle against poverty is the shared responsibility of all countries.







4

Changing Consumption Patterns

The major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in the industrialized countries.

Excessive demands and unsustainable lifestyles among the richer segments of humanity place immense stress on the environment. The poorer segments, meanwhile, are unable to meet food, health-care, shelter and educational needs. This pattern, which aggravates poverty in the world, is a matter of grave concern. It is essential to have sustainable consumption patterns in order to reach the goals of Agenda 21.

We must examine the demand for natural resources generated by unsustainable consumption and seek ways of using resources that minimize depletion and reduce pollution.

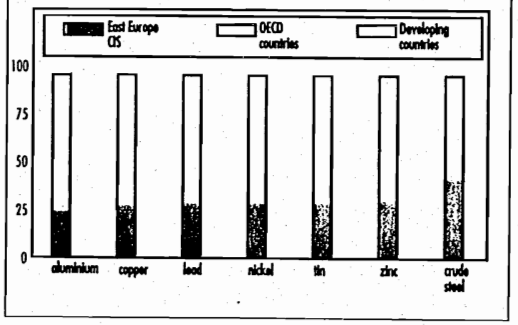
We must consider the need for new concepts of wealth and prosperity, which allow higher standards of living through changed lifestyles and are less dependent on the Earth's finite resources and more in harmony with the Earth's carrying capacity. Some economists are questioning traditional concepts of economic growth. They underline the importance of pursuing economic objectives that take account of the full value of natural resource capital. This may require the development of new indicators that include sustainability in the measurements of the economic well-being of nations.

Achieving sustainable development will require efficiency in production and changes in consumption patterns. In many instances, this will require reorientation of existing production and consumption patterns which have developed in industrial societies and are, in turn, emulated in much of the world.

All countries should strive to promote sustainable consumption patterns, but developed countries should take the lead in achieving this goal.

Developing countries should try to establish sustainable consumption patterns as they build their economies. They need to guarantee the provision of basic needs for the poor, while avoiding unsustainable patterns which are generally recognized as unduly hazardous to the environment, inefficient and wasteful. Such development will require technological and other assistance from industrialized countries.

4.1
World Consumption of Metals (by percentage)



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In order to develop sustainably, countries need to:

- Find ways of making economies grow and prosper while reducing the use of energy and materials and the production of waste.
- Identify balanced patterns of consumption worldwide which the Earth can support in the long term.

Governments should strive to:

- Promote efficient production and reduce wasteful consumption.
- Develop policies that encourage a shift to sustainable patterns of production and consumption.
- Encourage the transfer of environmentally sound technologies to developing countries.

Governments and industries need to cooperate in the development of environmentally sound and sustainable ways of using resources and of producing and using energy. Reducing the amount of materials and energy used to produce goods and services reduces environmental stress and increases economic productivity and competitiveness.

Society needs to cope with mounting levels of waste products by encouraging recycling, reducing wasteful packaging and encouraging the introduction of more environmentally sound products. In many countries, a more environment-conscious consumer public has emerged, combined with increased interest on the part of some industries in providing environmentally sound consumer products.

Governments, in cooperating with industry and other groups and through such means as consumer legislation, should develop or expand environmental labelling and other information that informs people of the health and environmental impact of products.

Governments themselves are often big consumers, and they should review their purchasing policies to improve the environmental content, where possible.

Significant changes in consumption and production patterns seem unlikely to occur soon without the stimulus of prices and market signals that make clear the environmental costs of the consumption of energy, materials and natural resources and the generation of wastes. The use of market signals, such as environmental charges and taxes and deposit and refund systems, should be encouraged.

It is important that individuals take responsibility for consuming goods and services in a sustainable manner. Government and business can promote sustainable consumption through education, public-awareness programmes and the positive advertising of products and services that encourage sustainability.

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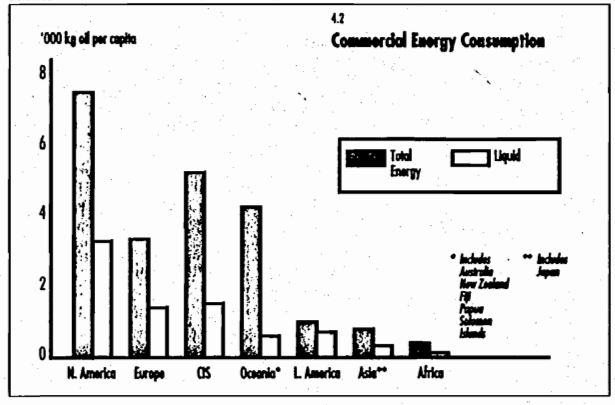
4.2
Commercial Energy Consumption



5

Population and Sustainability

The world's growing population and production, combined with unsustainable consumption patterns, is putting increasing stress on air, land, water, energy and other essential resources. The world's population was more than 5.5 billion in 1993, and is expected to exceed 8 billion by the year 2020.

Development strategies will have to deal with the combination of population growth, health of the ecosystem, technology and access to resources. The primary goals of development include poverty alleviation, secure livelihoods, good health and quality of life, including an improvement in the status of women. Development plans have to deal with such needs as food security, basic shelter, essential services, education, family welfare, reforestation, primary environmental care and employment.

Development strategies will have to deal with the combination of population growth, ecosystem health, technology and access to resources.

Population concerns should be part of national sustainable development strategies, and countries should establish population goals and programmes. Countries need to assess how the age structure of their populations will create future demands for resources.

Countries need to know their national population-carrying capacity. Special attention should be given to critical resources, such as water and land, and environmental factors, such as ecosystem health and biodiversity. (The carrying capacity is the ability of the resource base to support and provide for the needs of humans without becoming depleted.)

The world needs to do a better job of forecasting the possible outcomes of current human activities, including population trends, per capita resource use and wealth distribution. One outcome that may be expected is major migrations as a result of climate change and the cumulative environmental

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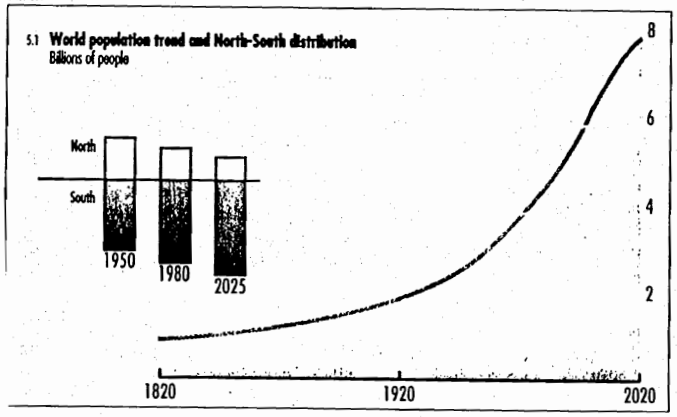
5.1 **World population trend and North-South distribution**
Billions of people



change that may destroy people's local livelihoods. The world will need policies to deal with both the migrations that result from and lead to environmental disruption.

Sustainable development will require reproductive health programmes to reduce maternal and infant mortality, and provide men and women with the information and means to plan family size. Women should have access to pre-natal care, and the opportunity to breast-feed for at least four months after birth. They should also be assured of education and job opportunities.

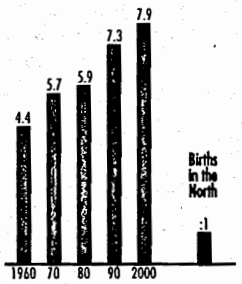
Population programmes need to be part of broader policies that also deal with such factors as ecosystem health, technology and human settlements, and with socio-economic structures and access to resources. Resource management must be able to cope with the needs of the people and be sustainable over the long term.

Population programmes will require the support of political, indigenous, religious and traditional authorities, the private sector and the scientific community. The programmes will also need adequate funding, including support to developing countries.

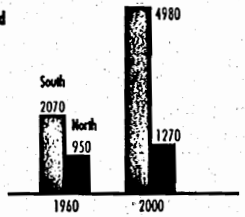
Population programmes need to be part of broader policies.

Countries need to know their national population-carrying capacity.

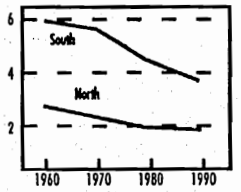
5.2 **Shifting demographic balance**
Ratio of births in the North to births in the South



Global population trend
Millions



Fertility rate



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6

Protecting and Promoting Human Health

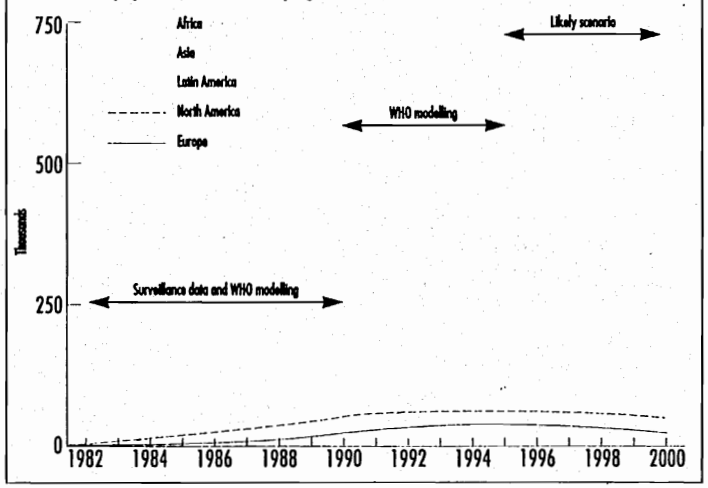
Human health depends on a healthy environment, including clean water, sanitary waste disposal and an adequate supply of healthy food. We must care for both human health and the health of our environment.

Among the challenges facing the world:

- At least 15 million children a year die from such preventable causes as birth trauma and asphyxia, acute respiratory infections, malnutrition and diarrhoea. Youth is increasingly vulnerable to drug abuse, unwanted pregnancy and sexually transmitted diseases.
- Most women in developing countries lack the means to improve their health and socio-economic status, or control reproduction. They continue to face increasing poverty, malnutrition and general ill-health.
- Despite the development of vaccines and other medicines, many people still suffer from such diseases as polio, cholera, tuberculosis, leprosy, diarrhoea, malaria and schistosomiasis. These result from a lack of housing, clean water and sanitation, combined with inadequate health care.
- In many regions, urban growth has outstripped society's capacity to meet human needs, leaving hundreds of millions without adequate livelihood, food, shelter or other services. Urban pollution is linked to illness and death, while overcrowding and poor housing contribute to tuberculosis, meningitis, respiratory and other diseases.
- HIV is expected to infect 30 to 40 million people by the year 2000, creating a pandemic that will affect all countries. This AIDS-related virus will substantially increase health costs, but the cost in lost income and the decreased productivity of working people will be even higher.

6.1

Estimated and projected incidence of AIDS by region, 1982-2000



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- Pollution, from such sources as energy production and use, industry and transportation, affects the health of hundreds of millions of people. Despite some improvements, environmental deterioration continues, because pollution controls have not kept pace with economic development.
- Indigenous peoples, whose traditional lifestyles have often been fundamentally changed, suffer higher than average rates of unemployment, poor housing, poverty and ill health.

Good health depends on social, economic and spiritual development, and a healthy environment, including safe food and water. The world needs to use a broad-based campaign against ill health, ranging from training in molecular biology to educating mothers on how to prevent and treat diarrhoea at home. People need health education, immunization and essential drugs. Health care should be adapted to local needs, and local people trained to maintain and repair medical equipment.

Within the overall strategy to achieve health for all by the year 2000, some major goals for the world are:

- Eliminate guinea-worm disease (dracunculiasis) and polio, and control onchocerciasis (river blindness) and leprosy.
- Mobilize and unify national and international efforts to control HIV Infection.
- Control tuberculosis, especially the new drug-resistant varieties.
- Provide 95 per cent of the world's children with treatment for acute respiratory infections.
- Cut the number of deaths from childhood diarrhoea in developing countries by 50 to 70 per cent.
- Have anti-malaria programmes in all countries where malaria presents a significant health problem.
- Reduce measles deaths by 95 per cent by 1995.

Every country needs a health action plan that includes a national public health system. Countries need to:

- Have a national health watch able to monitor and forecast the introduction of or increase in communicable diseases.
- Develop community-based health-care systems that meet basic health needs for clean water, safe food and sanitation.
- Ensure men and women of the same right and means to choose responsibly the number and spacing of their children.
- Provide children with basic health care, including immunization and nutrition, and protect them from sexual and workplace exploitation.
- Use effective traditional knowledge in national health-care systems.
- Develop programmes to control outdoor and indoor forms of air pollution and to dispose of solid wastes safely.
- Control the distribution and use of pesticides to minimize health risks.

All countries should have programmes to identify environmental health hazards and reduce the risks. They need to make environment and health safeguards part of national development programmes, and train people to deal with environmental health hazards.

Human health depends on a healthy environment.

7

Sustainable Human Settlements

By the year 2000, half the world's people will be living in cities. The urbanization of society is part of the development process, and cities generate 60 per cent of gross national product.

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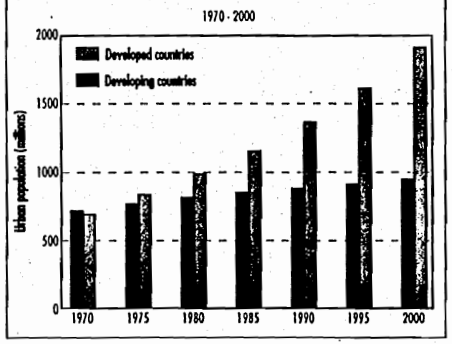
7.1 The growth of urban populations in developed and developing regions, 1970 - 2000



A growing number of cities, however, are showing symptoms of the global environment and development crisis, ranging from air pollution to homeless street dwellers. In most developing countries, a lack of clean water and sanitation leads to widespread ill-health and many preventable deaths each year.

To make urban life more sustainable, governments should see that the homeless poor and unemployed get access to land, credit and low-cost building materials. People also need security of tenure and legal protection against unfair eviction. Informal settlements and urban slums should be upgraded to ease the deficit in urban shelter. All urban areas need such services as clean water, sanitation and waste collection, and higher-income neighbourhoods should pay the full cost of providing such services.

Construction programmes should emphasize local materials, energy-efficient designs, materials that do not harm health and the environment, and labour-intensive technologies that employ more people.

Transportation uses about 30 per cent of the world's commercial energy production and consumes about 60 per cent of the world's petroleum production. Exhaust gases pollute urban air with ground-level ozone, particulate matter, carbon monoxide and other gases, all of which harm health. National action programmes are needed to promote energy-saving and renewable energy technologies, such as solar, hydro, wind and biomass. Transportation strategies should reduce the need for the motor vehicles by favouring high-occupancy public transport, and providing safe bicycle and foot paths. Municipalities need to be developed in ways that reduce the need for long-distance commuting.

Countries need to reduce urban poverty by supporting the informal economic sector, which operates many small businesses. Governments need to develop urban renewal projects in partnership with non-governmental organizations.

To reduce migration to the big cities, governments should improve rural living conditions and encourage the development of medium-sized cities that create employment and

housing. Sound management is needed to prevent urban sprawl onto agricultural land and environmentally fragile regions.

It also important to see that settlements are built in locations and using designs and materials that reduce the risk of damage from such natural disasters as storms, flooding, earthquakes and landslides.

Developing countries need financial and technical assistance to help train experts in such fields as urban planning, waste reduction, water quality, sanitation, energy efficiency and clean, efficient transportation.

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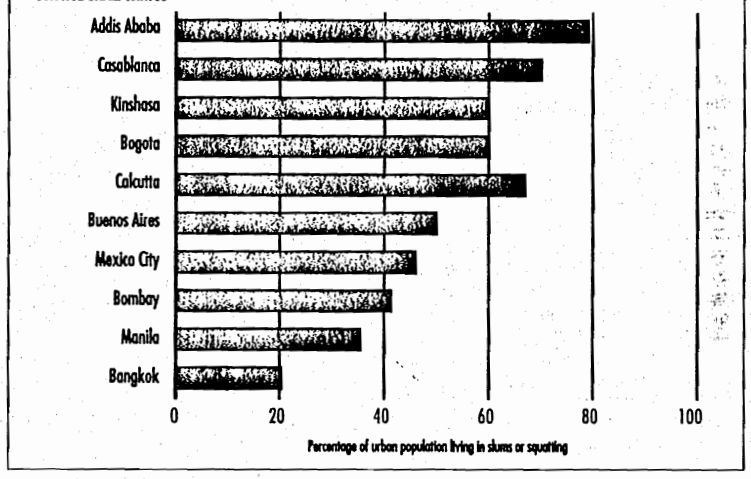
7.2 Percentage of people living in slum areas and as squatters in selected urban centres



By the year 2000, half the world's people will be living in cities.

8

Making Decisions for Sustainable Development

The way most people make decisions, whether in government, business or as individuals, separates economic, social and environmental factors.

It is necessary to understand the links between environment and development in order to make development choices that will be economically efficient, socially equitable and responsible, and environmentally sound.

Some governments have begun to consider systematically the environmental impacts of economic, social, fiscal, energy, agricultural, transportation, trade and other policies. More groups are participating in development decisions through discussions among national and local governments, industry, science, environmental groups and the public.

Governments should create sustainable development strategies to integrate social and environmental policies in all ministries and at all levels, including fiscal measures and the budget.

The strategies should aim for socially responsible economic development while protecting the resource base and the environment for the benefit of future generations. The strategies should be developed through the widest possible participation.

Moving decision-makers from narrow sectoral approaches towards integrating environmental issues into sustainable development policy-making will require changes in information-gathering, management techniques and planning.

To make informed decisions, people need regular sustainable development progress reports that integrate economic and social conditions and trends with information on the state of the environment and natural resources. National accounting systems should measure the crucial role of the environment as a source of natural capital, and as a sink for our waste by-products.

Much environment and development law-making seems to be ad hoc and piecemeal, or lacks enforcement and updating. Governments need to foster the evolution of sustainable development law, based on sound economic, social and environmental principles and appropriate risk assessment, and backed up by enforcement.

Prices, markets and governmental fiscal and economic policies also shape attitudes and behaviour towards the environment. There is a tendency to treat the environment as a "free good", and to pass the costs of environmental damage to other parts of society, other countries, or future generations. Environmental costs need to be clearly visible to producers and consumers, and prices should reflect the relative scarcity and total value of resources. These changes are needed in such fields as energy, transportation, agriculture, forestry, water, wastes, health and tourism.

Governments should remove or reduce subsidies that do not meet sustainable development objectives, and move towards pricing policies consistent with these goals.

Advice and technical support in using markets to make development more sustainable should be provided to countries whose economies are developing or are in transition to market systems.

9

Protecting the Atmosphere

Our atmosphere is under increasing pressure from greenhouse gases that threaten to change the climate and from chemicals that reduce the ozone layer. Other pollutants, including those that cause acid rain, often travel long distances through the atmosphere to cause damage on land and water. In many parts of the world, these harmful subtances often cross national borders before they land.

Energy use is a major source of emissions. The use of energy is essential to economic and social development and improved quality of life. Much of the world's energy, however, is produced and consumed in ways that cannot be sustained if overall quantities increase substantially. Controlling emissions will depend on greater efficiency in energy production, transmission, distribution and consumption, and on creating environmentally sound energy systems.

At the same time, there is a need for equity and enough energy to meet increasing consumption in developing countries. Consideration is also needed for countries that are highly dependent on the export or consumption of fossil fuels, or use a lot of energy in their industries. Some countries do not have easy alternatives to fossil fuels.

Governments need to:

- Develop more precise ways of predicting levels of atmospheric pollutants and greenhouse gas concentrations that would cause dangerous interference with the climate system and the environment as a whole.
- Modernize existing power systems to gain energy efficiency, and develop new and renewable energy sources, such as solar, wind, hydro, biomass, geothermal, ocean, animal and human power.
- Help people learn how to develop and use more efficient and less-polluting forms of energy.
- Coordinate regional energy plans so that environmentally sound forms of energy can be produced and distributed efficiently.
- Promote environmental assessment and other ways of making decisions that integrate energy, environment and economic policies in a sustainable manner.
- Develop energy efficiency labelling programmes for consumers.

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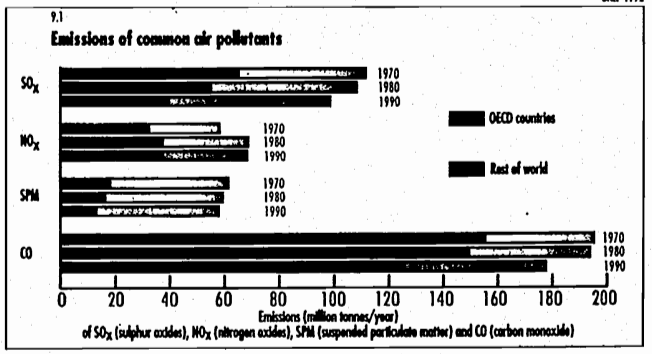


Transportation is essential for economic and social development, and the need will undoubtedly increase, but this activity is also a source of atmospheric emissions.

Governments should:

- Promote national energy efficiency and emission standards, and increase public awareness of environmentally sound energy systems.
- Develop efficient, cost-effective, less polluting and safer rural and urban mass transport, along with environmentally sound road networks.
- Encourage forms of transportation that minimize emissions and harmful effects on the environment.
- Plan urban and regional settlements to reduce the environmental impacts of transport.

Industry provides goods, services and jobs, but the industrial use of resources and materials causes atmospheric emissions. Industry needs to make more efficient use of materials and resources, instal pollution controls, replace chlorofluorocarbons (CFCs) and other ozone-depleting substances with safer substitutes, and reduce wastes. There are environmental and economic benefits from increasing efficiency and waste reduction.

Governments should:

- Use administrative and economic measures that encourage industry to develop safer, cleaner and more efficient technologies.
- Help transfer such technologies to developing countries.
- Use environmental impact assessments to foster sustainable industrial development.

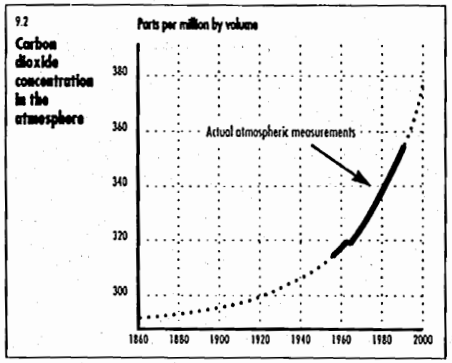
Certain uses of the land and seas can decrease the amount of plant material available to take carbon dioxide, a greenhouse gas, out of the air. Governments should promote the sustainable management and conservation of natural greenhouse gas sinks and reservoirs, including forests and salt-water ecosystems.

The planet's stratospheric ozone layer continues to decline because of releases of CFCs, halons and other substances containing reactive chlorine and bromine. Governments should put into force international agreements calling for reductions in the use of ozone-depleting substances. It is necessary to develop safe substitutes for these chemicals, and to see that they are made available to developing as well as developed countries.

Based on research on the effects of more ultraviolet radiation reaching the Earth's surface, governments should consider measures to protect human health, agriculture and life in the seas.

Governments should create or strengthen regional agreements, such as the 1979 Convention on Long-range Transboundary Air Pollution, in order to reduce flows of pollutants that harm human health and forests, and acidify lakes and rivers. Countries should also have early-warning systems and responses for air pollution coming from industrial accidents, natural disasters or the destruction of natural resources.

Our atmosphere is under increasing pressure...



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10

Managing Land Sustainably

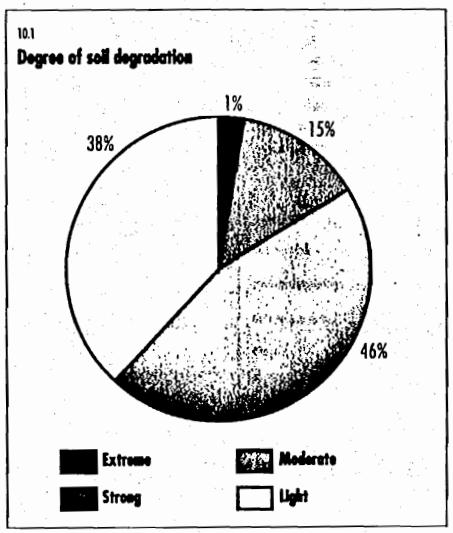
Increasing human demand for land and its natural resources is creating competition and conflicts. If we are going to meet human requirements in a sustainable manner, we must resolve these conflicts, and find more effective and efficient ways of using land and its natural resources.

The objective is to see that land is used in ways that provide the greatest sustainable benefits. The way to minimize conflicts and make the most efficient trade-offs and appropriate choices is to link social and economic development with environmental protection and enhancement. We also have to account for protected areas, private property rights, and the rights of indigenous people and other local communities.

As land-use choices arise, there are opportunities to support traditional patterns of sustainable land management, and to protect lands to conserve biological diversity and other ecological benefits.

Governments should take into account environmental, social, population and economic issues, then develop laws, regulations and economic incentives to encourage sustainable use and management of land resources. They should:

- Develop policies that take into account the land-resource base, population changes and the interests of local people.
- Improve and enforce laws and regulations to support the sustainable use of land, and restrict the transfer of productive arable land to other uses.
- Use techniques such as landscape ecological planning that focus on an ecosystem or a watershed, and encourage sustainable livelihoods.
- Include appropriate traditional and indigenous land-use practices, such as pastoralism, traditional land reserves and terraced agriculture in land management.
- Encourage the active participation in decision-making of those affected groups that have often been excluded, such as women, youth, indigenous people and other local communities.



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- Test ways of putting the value of land and ecosystems into national reports on economic performance, such as the gross national product (GNP).
- Ensure that institutions that deal with land and natural resources integrate environmental, social and economic issues into their planning.

The following are target dates:

- Develop policies for sustainable land management, and make it easier for all people affected by land planning to participate in decisions by 1996.
- Improve ways of coordinating land planning by 1998.
- Have stronger land planning and management systems by 2000.

Increasing human demand for land and its natural resources is creating competition and conflicts.

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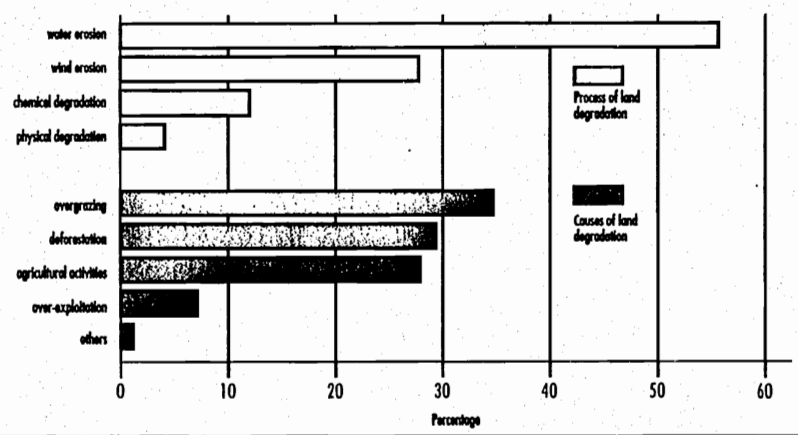
10.2
Processes and causes of land degradation



11

Combating Deforestation

Forests are a source of timber, firewood and other goods. They also play an important role in soil and water conservation, maintaining a healthy atmosphere and maintaining biological diversity of plants and animals.

Forests are renewable and, when managed in a way that is compatible with environmental conservation, can produce goods and services to assist in development.

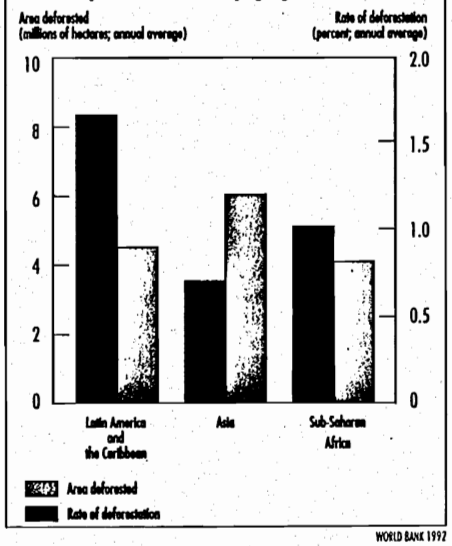
Now, forests world-wide are threatened by uncontrolled degradation and conversion to other uses because of increasing human pressure. There is agricultural expansion, overgrazing, unsustainable logging, inadequate fire control and damage from air pollution. Damage to and loss of forests causes soil erosion, reduces biological diversity and wildlife habitats, degrades watersheds and reduces the amount of fuel-wood, timber and other products available for human development. It also reduces the number of trees that can retain carbon dioxide, a greenhouse gas.

The survival of the forests depends on our recognizing and protecting their ecological, climate-control, social and economic values. These benefits should be included in the national economic accounting systems used to weigh development options.

There is an urgent need to conserve and plant forests in developed and developing countries to maintain or restore the ecological balance, and to provide for human needs. National governments need to work with business, non-governmental organizations, scientists, technologists, local community groups, indigenous people, local governments and the public to create long-term forest conservation and management policies for every forest region and watershed.

Better management will also require more information on the state of forests. In many cases, planners lack even basic information on the size and type of forests, and on the amount of wood being harvested.

11.1
Loss of tropical forests in developing regions, 1980-90



WORLD BANK 1992

Governments should create national action programmes for sustainable forestry development. This will require a broad range of actions, ranging from the use of satellite images of the forests through better logging equipment to government policies that encourage the most efficient use of the trees and other forest products.

Governments, along with business, non-governmental and other groups can:

- Plant more forests to reduce pressure on primary and old-growth forests. Plant valuable crops among the trees to further increase the value of managed forests.
- Breed trees that are more productive and resistant to environmental stress.
- Protect forests from fires, pests, poaching and mining and reduce pollutants that affect forests, including air pollution that flows across borders.
- Limit and aim to halt destructive shifting cultivation by addressing the underlying social and ecological causes.
- Use environmentally sound, more efficient and less polluting methods of forest harvesting and expand forest-based processing industries that use wood and other forest products.
- Minimize wood waste and find uses for tree species that are now discarded or ignored.
- Promote small-scale forest-based enterprises that support rural development and local entrepreneurship.
- Increase the amount of value-added secondary processing of forest products to increase the amount of employment and revenue for each tree harvested.
- Develop urban forestry for the greening of all places where people live.
- Promote the use of such forest products as medicinal plants, dyes, fibres, gums, resins, fodder, rattan, bamboo and works of local artisans.
- Encourage low-impact forest use, such as eco-tourism and the managed supply of genetic materials, such as those used to develop medicines.
- Reduce damage to forests by promoting sustainable management of areas adjacent to the trees.

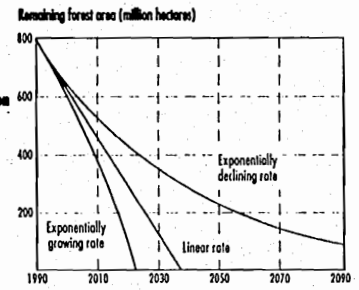
In order to get more value from their forests, some countries will need international cooperation in the form of advice on modern technologies, and the use of fair terms of trade, without unilateral restrictions and bans on forest products.

In addition to encouraging sustainable use of forests, countries need to create or expand protected area systems to preserve some forests. Such forests are needed to preserve ecological systems, biological diversity, landscapes and wildlife habitat. Forests also need to be preserved for their social and spiritual values, including that of traditional habitats of indigenous people, forest dwellers and local communities.

☛ *For more information on forests, please see the Statement of Principles on Forests.*

Governments should create national action programmes for sustainable forestry development.

11.2 **Some possible paths of tropical deforestation**



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12

Combating Desertification and Drought

Desertification is the process of land degradation caused by variations in climate and by human impact. It particularly affects drylands that are already ecologically fragile.

The most obvious impacts of desertification are the degradation of grazing lands, and a decline in food production. The results of drought and desertification include poverty and starvation. An estimated 3 million people died in the mid-1980s because of drought in sub-Saharan Africa.

The problem is very large. Seventy per cent of all the world's drylands — 3.6 billion hectares — are already affected by degradation. This is one-quarter of the world's land — an area three times larger than Europe. Degradation, particularly salination caused by inadequate drainage, affects large tracts of irrigated cropland.

The results of drought and desertification include poverty and starvation.

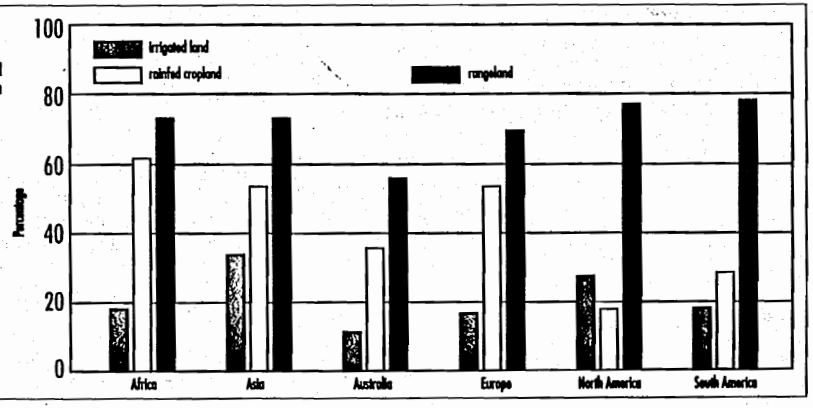
To stop desertification from spreading, land use, including farming and grazing, must be made environmentally sound, socially acceptable, fair and economically feasible.

One of the major tools to fight the spread of deserts is the planting of trees and other plants that retain water and maintain soil quality. Plantations can be harvested for such products as fuel, timber, fodder and food.

To combat desertification, governments should:

- Adopt national sustainable land-use plans and sustainable management of water resources.

12.1 **Percentage of drylands affected by desertification**



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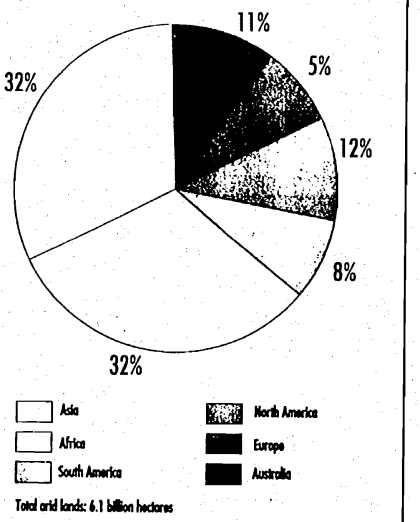
- Accelerate planting programmes, using fast-growing, drought-resistant local trees and other plants.
- Help to reduce the demand for fuel wood through energy efficiency and alternative energy programmes.

In areas prone to desertification and drought, traditional farming and grazing lifestyles are often inadequate and unsustainable, particularly in the face of increasing populations. Rural dwellers should be trained in soil and water conservation, water harvesting, agroforestry and small-scale irrigation. National anti-desertification programmes are needed to raise public awareness of measures needed to combat the problem.

In areas prone to desertification and drought, traditional farming and grazing lifestyles are often inadequate and unsustainable.

12.2
World arid lands, by continent



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Poverty is a major factor in accelerating the rate of degradation and desertification. To reduce pressure on the fragile lands, it is necessary to rehabilitate degraded lands, and provide alternative livelihoods for people. Rural banking and credit systems should be set up to help people establish small businesses that use local resources.

In addition, it is necessary to establish an international drought emergency-response system equipped with food, health care, shelter, transport and finances.

It is necessary to strengthen such programmes as Earthwatch and the Sahara and Sahel Observatory, as well as national and regional weather and water monitoring networks. Their information will help governments to develop land-use plans, and will provide early warning of droughts, so that people can prepare in time.

An international convention to combat desertification, particularly in Africa, should be prepared by June 1994.

National anti-desertification programmes are needed.

13

Sustainable Mountain Development

Mountains are important sources of water, energy, minerals, forest and agricultural products and areas of recreation. They are storehouses of biological diversity, home to endangered species and an essential part of the global ecosystem.

The fate of mountain ecosystems affects half the world's people. About 10 per cent of the Earth's population lives in mountain areas, while about 40 per cent occupies watershed areas below. From the Andes to the Himalayas, and from Southeast Asia to East and Central Africa, there is serious ecological deterioration in these watersheds. Causes include deforestation, excessive livestock grazing and cultivation of marginal soils.

Mountain ecosystems are susceptible to soil erosion, landslides and the rapid loss of habitat and genetic diversity. Among mountain dwellers, there is widespread unemployment, poverty, poor health and bad sanitation. Most mountain areas are experiencing environmental degradation.

The proper management of mountain resources and the socio-economic development of the people need immediate action. There is a need to develop land-use planning and management for mountain-fed watersheds by the year 2000. It should aim at preventing soil erosion, increasing the amount of tree and plant life, and maintaining the ecological balance in mountains.

There is also a need to provide services, such as education, health care and energy for local communities and indigenous people. The people also need more opportunities to earn livelihoods from such activities as sustainable tourism, fisheries, environmentally sound mining and cottage industries, such as the processing of medicinal and aromatic plants.

Governments should:

- Promote erosion-control measures that are low-cost, simple and easily used.
- Offer people incentives to conserve resources and use environment-friendly technologies, help them to understand what kind of development is environmentally sustainable in mountains and involve them in resource management.
- Produce information on alternative livelihoods involving, for example, crops, livestock, poultry, beekeeping, fisheries, village industries, markets and transport.
- Create protected areas to save wild genetic material.
- Identify hazardous areas that are most vulnerable to erosion, floods, landslides, earthquakes, snow avalanches and other natural hazards and develop early-warning systems and disaster-response teams.
- Identify mountain areas threatened by air pollution from neighbouring industrial and urban areas.
- Create centres of information on mountain ecosystems, including expertise on sustainable agriculture and conservation practices where people can turn for help in learning about sustainable mountain development.

The fate of mountain ecosystems affects half the world's people.

14

Sustainable Agriculture and Rural Development

Hunger is already a constant threat to many people, and the world's long-term ability to meet the growing demand for food and other agricultural products is uncertain.

The global population was 5.5 billion in 1993 and is expected to reach 8.5 billion by 2025, when 83 per cent of the world will be living in developing countries. One of the world's great challenges is to increase food production in a sustainable manner so that a rapidly growing global population can be fed.

The productivity of huge food-producing areas is declining, even as the demand for food, fibre and fuel is growing. Soil erosion, salination, waterlogging and loss of soil fertility are increasing in all countries. Increased ultraviolet radiation resulting from thinning of the stratospheric ozone layer may also reduce food production.

Agriculture has to meet the rising needs mainly by increasing productivity, because most of the world's best food lands are already in use. At the same time, further encroachment on land that is only marginally suitable for cultivation must be avoided.

Sustainable agriculture and rural development will require major adjustments in agricultural, environmental and economic policies in all countries, and at the international level. This requires cooperation involving rural people, national governments, the private sector and the international community.

The world's long-term ability to meet the growing demand for food and other agricultural products is uncertain.

Techniques for increasing production, reducing food spoilage and loss to pests and for conserving soil and water resources are already available but are not widely or systematically applied. By the turn of the century, governments should have sound food policies, based on an awareness of the environmental costs and benefits of various policy choices.

Sustainable land-use policies should encourage planning on a scale large enough to maintain the health of regional ecosystems, such as watersheds. People should be encouraged to invest in the future of the land by giving them ownership and providing access to resources, financing and means to market their produce at fair prices.

People need advice and training in the use of technologies and farming systems that conserve and rehabilitate land, while increasing production. These include conservation tillage, crop rotation, use of plant nutrients (including organic fertilizers), agroforestry, terracing and mixed cropping. Both modern and indigenous conservation techniques should be used.

The productivity of huge food-producing areas is declining.

More energy will have to be used to increase food production. This should involve a cost-effective mix of fossil and renewable energy sources, including fuels from wood and plants.

Better use of the world's great variety of plant and animal genetic resources is essential to diversify and increase food production and improve the quality of draught animals. There is a steady loss of invaluable plant and animal species, and efforts to promote genetic diversity are underfunded and understaffed. The benefits of research and development in plant breeding and seed production should be shared equitably between sources and users of the material.

The amount of food lost to pests has been estimated at 25 per cent of harvests. Chemical control of food pests has been dominant, but its over-use is costly and has adverse effects on human health and the environment. The best option is integrated pest management, which combines biological controls, host-plant resistance and appropriate farming practices, to minimize pesticide use. This technique guarantees food production, reduces costs and is environmentally less harmful.

To keep poor rural populations from using marginal lands, off-farm work such as cottage industries, wildlife utilization, fisheries, village-based light industries and tourism should be developed.

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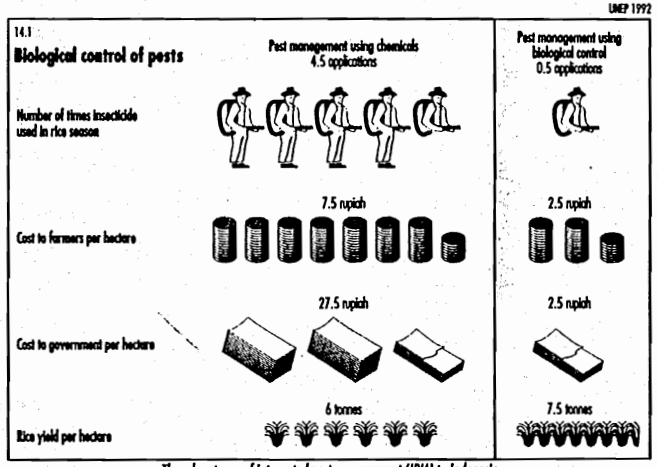

The advantages of integrated pest management (IPM) to Indonesia.
Farmers switched from chemicals to encouraging natural predators of the pest destroying their rice crops.

15

Conservation of Biological Diversity

The essential goods and services on our planet depend on the variety and variability of genes, species, populations and ecosystems.

Biological resources feed and clothe us, and provide housing, medicines and spiritual nourishment. Those resources are found in natural ecosystems of forests, savannahs, pastures and rangelands, deserts, tundras, rivers, lakes and seas. They are also in farm fields, gardens, gene banks, botanical gardens and zoos.

The loss of the world's biological diversity continues, mainly from habitat destruction, over-harvesting, pollution and the inappropriate introduction of foreign plants and animals. This decline in biodiversity is largely caused by humans, and represents a serious threat to our development.

Urgent and decisive action is needed to conserve and maintain genes, species and ecosystems. Recent advances in biotechnology show that genetic material in plants, animals and microorganisms has potential for agriculture, health and welfare of people and for environmental protection.

Governments, with the cooperation of the United Nations, non-governmental organizations, the private sector and financial institutions, should:

- Conduct national assessments on the state of biodiversity.
- Develop national strategies to conserve and sustainably use biological diversity and make these part of overall national development strategies.
- Conduct long-term research into the importance of biodiversity for ecosystems that produce goods and environmental benefits.
- Encourage traditional methods of agriculture, agroforestry, forestry, range and wildlife management which use, maintain or increase biodiversity. Involve communities, including women, in conserving and managing ecosystems.
- Implement fair and equitable sharing of benefits from the use of biological and genetic resources between the sources and users of these resources. Indigenous people and their communities should share in the economic and commercial benefits.

15.1

The socio-economic benefits of biodiversity

- About 4.5 per cent of GDP in the United States (some $87 billion per year) is attributable to the harvest of wild species.
- In Asia, by the mid-1970s, genetic improvements had increased wheat production by $2 billion and rice production by $1.5 billion a year by incorporating dwarfism into both crops.
- A 'useless' wild wheat plant from Turkey was used to give disease resistance to commercial wheat varieties worth $50 million annually to the United States alone.
- One gene from a single Ethiopian barley plant now protects California's $160 million annual barely crop from yellow dwarf virus.
- An ancient wild relative of corn from Mexico can be crossed with modern corn varieties with potential savings to farmers estimated at $4.4 billion annually worldwide.
- Worldwide, medicines from wild products are worth some $40 billion a year.
- In 1960, a child suffering from leukaemia had only one chance in five of survival. Now the child has four chances in five, due to treatment with drugs containing active substances discovered in the rosy periwinkle, a tropical forest plant originating in Madagascar.

UNEP 1992

- Protect natural habitats. Areas can be further protected by promoting environmentally sound development around them.
- Promote the rehabilitation of damaged ecosystems, and the recovery of threatened and endangered species.
- Develop sustainable uses of biotechnology, and ways of safely and equitably transferring it, particularly to developing countries.

Governments, business and development agencies need to learn more about how to evaluate the impact of development projects on biological diversity, and how to calculate the costs of losing this diversity. Projects likely to have significant impacts should undergo environmental impact assessments involving the wide public participation.

☛ *For more information on this issue, please see the section on the Convention on Biological Diversity.*

Biological resources feed and clothe us, and provide housing, medicines and spiritual nourishment.

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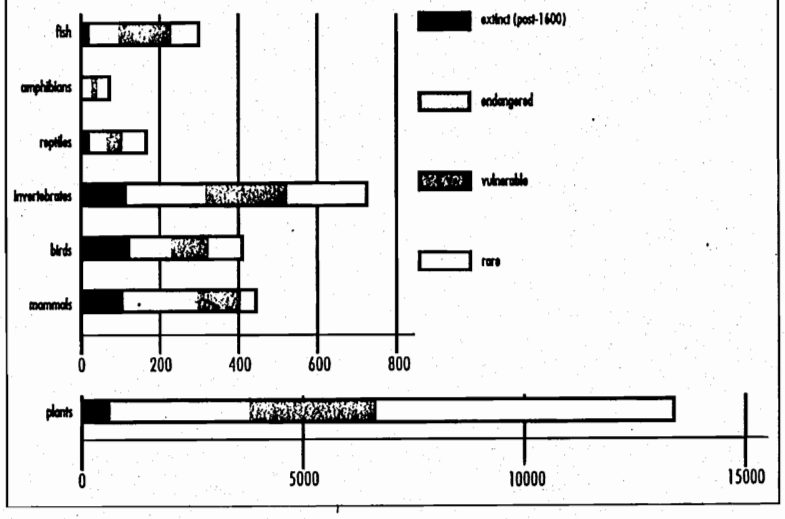
15.2

Number of extinct and threatened species



16

Management of Biotechnology

Biotechnology uses traditional knowledge and modern technology to change the genetic material in plants, animals and microbes and create new products.

It promises to make a significant contribution to better health, increased food production, better reforestation, more efficient industrial processes, decontamination of water and the cleanup of hazardous wastes.

Most of the developments in modern biotechnology have been in the industrialized world. Biotechnology offers new opportunities for global partnerships between these countries – rich in technological expertise – and developing countries, which are rich in biological resources but lacking in funds and expertise to use them.

Governments, working with international and non-governmental organizations, the private sector and academic and scientific institutions, should improve both plant and animal breeding through the use of traditional and modern biotechnologies. Indigenous peoples have much to contribute and should share in the economic and commercial benefits arising from biotechnology. Care must be taken that new techniques do not damage environmental integrity or pose threats to health. People need to be aware of both the benefits and the risks of biotechnology. There is a need for internationally agreed principles on risk assessment and management of all aspects of biotechnology.

Biotechnology needs to be developed to:

- Improve productivity and the nutritional quality and shelf-life of food and animal feed products.
- Develop vaccines and techniques for preventing the spread of diseases and toxins.
- Increase crop resistance to diseases and pests, so that there will be less need for chemical pesticides.
- Develop safe and effective methods for the biological control of disease-transmitting insects, especially those resistant to chemical pesticides.
- Contribute to soil fertility and increase the efficiency with which plants use soil nutrients, so that agriculture does not drain nutrients from the ground.
- Provide renewable energy sources and raw materials from organic waste and plant material.
- Treat sewage, organic chemical wastes and oil spills more cheaply and effectively than conventional methods.
- Develop currently under-utilized crops for food and industrial raw materials.
- Develop more productive strains of fast-growing trees, especially for fuel wood.
- Tap mineral resources in ways that cause less environmental damage.

The success of biotechnology programmes depends on highly trained scientific professionals. There is a need to reduce the "brain drain" from developing countries by creating training programmes in advanced technology, geared to meet regional or national needs. The programmes would benefit from funding to allow collaboration between researchers in different countries.

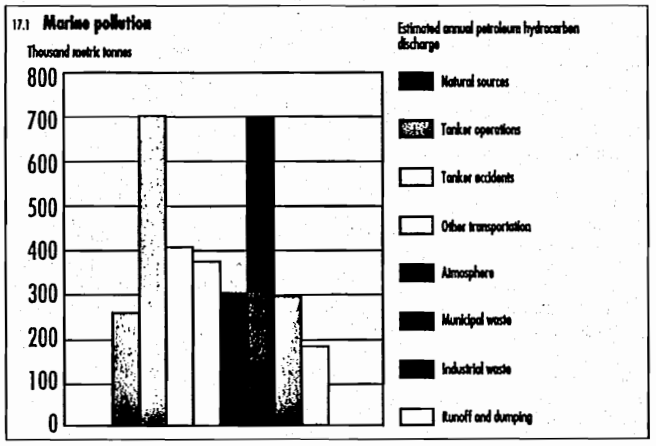
17

Protecting and Managing the Oceans

The oceans, including enclosed and semi-enclosed seas, are an essential part of the global life-support system. They cover much of Earth's surface, influence climate, weather and the state of the atmosphere and provide food and other resources for our growing world population.

The Law of the Sea provides an international basis for the protection and sustainable use of the seas. However, oceans are under increasing environmental stress from pollution, over-fishing and degradation of coastlines and coral reefs.

About 70 per cent of marine pollution comes from sources on land, including towns and cities, industry, construction, agriculture, forestry and tourism.



SHAH 1985

The contaminants that pose the greatest threat to the marine environment are sewage, chemicals, sediments, litter and plastics, metals, radioactive wastes and oil. Some of these materials are toxic, slow to break down in the environment and accumulate in living creatures. There is currently no global scheme to address marine pollution from land-based sources.

Pollution also comes from shipping and dumping at sea. About 600,000 tons of oil enter the oceans each year as a result of normal shipping operations, accidents and illegal discharges.

Nations commit themselves to control and reduce degradation of the marine environment so as to maintain and improve its life-support and productive capacities. It is necessary to:

- Anticipate and prevent further degradation of the marine environment and reduce the risk of long-term or irreversible effects on the oceans.
- Ensure prior assessment of activities that may have significant adverse impact on the seas.
- Make marine environmental protection part of general environmental, social and economic development policies.
- Apply the "polluter pays" principle, and use economic incentives to reduce pollution of the seas.

- Improve the living standards of coast-dwellers, particularly in developing countries, so people can help to protect the coastal and marine environment.

Nations need to build and maintain sewage-treatment systems, and avoid discharging sewage near shell fisheries, water intakes and bathing areas. Industrial discharges also need to be controlled and properly treated.

Countries should change sewage- and waste-management, agricultural practices, mining, construction and transportation to control the run-off of pollutants from diffuse sources.

Countries should consider:

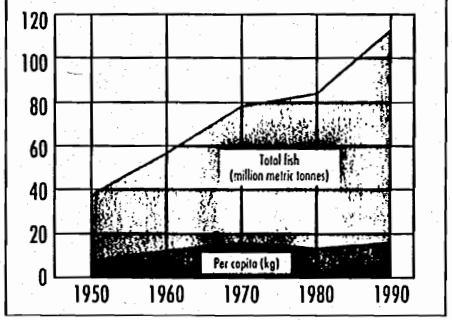
- Reducing or eliminating discharges of synthetic chemicals that threaten to accumulate to dangerous levels in marine life.
- Controlling and reducing toxic-waste discharges, and setting up safe land-based waste-disposal systems instead of dumping at sea.
- Stricter international regulations to reduce the risk of accidents and pollution from cargo ships.
- Controlling discharges of nitrogen and phosphorous that threaten to disrupt the marine environment by fertilizing excessive plant growth.
- Developing land-use practices that reduce run-off of soil and wastes to rivers, and thus to the seas.
- Using environmentally less harmful pesticides and fertilizers, and prohibiting those that are environmentally unsound. Using alternative methods for pest control.
- Stopping ocean dumping and the incineration of hazardous wastes at sea. Ports, marinas and fishing harbours should collect oil and chemical wastes and garbage. Pollution from ships should be controlled by stronger regulations.

Parts of the marine environment, such as coral reefs, mangroves and estuaries, are among the most highly diverse and productive of Earth's ecosystems. They protect coastlines and contribute to food, energy, tourism and economic development. In many parts of the world, these ecosystems are under stress or are threatened. Nations need to protect these ecosystems by such methods as controlling and preventing coastal erosion and silting, due to land uses such as construction.

Marine fisheries yield 80 to 90 million tons of fish and shellfish per year, 95 per cent of which is taken from waters under national jurisdiction. Fish landings have increased nearly fivefold over the past 40 years.

SMH 1990

17.2
World Fish Production



There are increases in over-fishing, unauthorized incursions by foreign fleets, ecosystem degradation and in inappropriate equipment that catches too many fish. There is inadequate knowledge of the state of fish stocks, and too little cooperation among nations to prevent over-fishing on the high seas. Countries need to deal with highly migratory fish stocks and those which swim across the boundaries of national economic zones, particularly into the high seas.

About 70% of marine pollution comes from sources on land.

Nations commit themselves to the conservation and sustainable use of marine life, including fish and marine mammals, which include whales, dolphins, porpoises and seals.

Nations should:

- Set policies for sustainable use of the seas, accounting for the needs of local communities and indigenous people.
- Develop more aquaculture, in which fish are raised in pens in the sea.
- Negotiate international agreements to manage and conserve fish.
- Strengthen surveillance and enforcement of fisheries regulations.
- Reduce wastage in the catching, handling and processing of fish, and minimize the catches of species that are often discarded.
- Assess the environmental impact of major new fishery practices, and use environmentally sound fishing technologies.
- Prohibit dynamiting, poisoning and comparable destructive fishing practices.
- Protect certain areas, including coral reefs, estuaries, mangroves and wetlands, seagrass beds and other marine spawning and nursery areas.
- Deter the reflagging of vessels as a way of avoiding compliance with fishery conservation rules.
- Control the use of large-scale drift-net fishing on the high seas.

Global warming caused by climate change is likely to cause sea levels to rise, and even a small increase could cause significant damage to small islands and low-lying coasts. Precautionary measures should be undertaken to diminish the risks and effects, particularly on small islands and low-lying and coastal areas. Already, more than half the world's population lives within 60 kilometres of the seashore, and this could rise to three quarters by the year 2020.

Small-island developing states are particularly vulnerable, and some could be totally lost to a rise in sea levels. Most tropical islands are now experiencing the more immediate impact of the increasing frequency of cyclones, storms and hurricanes associated with climate change. They need assistance to prepare contingency plans for sea-level rise.

Tropical islands are home to many unique species of plant and animal life, and they have rich and diverse indigenous cultures with knowledge of the sound management of island resources. Development options for such nations are limited by their small size and they need to:

- Investigate their carrying capacity — the level of use their ecosystems can support over the long term.
- Prepare sustainable development plans that emphasize multiple use of resources, integrate environmental and economic planning, maintain cultural and biological diversity, and conserve endangered species and critical marine habitats.
- Review and modify existing unsustainable policies and practices, and identify technologies that should be excluded because they threaten essential island ecosystems.

Other countries and international organizations should assist small-island developing nations to plan and implement sustainable development.

Marine fisheries yield 80 to 90 million tonnes of fish and shellfish per year.

18

Protecting and Managing Fresh Water

Fresh water is vital for drinking, sanitation, agriculture, industry, urban development, hydro-power generation, inland fisheries, transportation, recreation and many other human activities. It is also critical for the healthy functioning of nature.

In many parts of the world, there is widespread scarcity, gradual destruction and increased pollution of fresh-water resources. The causes include inadequately treated sewage and industrial waste, loss of natural water catchment areas, deforestation and poor agricultural practices, which release pesticides and other chemicals into the water. Dams, river diversions and irrigation schemes also affect water quality and quantity. All these practices harm aquatic ecosystems, and threaten living fresh-water resources.

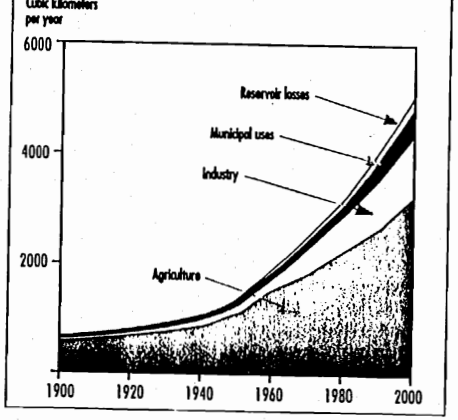
Food supplies for the world's growing population are highly dependent upon water, but irrigation systems have suffered from waterlogging and salt build-up, which reduce the land's ability to grow food.

Many of these problems are the result of a development model that is environmentally destructive, and a lack of public awareness and education about the need and the ways to protect water resources. There is widespread failure to understand the linkages between various forms of development and their impact on water resources.

In the developing world, one person in three lacks safe drinking water and sanitation — basic requirements for health and dignity. In these nations, an estimated 80 per cent of all diseases and over one-third of deaths are caused by consumption of contaminated water.

18.1

Estimated annual world water use, total and by sector, 1900-2000



WORLDWATCH 1993

Although there are uncertainties about global climate change, a temperature increase and a decrease in rain and snowfall would further strain the already fragile balance between water supplies and demand in some parts of the world. In other areas, increased precipitation might lead to floods. If the warming causes sea levels to rise, this could cause salt-water intrusion into estuaries and coastal aquifers and flood low-lying areas, particularly low islands. The Ministerial Declaration of the Second World Climate Conference states that "the potential impact of

such climate change could pose an environmental threat of an up to now unknown magnitude ... and could even threaten survival in some small island states, and in low-lying coastal, arid and semi-arid areas".

Faced with such an array of threats, ways must be found of supplying everyone on the planet with an adequate supply of good quality water. To do this, human activities must be adapted to fit within the limits of nature, so that the healthy functioning of ecosystems can be preserved. The way to provide all people with basic water and sanitation is to adopt the approach "some for all, rather than more for some". A realistic strategy to meet present and future water needs is to develop low-cost but adequate services that can be installed and maintained at the community level.

Better water management will require innovative technologies, including the improvement of indigenous technologies, to make full use of limited water resources and to safeguard the water from pollution. It will require that water management be integrated into national economic and social policies, including planning of land use, utilization of forest resources and the protection of mountain slopes and river banks.

The management of water resources should be delegated to the lowest appropriate level. It should include full public participation, including that of women, youth, indigenous people and local communities in water management and decision-making.

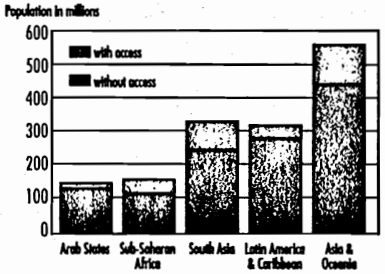
A realistic target date for universal water supplies is 2025. This can be achieved by developing low-cost services that can be built and maintained at the community level.

An interim set of goals for the year 2000 is:

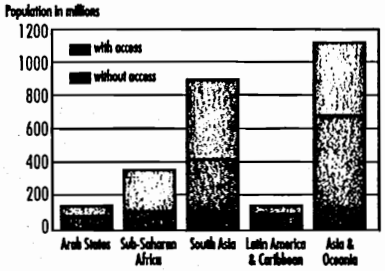
- To provide all urban residents with at least 40 litres of safe drinking water per person per day.
- To provide 75 per cent of urban dwellers with sanitation.
- To have in force standards for the discharge of municipal and industrial wastes.

18.2

Urban population: Access to safe water



Rural population: Access to safe water



SHAH 1991

- To have three-quarters of solid urban waste collected and recycled, or disposed of in an environmentally safe way.
- To ensure that rural people everywhere have access to safe water and sanitation for healthy lives, while maintaining essential local environments.

- To control water-associated diseases generally, and to set targets, such as the eradication of dracunculiasis (guinea-worm disease) and onchocerciasis (river blindness) by the year 2000.

Various approaches are needed to provide adequate water supplies and sanitation:

- There is a need for more research into the amount and quality of water that will be available for growing populations and economic needs. This comes at a time when water research lacks adequate funding and qualified experts.
- Water management must recognize the need to protect the integrity of aquatic ecosystems, and to prevent their degradation on a drainage-basin basis. Water protection should include the precautionary approach, with the aim of minimizing and preventing pollution.
- Nations need to identify and protect water resources and see that water is used on a sustainable basis. They need effective water pollution prevention and control programmes. There is a particular need for appropriate sanitation and waste-disposal technologies for low-income, high-density cities.
- There should be mandatory assessment of the environmental impact of all major water-resource development projects that have the potential to impair water quality and aquatic ecosystems.
- Alternative sources of fresh water must be developed. These include de-salting sea water, catching rain water - particularly on small islands, re-using waste-water and recycling water. Such projects must use low-cost water technologies that are available and affordable to developing countries.
- In developing and using water resources, priority has to be given to satisfying basic human needs and to safeguarding ecosystems. Beyond these requirements, water users should be charged appropriately.
- A prerequisite for the sustainable management of water as a scarce and vulnerable resource is the obligation to acknowledge its full cost during the planning and development of all projects.
- Nations need to protect the forest cover of watersheds, and minimize the impacts of agricultural pollutants on water.
- Fresh-water fisheries need to be managed to yield the greatest amount of food in an environmentally sound manner. Care must be taken that fishing and fish-farming do not damage the aquatic ecosystem.
- Livestock need adequate water supplies, and water quality has to be protected from contamination by animal wastes.
- New irrigation projects that may have significant environmental impacts should undergo environmental assessment while in the planning stage.

...some for all, rather than more for some.

In the developing world, one person in three lacks safe drinking water and sanitation...

The world needs more well-trained people to assess and develop fresh-water supplies and to manage water projects for sustainable use. Poor countries, in particular, need access to technologies that will allow them to assess their own water resources.

19

Safer Use of Toxic Chemicals

Chemicals are used throughout the world and are necessary to meet social and economic goals, but a better job must be made of reducing their health and environmental impacts.

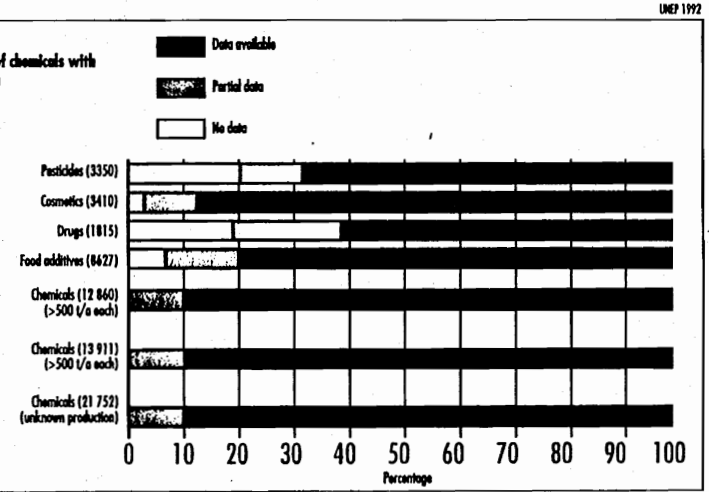
Some of the world's major industrial areas are so contaminated by chemicals that there is damage to human health, genetic structures and reproduction. In addition, long-range pollution is affecting the Earth's atmosphere and climate. The illegal traffic in toxic and dangerous products and wastes involves chemicals banned in one country as hazardous being shipped to other countries, often developing nations.

There are about 100,000 commercial chemicals, although only 1,500 of them account for 95 per cent of world production. However, crucial data needed to assess the health and environmental risks of a great number of these high-volume chemicals are lacking.

Chemicals can be used in a cost-effective manner and with a high degree of safety, but most countries, particularly developing nations, lack the ability to manage chemicals safely. Countries need to develop and share expertise in assessing chemical risks.

UNEP 1992

19.1 **Percentage of chemicals with toxicity data**



Background Reading (Module 2)
Global and Cross-Sectoral Issues in Environmental Review
(excerpted sections from World Bank, 1991)

The following background reading has been adapted from the World Bank's Environmental Assessment Sourcebook (World Bank, 1991), Chapter 2: "Global and Cross-Sectoral Issues in Environmental Review". It provides some background on the following key cross-sectoral and global issues:

Atmospheric Pollution
International Waterways
Biological Diversity
Wildlands
Wetlands
Arid and Semi-Arid Lands
Coastal Zone Management
Land and Water Resource Management
Environmental Issues in Land Resource Management
Land Clearing
Environmental Issues in Water Resource Management
Natural Hazards

This reading provides some useful guidelines for identifying projects that might have significant impacts, and in some cases suggests mitigation steps that can be followed. More complete information can be found in the World Bank EA Sourcebook itself; additional information related to Bank procedures, environmental assessments, and mitigation issues were excluded in the interest of conciseness.

Atmospheric Pollution

Atmospheric pollution refers to a variety of physical and chemical alterations of the atmosphere, including natural alterations such as volcanic emissions of particulate matter, and anthropogenic (manmade) alterations such as climate warming (the "greenhouse effect"), ozone depletion, acid rain, and the release of airborne toxic pollutants. This section will discuss two phenomena of global significance, climate warming and ozone depletion, together referred to as global change. It will also consider acid rain, which can have significant transboundary impacts.

The greenhouse effect is a natural component of the earth's climate by which certain atmospheric gases (known as greenhouse gases) absorb some of the radiant heat which the earth emits after receiving solar energy. This phenomenon is essential to life on earth as we know it, since without it the earth would be approximately 30 degrees centigrade cooler. However, certain anthropogenic activities have the potential to amplify the greenhouse effect by emitting greenhouse gases (primarily carbon dioxide, methane, nitrous oxide, chlorofluorocarbons and halons, and tropospheric ozone) to the atmosphere and causing their concentrations to increase. The result is an increase in mean global temperatures, i.e., climate warming.

Ozone (O3) is a gas that occurs at low concentrations throughout the earth's atmosphere, although most resides in the upper atmosphere, or stratosphere (from about 10 to 50 kilometers above the earth's surface), where it acts as a protective shield, preventing harmful ultraviolet radiation from reaching the earth's surface. Ozone is constantly formed and destroyed in the stratosphere, forming a balance between O3, O2, and O. However, reactive chlorine and bromine species, originating primarily from the use of chlorofluorocarbons (CFCs) and halons, promote the destruction of ozone and upset this balance. It is the chemical stability of CFCs and halons, and consequently their extremely long atmospheric lifetimes of up to a century and longer, that allows them to reach the stratosphere. Once in the stratosphere, ultraviolet radiation causes the release of chlorine and bromine atoms, which act as catalysts in the destruction of ozone. Through this process, CFCs and halons contribute to general ozone depletion, as well as to localized seasonal ozone

holes over Antarctica and perhaps also in the Arctic.

The **anthropogenic activities** that contribute to climate warming and ozone depletion are an integral part of human life and economic development. Anthropogenic increases in concentrations of carbon dioxide (CO2), which are responsible for about half of the climate forcing that occurred during the 1980s, result primarily from the combustion of fossil fuels (coal, oil, and natural gas) and tropical deforestation. Cement production produces a minor amount of CO2. Anthropogenic methane (CH4) emissions, responsible for about 15 percent of the climate forcing in the 1980s, result from agricultural activities (anaerobic decomposition of organic material in flooded rice fields and in the guts of domestic animals, burning of lands for pasture and crop management, and burning of agricultural wastes such as rice straw), fossil fuel production (coalbed methane release during mining, and venting and leakage of natural gas during production and transmission), and anaerobic decomposition in landfills. Anthropogenic nitrous oxide (N2O) emissions, responsible for about 5 percent of the climate forcing in the 1980s, result primarily from agricultural activities (use of nitrogen fertilizers, land clearing, and biomass burning). A small, uncertain portion of the N2O emissions arise from fossil fuel combustion. Tropospheric ozone, responsible for a small and highly uncertain portion of the climate forcing of the 1980s, is not emitted directly by human activity. However, its concentration is strongly governed by trace gas emissions resulting from industrial activity and transportation.

CFCs and halons are manmade chemicals, responsible for about 17 percent of the present climate forcing, and believed to the main cause of the ozone depletion observed to date. CFCs are used as aerosol propellants, refrigerants, electronics solvents, and in foam blowing and chemical production; halons are used for fire extinguishers. Two other long-lived, manmade chemicals, carbon tetrachloride, which is used in chemical production, as a solvent, and as a grain fumigant, and methyl chloroform, used in industrial degreasing, cold cleaning, and as a solvent, are additional important greenhouse gases as well as ozone depleters.

Anthropogenic emissions of greenhouse gases over the last century have already committed the earth to a warming of 1-2 degrees centigrade. An effective doubling of CO2 (an increase in the atmospheric concentrations of all the greenhouse gases that in total is equivalent to a doubling of the pre-industrial concentration of CO2), expected to occur around the middle of the next century, is predicted to result in warming of 1.5-4.5 degrees centigrade. For comparison, between the last glacial maximum (about 18,000 years ago) and today, average global temperature has risen about 5 degrees centigrade. Even over the last 700,000 years, the maximum global temperature swing was no greater than 5 degrees centigrade.

It is not only the magnitude of the potential warming that is alarming, it is also the **rate of expected climate change**. Natural eco- systems that could possibly migrate or adapt in a less rapidly changing world, may not be able to adjust quickly enough to survive. Potential impacts include loss of forests, wetlands, and other ecosystems, and the decline and possible extinction of many species. Managed systems may be more resilient, although impacts are still likely to be large, particularly in countries that are least equipped to adapt. Changes in temperature and precipitation will affect agricultural and water management practices. Sea level rise will cause coastal flooding and salt water intrusion into bays and coastal aquifers to increase, and will destroy valuable wetlands. The frequency of extreme weather events (e.g., heatwaves, hurricanes) is likely to increase, affecting human health and property, and natural and managed ecosystems. Higher temperatures may exacerbate air pollution, especially smog.

The **Antarctic ozone "hole"** was first recognized in the late 1970s, and its connection to the use of CFCs and halons was established about a decade later. Significant declines in ozone in the Southern Hemisphere mid-latitudes and more modest declines in the northern mid-latitudes observed in the 1980s, as well as the decrease in the global contration of ozone of a few percent between 1969 and 1986, are also believed to be due primarily to the use of CFCs and halons.

Continued **stratospheric ozone depletion** and the resultant increase in penetration of biologically-damaging ultraviolet radiation to the earth's surface will have harmful effects on human health and the environment. Solar ultraviolet radiation induces skin cancer, cataracts, suppression of the human immune response system, and indirectly (through immunosuppression) the development of some cutaneous infections,

such as herpes. Natural and managed ecosystems are likely to be affected through three mechanisms: (a) general damage to biological functions in plants resulting in stunted growth and lowered competitive capacity, (b) specific damage to DNA with similar effects, and (c) specific damage to germ cells resulting in increased mutation rates. Agricultural yields are likely to decrease and be of poorer quality, although plant breeding and genetic engineering may produce ultraviolet resistant crops. Nonmanaged ecosystems, however, may not fare so well; less resistant species will be more vulnerable and ecological balance may thus be threatened. Ozone depletion is also likely to cause accelerated degradation of plastics and paints used outdoors, and to exacerbate urban smog.

Because the gases responsible for climate warming and ozone depletion have very long lifetimes once they are introduced into the atmosphere, **delays in reducing emissions** produce a relatively longer commitment to global change, as amplified in Table 2.1. Although the magnitude of the effects are uncertain, they are potentially severe and possibly irreversible. Taking prompt action seems wise, in light of the risks associated with delay, as well as the fact that many commonly proposed actions make economic, social, and environmental sense on their own, such as:

- more efficient use of fossil fuel energy and development of alternative, renewable energy sources;
- reducing the rate of deforestation and increasing reforestation (e.g., carbon sink forests);
- collection and use (as an energy source) of coalbed methane and methane generated from anaerobic systems (landfills, animal wastes, etc.);
- more efficient agricultural practices (more efficient fertilizer use, sustainable rather than shifting agriculture); and . development and use of less damaging replacements for CFCs and halons.

Acid rain results from the presence of abnormally high atmospheric concentrations of substances that form acids in reaction with water -- principally sulfur dioxide (SO2) and, to a lesser extent, nitrogen oxides (NOx). These oxides are formed in nature (in volcanic gases and sea spray, for instance), but in highly industrialized or urbanized areas, man-made sources emit quantities which exceed natural amounts. Coal- and oil-fired generating plants are the largest sources of SO2, followed by use of high-sulfur coal and oil in industry and home heating. Energy generation and internal combustion engines are the largest sources of NOx. Data show that precipitation in wide areas of both Europe and North America is abnormally acidic.

Available evidence does not permit a complete assessment of the extent of **damage caused by acid rain** worldwide. However, poorlybuffered lakes and streams are susceptible to the changes in pH acid rain can cause, and food chains have been shown to be affected in North America and northern Europe. Certain tree species are also sensitive to acid rain, and forests have been affected on both of those continents. Stone buildings and monuments, among them many properties of historic and cultural importance, deteriorate faster where precipitation is acidic. In the cases of Canada, Germany, Yugoslavia and the Scandinavian countries, major sources of the SO2 that forms the acid rain are located in other countries.

Numerous development activities, such as the following, may influence climate change and ozone depletion:

- energy projects involving increased production, transportation, and consumption of fossil fuels;
- forestry projects involving clear-felling or intensive logging,
- construction of access roads and establishment of forest products industries which induce development and further forest clearing;
- agriculture projects involving conversion of forests to pasture or crops, cultivation of paddy rice, livestock management, use of nitrogen fertilizers, burning of savanna and other lands for pasture management, burning of agricultural wastes; and
- industrial development projects involving the use of CFCs, halons, and related manmade chemicals; and construction of landfills.

Activities that may **decelerate the threat** of global change are:

- energy projects involving increased fossil energy efficiencyand conservation, the development of alternative energy sources (e.g., biomass, solar, wind, hydroelectric, and cogeneration), collection and use of coalbed methane as an energy source, improved natural gas transmission systems to

reduce leakage;

- industrial development projects involving the use of substitutes for CFCs, halons, and related manmade chemicals; collection of methane from landfills and other waste streams and use as an energy source;
- forestry projects involving sustainable fuelwood use and agro-forestry development, forest conservation and reforestation/ afforestation;
- agriculture projects involving the development of sustainable systems, restoration of degraded lands and accumulation of soil carbon, and improved efficiency of livestock management and fertilizer use; and
- development of effective environmental regulations and agencies.

International Waterways

Projects involving international waterways ... are those corresponding to the following descriptions:

(a) Types of international waterways:

(i) river, canal, lake or any similar body of water which forms a boundary between, or any river or body of surface water which flows through two or more states, whether members of the Bank or not;

(ii) any tributary or any other body of surface water which is a part or component of any waterway described in (i) above; and

(iii) bays, gulfs, straits, or channels -- bounded by two or more states or, if within one state, recognized as necessary channels of communication between the open sea and other states -- and any river flowing into such waters.

(b) Types of projects:

(i) hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial, orsimilar projects which involve the use or pollution of international waterways as described above; and

(ii) detailed design and engineering studies of projects under (b)(i) above, including those to be carried out by the Bank as executing agency.

Waterways have always been important to countries, for trade and defense and as a commodity to be used, and likely will become more so as awareness of the interconnectedness of global resources (as reflected in such terms as "global commons") and as concern for global pollution and potential global threats (such as depletion of the ozone layer and global warming or forcing) grow.

Biological Diversity

Biological diversity, or **biodiversity**, refers to the variety of the world's biological resources -- its living organisms. It is a function not simply of the number of ecosystems and distinct plant and animal species in existence at any given time, but also of genetic differences within individual species. This great diversity of the world's plant and animal species has intrinsic value, simply for existing. Further, biological diversity is more than a concept; it is a precious natural resource -- a resource essential to human existence and commerce.

All **principal food crops** of today were derived from wild species, and the existence of genetic variability in the form of wild relatives of domestic crops is the source for continued improvement in yield and resistance to disease or stressful changes in environmental conditions. Many industries depend on plants and animals for tannin, resins, dyes, oils and other raw materials. A large number of modern drugs originate from wild species of fungi, bacteria, higher plants and animals. Many crops are pollinated by naturally occurring events. Wild species help prevent pest outbreaks. With only a small fraction of existing species inventoried (perhaps as few as five percent), the diversity of biological resources promises numerous

discoveries of useful products as yet unidentified.

No less important are the **intangible, cultural values** of biodiversity. Wild plant and animal species are sources of recreation and aesthetic pleasure to many people. They are deeply embedded in folklore and our shared heritage; they inspire works of art and expressions in languages and figure prominently in religions.

Biological diversity is also the characteristic of wild species and natural ecosystems that allows them to **withstand external stress.** Genetic variability within a species is the basis for its developing resistance to a disease or a change in climate which would otherwise cause its extinction. Species diversity affords stability to ecosystems; while a particular pollutant may destroy or drive away some of the species at one level in a food chain, others which are more resistant may remain to reproduce in greater numbers and sustain the organisms which depend on them.

Conservation of biological diversity is therefore a form of natural resource management which has as its primary goal maintaining the long-term potential of world biological resources to meet the needs and aspirations of future generations -- a fundamental principle of sustainable development. Natural resource management practices which seek only to maximize short-term productivity, and even some practices which maximize long-term productivity of specific resources, often have the opposite effect. Thus we are witnessing the **loss of biological diversity at an alarming rate**, due largely to the demands of growing populations on biological resources and habitats -- and the losses are irreversible. Some scientists believe 15 to 20 percent of the estimated 10 to 30 million species of plants and animals extant in 1980 may become extinct by the year 2000 if present trends continue. They estimate that extinctions are occurring 1,000 to 10,000 times more rapidly today than during the millions of years before human intervention become a significant force. These statistics illustrate the urgent need for sound management of natural resources (and especially for conservation of biological diversity) in the work of development agencies worldwide.

Examples of development activities which may have the most significant negative consequences for biological diversity are:

- agriculture and livestock projects involving land clearing, wetlands elimination, inundation for irrigation storage reservoirs, displacement of wildlife by fences or domestic livestock, heavy use of pesticides, introduction of cash crop monoculture into settings previously dependent on a large suite of local crops for subsistence agriculture;
- fisheries projects involving conversion of important natural breeding or nursery sites for aquaculture or mariculture, overfishing, introduction of exotic species in natural aquatic ecosystems;
- forestry projects involving construction of access roads, in- tensive logging, establishment of forest products industries which induce other development near the project site;
- transportation projects involving construction of highways, bridges, roads, railways, or canals, all of which may facili- tate access to and spontaneous settlements in natural areas;
- channelization of rivers;
- dredge and fill activities in coastal or inland wetlands;
- hydropower projects involving large water diversion, inunda- tion or other major transformation of aquatic or terrestrial natural areas, leading to habitat reduction or modification with resultant forced movement of fauna into new areas and likely violation of carrying capacity there;
- irrigation and other water supply projects that may remove water, drain wetland habitats or eliminate essential watering sources;
- industrial projects involving air, water, or soil pollution;
- large-scale loss of habitats due to mining and mineral exploration; and
- conversion of biological resources for industrial fuels or feedstocks.

Ideally, any implications for biological diversity will be among the major issues identified during the **screening** of proposed projects. During environmental reconnaissance conducted as part of an early preparation mission, the significance of the issues can be determined and any additional concerns identified. The resulting information is useful both for integrating biological diversity into project planning and design

and for establishing the scope of an environmental assessment or other environmental study which may be conducted in conjunction with project preparation. A **simple checklist** to assist in early identification of biological diversity issues is provided here.

(a) Identify the specific types of ecosystem the proposed project will affect (e.g., tropical forest, salt marsh, wet savanna, etc.). Are any of them wildlands of special concern or designated natural sites of national or international importance?
(b) What are important biological features of the ecosystems (e.g., habitat for endangered species, or only breeding and nesting area for a particular species)?
(c) Determine the general nature of the project's impact on ecosystems (e.g., deforestation, flooding, draining, changing hydrologic regime, facilitating human access, vehicle traffic and noise).
(d) Assess the significance of likely negative impacts relative to:
total area of ecosystem type in region and/or country (e.g., project will destroy approximately 10 percent of nation's remaining lowland swamp forest); and
cumulative effects and trends for ecosystem type (e.g., tidal wetlands area is being lost in the country at an annual rate of three percent a year; this project and two other harbor facilities projects planned for the coastal zone will involve a total of 6 percent of the remaining area).

In making a rapid assessment of habitats and species composition of plant and animal communities, the following are important information sources:

- publications on natural areas of special concern or international importance;
- national compilations of flora and fauna;
- stock assessments and timber, fish or other biological surveys providing census data and trends in species and populations;
- national or regional programs monitoring the status of or trends in biological resources; and
- local and regional research institutions and NGOs.

The technical aspects of mitigation plans for projects which may have adverse impacts on biological diversity include actions such as:

- establishing wildlands management areas or other protected habitats in the project's area of influence;
- establishing equivalent conservation units elsewhere in the region to offset unavoidable loss of habitat in the project area;
- designing buffer zones, wildlife corridors, and other features to maximize the benefits of the wildlife management areas or minimize impacts of the project on wildlife;
- restoring damaged habitats;
- creating new habitat, such as wetlands, artificial reefs, bird nesting sites; and
- maintaining rare or endangered species in special facilities, such as zoos, botanical gardens, seed storage.

Wildlands

Wildlands are natural land and water areas that have been modified by human activities only slightly or not at all. Any relatively undisturbed natural ecosystem may be a wildland; forests, grasslands, inland bodies of water, inland and coastal wetlands, and marine areas such as coral reefs are all examples.

Wildlands merit **special attention in environmental assessments**. They are valuable because (a) they constitute habitats for indigenous plant and animal species (and thus contribute to maintaining biological diversity); (b) they perform important environmental services for society at little or no direct cost; and (c) they are in some cases essential to the livelihood of indigenous peoples. Wildlands are vulnerable to the pressures of population growth, landlessness, and economic development and have been rapidly disappearing in many countries, developing and developed alike.

Wildlands of special concern are those recognized as exceptionally important in preserving biological

diversity or performing environmental services. Some of these have been **officially designated** by national governments, sometimes in collaboration with international agencies such as the United Nations (e.g., World Heritage Natural Sites). Others are as yet unprotected but recognized nationally or internationally as biologically unique, ecologically fragile, or of special importance for local people or environmental services.

Wildlands are potentially **linked to virtually every sector** ... either as resources which may be damaged or eliminated as a direct or indirect impact of a project, or as resources on which the success of the project in part depends.

- Agriculture and livestock projects may result in the displacement of wildlife and the elimination of wildlands.
- Aquaculture projects sometimes lead to loss of natural breeding and nursery grounds and disturbance of ecosystems by introduction of exotic species; many natural fisheries, however, are dependent on headwater and wetland nursery areas and may be adversely affected if these are not protected.
- Forestry projects may include logging of wildland areas and can facilitate uncontrolled access to them via logging roads.
- A variety of transportation projects, including roads, railways, canals, river dredging, and port development, also make wildland areas more accessible, induce development, and may directly eliminate wildlands.
- Shipping channel maintenance becomes more costly when a watershed has a high rate of soil erosion, which may be caused by the elimination of natural vegetation.
- Dams may inundate wildland areas but may also benefit from them for control of siltation, protection of reservoir water quality and maintenance of a balanced hydrologic cycle.
- Industrial development can affect wildlands adversely (through thermal pollution from cooling water discharges, for example, or chemical pollution of aquatic and terrestrial wildlands via water or air).

Environmental impacts on wildlands are often **intersectoral**. For instance, wetlands and headwaters are vulnerable to industrial or municipal wastewater discharges, agricultural runoff, siltation from forestry operations, or dredging and filling for transportation projects or shoreline development. If these wildland areas are not protected, fishery productivity and revenue can be diminished. Where the wildlands in question are tourist attractions, loss or damage can reduce tourism revenues as well.

There are also linkages to **regional or global environmental conditions**. Wildlands can be breeding, resting or wintering sites for fish or bird species which migrate long distances to other ecosystems. Large tracts of forest can have a moderating effect on regional climate, and destruction of them may also contribute to global warming.

The processes of analyzing project alternatives and predicting environmental impacts of the proposed project include consideration of potential effects on wildlands, and the environmental assessment report should present the results explicitly. **Measuring impacts** is a task for specialists in the types of ecosystems involved. It includes but is not limited to the following concepts:

- area lost, in absolute terms and as a proportion of the total area of the ecosystem type in the region or country;
- area altered, in the same terms, and the nature of the alteration;
- extent of change in resources critical to the wildland, e.g., water quality, freshwater flow, tidal flushing, ambient air quality, nutrient cycles;
- extent and duration of external disturbances (e.g., noise, smoke, dust and fumes during construction or operation; vehicle or ship traffic; visitors to previously undisturbed site; interference with animal migration or daily movement);
- extent of habitat loss or modification and the likely effects on numbers and diversity of plant and animal species;
- changes in plant and animal productivity, including economic value when possible (e.g., annual fishery revenue);
- losses in environmental service levels (e.g., waste assimilation, erosion control, and groundwater

recharge); replacement costs of the lost services);

- numbers of indigenous peoples affected and the nature of the impact;
- change in numbers of visitors, and associated revenues, if the wildland is an important tourist site;
- changes in other social benefits and services (e.g., recreation, aesthetic enjoyment, conservation education, medical research);
- indirect impacts of loss of wildland (e.g., increased pressures on remaining wildland areas, need for more frequent channel dredging); and
- indirect impacts of improved access to wildlands, such as increased tourist revenues, recreational benefits, poaching, disturbance of wildlife, illegal conversion to other land uses, and illegal harvesting.

...Often mitigation measures and management techniques, of which examples are listed below, will overlap or coincide.... Measures to be considered are:

- alternative project siting or routing to avoid wildlands;
- establishment of WMA's to provide for protection or some form of controlled use of wildlands (see Annex I of OPN 11.02 for categories of WMA) either in project area or elsewhere (as compensation for converted wildlands);
- including wildland-sensitive features in project design, such as fish ladders, wildlife passages or crossings, noise barriers;
- establishing buffer zones around wildlands;
- rehabilitating or creating ecosystems to offset wildland conversions or add to existing stock;
- supporting research programs relevant to wildlands management and preservation of biological diversity;
- strengthening wildland management institutions, both government and nongovernment, with staff, equipment, training, and support of enforcement activities; and
- establishing environmental and conservation education programs at local schools.

Wetlands

The United Nations convention on Wetlands of International Importance (**Ramsar Convention**) defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters." Among the most important wetlands are: tidal and fresh water marshes, bogs, fens, herbaceous and wooded freshwater and peat swamps, mangroves, coastal lagoons, floodplains, deltas and estuaries. Wetlands are wildlands of particular importance both economically and environmentally. The most important roles which wetlands perform are:

- **Production of services.** Wetlands can contribute to local rainfall and can be an efficient, low cost water purification system (herbaceous swamps), a recreation area (hunting, fishing, boating), a buffer against floods, and protection from coastal erosion by storms (mangroves).
- **Preservation of biological diversity**. For many species of shrimp, fish, and waterfowl, tidal and fresh water marshes, coastal lagoons and estuaries are of vital importance as breeding grounds as well as staging areas in their migration routes. All types of wetlands may harbour unique plants and animals.
- **Production of goods**. Wetlands are among the most productive ecosystems in the world. Estuaries and tidal wetlands, in particular mangroves, are important nursery areas for most species of fish and shrimp which are later caught offshore. Shallow water areas are, in general, rich fishing grounds. Floodplains are important grazing areas for cattle and wildlife and vital spawning grounds for many fish species. Swamp forest may yield valuable timber.

Note that certain of the roles of wetlands are institutionally significant. For example, fishes do not recognize national boundaries or may migrate long distances. Consequently, destruction or degradation of wetlands in one country may have direct impacts on the biological resources of others. (See "International Waterways" section.)

Despite their importance, wetlands everywhere are under threat. These **threats** come from conversion to intensive agriculture and/or aquaculture, industrial development, artificial hydrological changes or degradation through over-exploitation.

The issue of wetland conservation is relevant to a large variety of ... projects, such as:

- projects which affect the hydrology of a wetland, such as construction of a road or high dam, flood control, lowering of the aquifer drainage, and irrigation and other water supply systems;
- direct conversion of wetlands for agriculture, port facilities, navigation projects, and aquaculture (in particular mangroves for shrimp culture);
- projects which indirectly influence wetlands through disturbance of the ecological conditions, such as those causing pollutants to flow into the wetlands, those posing the threat of introduction of exotic species (aquaculture), those introducing physical disturbance by people, and those contributing to acid rain or to rise in sea level; and
- watershed management on other projects conducted for environmental purposes.

In case a particular project is likely to impact a wetland, the following **questions** are usually relevant.

- Is the area on the Ramsar list?
- Will there be changes in the hydrology of the wetland?
- Will the project pollute or increase nutrients or physical disturbance in the wetland?
- Will (parts of) the wetland be converted or will there be a change in use?
- What is the socioeconomic value of the wetland as it is used at present? What would be the sustainable yield under better management? What is the replacement cost of the free goods and services now being produced by the wetlands if it were destroyed?
- What institutions exist which can or could manage or protect the wetlands and what are their capabilities and limitations? . Are local people willing and able to adapt their traditional exploitation systems to the eventual changes in the wetland caused by the project?

In conversion of wetlands for agriculture, the costs associated with the loss of opportunity to exploit the wetlands sustainably should be incorporated into the economic analysis. However, many wetlands contain poor acid soils, hardly suitable for agriculture. Drainage and exposure to air exacerbates acidity, especially in mangroves.

When a project has potential adverse impacts on wetlands, the design should be modified to avoid them, or to **mitigate or compensate** for those that are unavoidable. Options include any or all of the following:

- selections of alternative sites to avoid impact on wetland;
- design features to prevent disturbance of the flow patterns and hydrologic regimes critical to conservation of the wetland (e.g., flow regulating works, road crossings on trestles or pilings, rather than on embankments);
- enhancement and/or protection of other weltands in substandard conditions to offset losses at project site;
- artificial construction of wetlands to replace areas lost (where experience has shown that the wetland type in question can, in fact, be constructed);
- strengthening institutions to manage and protect wetlands;
- including local NGOs in the institutional arrangements for wetlands conservation;
- promoting development of national wetland incentives and management strategies;
- requiring wetland concerns to be considered in national and local planning and law use decision-making processes; and
- environmental education programs to disseminate knowledge on the importance of wetlands.

Arid and Semi-Arid Lands

Drylands of the world constitute a natural low-productivity environment, where the major limiting factor to biological production is normally water. When limiting factors are overcome -economically and

technically -- drylands can become moderately productive. However, under intensive production systems they require careful management as they are highly prone to soil salinization, alkalinization, waterlogging, and wind and water erosion. Insect pests also threaten to agricultural production (e.g., locusts,grasshoppers, aphids, etc.), especially where the project reduces the natural pest control value of the dry season.

The drylands of the developing world, including lands receiving a long-term annual average precipitation of 200-1000 mm, harbor some 550 million people, many of whom are among the poorest and most vulnerable groups.

Recent degradation and famines in drylands, together with frequent economic, physical and health problems in major irrigation schemes, have demonstrated the difficulties involved in developing suitable mechanisms and the need for concerted actions. Yet, drylands have remained remarkably resilient over generations, producing magnificent civilizations, as well as untold human misery.

The famines of the last few generations, in China, India and recently in Africa, have revealed the **fragility** of these ecologically marginal areas. While the media have focused on famines and the worst affected areas, little attention has been paid to the less marginal and potentially more productive environments. Recent evidence suggests that the impact on the environment of growing populations and their needs for food, energy and water may in the long run prove more acute in the more productive areas than in the driest ones.

Much uncertainty has developed among lending institutions and the donor community in general on how best to support drylands development. While some claim that investment in the drylands represents a low return, an unacceptable economic risk-taking, and a potential increase in debt-burden to borrowing dryland countries, others stress the need to avoid recent famines. It is important to consider the consequences of the economic (opportunity) costs of doing nothing.

Coastal Zone Management

There is no precise definition of "the coastal zone." All **definitions** seek to include coastal waters, marine and estuarine (and nearshore waters of large lakes and inland seas), and some portion of the land along the coast in which human activities and natural processes both affect and are affected by those in the waters. The extent of land area included varies, because its limits are determined not only by ecological and geological characteristics but also by some concept of what is politically and administratively manageable. Thus while one might include the entire land area of watersheds which drain to the sea, and the entire water area out to the continental shelf, in practice, the coastal zone is a relatively narrow band of water and land along a shoreline. Its natural features include beaches, wetlands, estuaries, lagoons, coral reefs, and dunes. Man-made features include ports, commercial fisheries and aquaculture operations, industries, recreational and tourist developments, archeological sites and, above all, some of the largest and most densely populated urban areas in the world.

The **economic significance** of the coastal zone is vast. Virtually all shellfish used by humans live and are harvested there. Most of the world's commercially important finfish depend on the coastal zone, and much of the commercial fishery takes place in it. Coastlines have been the obvious locations for seaports and for the siting of industrial and commercial operations which involve movement and processing of large volumes of raw materials or finished products. The land is attractive and valuable for residential use; in many areas of the developing world, population growth rates and urban population are highest along the coasts. Coastal areas have been used for recreation for centuries, but tourism is now big business, sometimes the largest sector of a country's economy. Less obvious, but also important economically, are services the natural features of the coastal zone perform, without cost: shoreline stabilization, protection from storms, fish nurture, flood control, nutrient cycling, and waste treatment.

It is a particular challenge to **manage development** in the coastal zone in a way which is environmentally sound and sustainable: coastal and marine areas are among the most sensitive to the impacts

of development and, as described above, especially attractive for it. Some of the activities associated with coastline development, such as extensive dredging and filling, intensive urbanization of watersheds, siting of industries, and conversion for agriculture or aquaculture are relatively irreversible transformations. Most economic development projects in coastal and marine areas have the potential to seriously affect the resources located in these environments and to present conflicts among competing resource uses. Consequently, EA alone is insufficient for coastal zone management. Special attention to regional planning is required, both to minimize or mitigate adverse impacts and promote optimal use of the resources available.

The following types of **projects** have potential impacts on coastal and marine areas:

- Agriculture: coastal and upland; large irrigation dams.
- Fisheries: coastal capture fisheries and mariculture/aquaculture, including conversion of marshes and mangroves.
- Forestry: mangrove forest products harvesting; fuelwood and other renewable resources; large-scale forestry in uplands.
- Energy: oil and gas exploration and operation; coastal power generation; large inland hydroelectric dams.
- Transportation: ports and harbors; channel construction and maintenance dredging; dredge spoil disposal; roads, railroads and bridges.
- Urbanization: shoreline modification; waste disposal; recreation and tourism; large-scale water resource development; urbanization of watersheds.
- Industry/commerce: industrial plant siting; coastal and marine mining (e.g., sand); salt manufacture; and waste disposal.

Land and Water Resource Management

Environmental Issues in Land Resource Management

Almost any development project will involve disturbance of the land surface. When the area involved is small, the environmental impact is likely to be minimal. However, the cumulative impacts of many separate small disturbances can be substantial. The kinds of alterations to the land that are of concern are listed below. Many of these topics are discussed elsewhere in the [World Bank] Sourcebook, as indicated by a cross reference in parentheses, and most are therefore discussed only in general in this section.

- clearing (Roads and Highways; Large-Scale Housing Projects)
- topsoil removal (see above)
- grading (see above)
- filling (Wetlands; Coastal Zone Management; Roads and Highways)
- draining (Wetlands)
- landscape planting (Large-Scale Housing Projects)
- cultivation (Agricultural Management; Forestry)
- paving (Roads and Highways; Large-Scale Housing Projects)
- building construction (Large-Scale Housing Projects)
- waste disposal (Solid Waste Collection and Disposal Systems;Wastewater Collection, Treatment, Reuse and Disposal Systems)

The direct and immediate environmental impacts of these alterations can be grouped into four categories.

Loss of Habitat: Any of the activities listed result in loss of habitat. The seriousness of the impact depends on the type of habitat being converted, as well as on the way in which the conversion is carried out. When wildlands, wetlands, tropical forests or other sensitive ecosystems are involved, the EA team should carefully assess the impacts, examine the alternatives that were considered, and perhaps propose new alternatives. (See the "Wildlands" section.)

Loss of Soil Productivity: Certain forest soils, when stripped of natural cover, become laterized or subject to rapid erosion, and essentially unproductive. Removal of topsoil during grading also reduces

productivity. Soil loss through erosion has the same effect, and in addition may degrade water resources. Conversion of high-quality agricultural land to urban uses also reduces productivity. Mitigation measures an EA might recommend include avoidance of construction on steep slopes, retention of forest cover, stockpiling and replacement of topsoil, conservation of prime agricultural land, application of good cultivation practices, and control of erosion and sedimentation through use of mulch during construction and rapid replacement of vegetative cover on slopes
and construction of siltation basins and barriers of straw or filter fabric to protect waterways.

Modified Hydrology: Clearing, grading, filling, paving or construction of buildings alter patterns of surface runoff and infiltration. The results include local ponding and flooding, increased flood frequency and/or magnitude downstream, lowered water table, diminished groundwater recharge, and increase in low flows in streams. Management measures include design and construction techniques to maintain or replace local drainage channels, retention or detention structures to avoid increases in rates of runoff, measures to offset reduced infiltration (porous pavement, infiltration ponds, etc.), and conservation of open space on critical aquifer recharge areas.

Soil Contamination: Soil can be contaminated through salinization if irrigationsystems are not properly designed and operated. It can also be contaminated by disposal of hazardous waste or improper operation of solid waste and land-base wastewater disposal systems.

Land Clearing

Land clearing for agriculture is discussed as a separate topic because of the environmental implications of the choice of land to be cleared and the method employed to clear it. In general, the impacts of clearing are more significant in tropical than temperate regions because the former experience higher temperatures which accelerate chemical degradation of soils and higher intensity of precipitation leading to more severe erosion.

There are three basic methods, and they are often used in combination on single project:

(a) Manual methods -- felling or cutting vegetation, allowing a drying period, and then burning the debris;

(b) Mechanical methods -- using heavy equipment (e.g., bull-dozers, heavy chains and tractors) to fell trees and cut and lay down underbrush, windrowing (raking debris into rows or piles), burning, and final clearing of the residue;

(c) Chemical methods -- using herbicides to establish areas for crops, either leaving dead trees standing, felled, or burned.

Mechanical methods have significant adverse impacts, including topsoil loss or inversion, destruction of soil structure, and compaction leading to increased runoff. Both mechanical and manual methods involve burning, which often reduces soil nutrient content and the activities of beneficial soil organisms as well as contributing to elevated atmospheric carbon dioxide concentrations. Chemical techniques have been shown to have less drastic effects on soil. However, the long-term effects of herbicide use in the tropics are not well understood.

Inappropriate **post-clearing management practices**, such as lack of manuring, failure to employ soil conservation practices, and repeated fires have often led to reduction in soil fertility to the point at which economic agricultural production cannot be sustained. Abandonment and weed infestation are the ultimate results.

Environmental Issues in Water Resource Management

Water resource management issues that may emerge in an EA are associated with water use or land use decisions that affect the quantity or quality of surface water or groundwater. Changes in quantity or quality may in turn affect the range of uses the particular water resource can support or alter the functions of a natural system dependent on the water.

The actions related to development projects which can alter water quality or quantity include: contamination of surface water by directly discharged effluents; contamination of surface water by non-point or diffuse pollutant sources; contamination of surface water by atmospheric pollutants; contamination of ground or surface water by wastes disposed of on or beneath the land; increase in runoff by clearing, grading, paving, drainage or channel modification; decrease in surface water flow by diversion, impoundment, consumptive use; and reduction in water table elevation or artesian flow by interference with groundwater recharge or excessive groundwater withdrawals.

Environmental Impacts of Increased Runoff: Increases in runoff, result from any activities which make theland surface less permeable, "smoother" or both. The rate of runoff, the total amount of runoff or both may be affected. The impacts include declining water tables, more frequent or more intense flooding, more prolonged or extreme dry-weather flows, and scouring or silting of channels. Changes in natural flow patterns can modify or eliminate wetlands and affect agriculture that depends on seasonal flooding for irrigation and maintenance of soil fertility. Where these impacts are predicted, structural and non-structural measures can be incorporated into projects to mitigate them.

Environmental Impacts of Reduced Surface Water Flow: When the overall flow of surface water is reduced significantly by impoundment, diversion, or consumptive use, downstream users and natural systems experience impacts. Two common causes of the flow reductions are growth in the watershed in excess of that which existing water resources can support or overcommitment of water resources from failure to take all uses and users into consideration in project planning. The immediate impacts may include: decline in water quality from diminished dilution of pollutants; seasonal or continuous shortfall in supply for downstream users; reduction in wetland area; and increases in salinity and changes in circulation in estuaries.

Each of these impacts can in turn have secondary impacts, such as decline in shellfish harvests, loss of revenue from water-dependent industry and commerce, or reduced hydroelectric power output. Mitigating measures are few, and most are expensive; relocating industries or importing water from other watersheds are examples. The sound approach is prevention through water resource planning and management on a watershed scale. The terms of reference for the EA on any project involving large-scale water consumption or diversion should require an analysis of existing, planned and projected water availability and use to avoid these impacts from the outset.

Environmental Impacts of Lowered Water Table or Reduction in Artesian Flow: The most obvious impact is the increased cost of drilling deeper wells and pumping water from greater depths. More disruptive is interruption of previously reliable water supply as a result of overpumping from nearby wells or cessation of artesian flow. When the aquifers affected are near the seacoast, saline water may intrude as fresh-water flow diminishes, making coastal wells unusable. Finally, a long-term impact which can occur over a large area and be virtually impossible to reverse is subsidence of the land surface caused by reduced water pressure in unconsolidated rock. Mitigation measures are again few and difficult. They involve replacing lost or salt-contaminated groundwater supplies with surface water. Attempts at reversing saline intrusion have met with only limited success. Subsidence may be arrested but is not realistically reversible by any artificial means.

Watershed Planning and Management: Water use and land use are interrelated. Decisions regarding water use in one part of a watershed are likely to pose opportunities and constraints for users in another part. These circumstances argue for integrated planning on a watershed basis, to ensure that the basin's water is not overcommitted, that upstream water users do not deprive those downstream of opportunities, that projects meet their intended purposes, and that patterns and amounts of growth are kept in balance with the capacity of the water resources. Tools and technical knowledge exist to accomplish such planning and management. The difficulties are institutional. Water resources do not respect political boundaries and there is thus a need for an institution with sufficient capacity and power to influence land and water use decisions in mulitiple jurisdictions. This frequently entails a corresponding willingness on the part of those jurisdictions to subordinate their authority to the watershed institution. In projects which depend on watershedwide planning and management, EA teams should carefully analyze the institutional structure, the needs for strengthening it, and whether it is politically realistic to anticipate success in the effort.

Natural Hazards

Major areas of the world are subject to risks from **natural hazards**. Earthquakes, volcanic eruptions, droughts, floods and hurricanes hinder development through their direct, indirect and cumulative impacts. There is a two-way, direct relationship between environmental deterioration and natural hazards; that is, soil erosion, deforestation, desertification, and coastal degradation increase the risks of extreme events, and in turn, natural hazards exacerbate environmental degradation. Furthermore, the potential for human and economic losses in an area is directly related to its vulnerability to natural hazards.

The resilience and sustainability of development may be significantly improved by **reducing disaster vulnerability**. Reducing losses from natural hazards can be brought about through appropriate and sound planning strategies and management. Disaster-resilient planning and management must be based on a sound understanding of natural hazard risk and such understanding must be incorporated into social and economic planning. In addition, scenarios concerning climate change indicate a potential for sea level rise, increased severe droughts, shifting in agricultural zones and more frequent hurricanes which underline the need for efficient mitigation and preparedness.

Environment on the World Wide Web:

Selected Internet Sites with Special Reference to Africa

Internet Version - Last Updated April 1, 1997

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United Nations Sites

Environment Sites by Topic
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Water
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Environment Mailing Lists

Environment--Africa Specific

Organization	URL
African Studies Center	**http://www.isp.msu.edu/AfricanStudies**
-country specific information/links to archives and bibliographies. From this site you can access information on MSU's Program on Lakes of East Africa (PLEA).	
Center for African Studies	**http://wsi.cso.uiuc.edu/CAS/**
-this site, which is managed by the University of Illinois at Urbana-Champaign, provides general, regional and country specific information. It is particularly useful because one can link from this site to conference information, libraries, and bibliographies.	

EcoNews Africa http://www.web.net/~econews/

-an NGO initiative (based in Nairobi) that analyses global environment and issues from an African perspective and reports on local, national, and regional activities that contribute to global solutions.

Index on Africa http://www.africaindex.africainfo.no/

-by searching the "Africa Index" under the categories forestry and environment, one can access other useful Internet sites.

Information Bank on African Development Studies (IBADS) http://www.worldbank.org/html/ibads/IBADS.html

- this World Bank provides information on development studies in Sub-Saharan Africa; the site contains an index of studies by the WB's Africa Technical Department (ATD), abstracts of these studies, and the publication "Findings." The site is searchable by keyword.

USAID Environment and Natural Resources Information Center (ENRIC) http://www.info.usaid.gov/enric/

-contains summaries of USAID support activities having an exclusive or significant environmental objective. By conducting a region search, one has access to 18 Africa activity profiles.

Resource Renewal Institute, Network for Environmental and Sustainable Development in Africa (NESDA), Environmental Atlas http://www.rri.org

-this site contains information on country environmental strategies for Cameroon, Chad, Congo, Mauritania, Cote d'Ivoire, Kenya, Zambia, and Zimbabwe.

PanAfrican News Agency:Environmental Bulletin http://www.africanews.org/PANA/environment/

-this bulletin is updated every Monday with environmental news from many African countries.

SANGONet http://wn.apc.org

-has background and contact information for Southern African environment NGOs, links to international sites, NGO and South African Government publications.

Southern Africa Environment Page http://www.ru.ac.za/departments/law/SAenviro/saep.html

-contains subpages on solid waste management, environmental education, environmental law and policy, environmental NGOs and CBOs, business and the environment, international organizations and programs, water, and the environment and development consultancies register. One can also access many environment related policy documents from this site.

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Environment -- General

Organization	URL
Amazing Environmental Organization WebDirectory	http://www.webdirectory.com

-from this site, you can access organizations, information, databases and libraries in a variety of environment fields.

Best Environmental Directories http://www.ulb.ac.be/ceese/cds.html

-this site contains access to a number of quality records relevant to the subject and is updated monthly. There are lists on a wide variety of environment related topics.

The Earth Times http://www.earthtimes.org

- daily news and views on environment and development.

EcoNet:Environmental Issues Resource Center http://www.igc.apc.org/econet/en.issues.html

-this site contains a relatively short list of issue pages that are regularly updated.

EcoWeb http://ecosys.drdr.virginia.edu

-This University of Virginia site provides access and search tools for Environmental Information Systems as well as a link to the World Wide Web Virtual Library. The WWW Virtual Library is a comprehensive site with lists of WWW sites and other sources relevant to eight environment subcategories.

Envirolink Library http://www.envirolink.org/

- this site has a comprehensive list of environmental organizations with links to their Internet sites.

EPA, US Environmental Protection Agency http://www.epa.gov

- from this site, one can access EPA information, libraries, publications, and other Internet resources.

Environmental Defense Fund WorldWide (EDF) http://www.edf.org/

- EDF's site provides information about its programs and publications.

Enviro-Source http://www.enviro-source.com

-from this site, via "international environmental web sources," one has access to UN and other international sites.

Guide to Environmental Resources on the Internet http://http2.sils.umich.edu/~cbriggs/environ_murphybriggs2.html

-the most comprehensive website for environmental resources; organized by subject and by Internet tools used to locate those resources. The table of contents includes: major environmental organizations and networks, regulations and standards, regional concerns, and library online catalogs.

International Development Research Center (IRDC) http://www.idrc.ca

- from this site, one can access information on the IRDC's environmental intiatives, various environmental international secretariats, archives, and the Development Data Bases Services

IUCN, The World Conservation Union http://w3.iprolink.ch/iucnlib/splash_en.html

- this site gives you access to IUCN annual reports.

Linkages/ Earth Negotiations Bulletin http://www.iisd.ca/linkages/

-an electronic clearing house for information on past and upcoming international meetings related to environment and development.

Macrocosm USA http://www.macronet.org/macronet

- an extensive nonprofit clearinghouse with a environment keyword index; one can access Africa specific information using the "Africa" keyword.

Virtual Library on International Development http://w3.acdi-cida.gc.ca/virtual.nsf

-a comprehensive development site containing UN global reports and the Directory of Country Environmental studies

Volunteers in Technical Assistance (VITA) http://www.vita.org

- access to information on VITA's projects in Africa. natural disaster emergency information service. information department. and communication service. as well as links to DevelopNet News, TechNet, and other Internet sites.

World Bank http://www.worldbank.org/html/gef/gefgraph.htm

Global Environment Facility

information on GEF. meetings, related projects. members. publications.

World Bank Public Information Center: http://www.worldbank.org/cgi-bin/imagemap/picdocs?212,104

Environmental Documents

- from this site, you can view abstracts and order: environmental assessments, National Environment Action Plans, environmental data sheets, environmental guidelines, and the Pollution Prevention and Abatement Handbook.

World Conservation Monitoring Centre http://www.wcmc.org.uk/index.html

- this site provides access to conservation databases with data, maps, and statistics on forests, coasts, species, protected areas, and national biodiversity.

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United Nations Sites

Organization	URL
Food and Agriculture Organization (FAO)	http://www.fao.org

-this site provides access to subpages on statistics databases, fisheries, forestry, and sustainable development; from this page, you can access publications, documentation services, and an events calendar.

UNDP http://www.undp.org/env.html

- by way of the "environment related information" subpage, one can access links to other networks, libraries, and UNEP.

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ENVIRONMENT SITES BY TOPIC

Forestry

Organization	URL
Canadian Forest Service Library	http://www.fcmr.forestry.ca/html/welcome_e.html
- from this site, one can access journal articles and information reports, R&D reports and R&D technical notes of the Canadian Forest Service.	
Institute for Commercial Forestry Research (ICFR)	http://www.icfrnet.unp.ac.za
- this South African site provides information on ICFR research and access to other forestry sites.	
International Center for Research in Agroforestry (ICRAF)	http://www.cgiar.org/icraf/
-international news reports related to international agricultural/agroforestry research; the majority of the articles are Africa related.	
USDA Forest Service National Headquarters	http://www.fs.fed.us/
- access to libraries, databases, and subpages containing paper abstracts and other information on global forestry, fire, timber, forest health, and forests & people.	
http://www Virtual Library: Forestry	http://www.metla.fi/info/vlib/Forestry.html
- this comprehensive site has information on working groups, networks, journals, bibliographies, research papers, publications, legislation and international agreements, forest policy, databases, libraries, conferences, and entomology.	

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Water

Organization	URL
Universities Water Information Network	http://www.uwin.siu.edu
-this site provides access to an extensive database on international water research compiled by the Water Resources Scientific Information Center (WRSIC) of the USGS; the data base abstracts cover a wide variety of topics that span the time period 1967 to 1993.	
Water Online	http://www.wateronline.com
-A well-spring of information. Particularly useful at this site are the Water Online Times and the resource library which can be searched by keyword.	
Water Quality Information Center	http://www.nal.usda.gov/wqic/
-this USDA site provides information on water resources and agriculture and access to water-related databases, bibliographies, and discussion lists.	
WaterWeb	http://waterweb.com
-information on the water technology community; access to water related discussion groups, relevant news, and information on a variety of water related topics.	
Water Wiser	http://www.waterwiser.org/
- this site contains a sampling of water efficiency, conservation, and water-related Internet resources and can be browsed by individual categories.	

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Wildlife

Organization	URL
African Wildlife - this site contains a taxonomic index, links to other information about Africa and Wildlife, and a bibliography on Africa and wildlife.	**http://www.wolfe.net/~scat/main.html**
World Wildlife Fund Global Network - From this site, you can access wildlife related news, publications, research, action alerts, information on WWF's Malawi and Madagascar projects, and WWF campaigns.	**http://www.panda.org/home.htm**

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ENVIRONMENT MAILING LISTS

Mailing lists, or listservs, distribute messages to everyone who has subscribed to the list. Some listservs are "read only", meaning that they distribute news and publications, but do not permit subscribers to submit messages to one another. Discussion groups, the more common type of mailing list, allow subscribers to both receive and submit information on a particular topic. If you subscribe to a discussion group, you can send a message to a central computer which then sends your message to all other subscribers on the list.

There are a huge number of mailing lists on the Internet, but this guide lists only select environment related listservs. They are all free and open to the public; all you have to do is subscribe.

To subscribe to *listserv* and *listproc* lists:

- send a email message to the subscription address listed below and enter the following as the first line of the message text:

SUBSCRIBE LISTNAME your real name

("LISTNAME" is given in the first column)

To subcribe to *Majordomo* lists:

- send an email message to the subscription address listed below and enter the following as the first two lines of the message text:

SUBSCRIBE LISTNAME @ your email address

END

("LISTNAME" is given in the first column)

LISTNAME AND TOPIC	SUBSCRIPTION ADDRESS
AE: Alternative Energy Sources (Sustainable)	listserv@sjsuvm1.sjsu.edu
AFA-ENVI: Environmental Finance	listserv@wsuvm1.csc.wsu.edu
BIODIV-L: Biodiversity Discussion	listserv@bdt.ftpt.br
BIOSPH-L: Bioshpere, Ecology	listserv@ubvm.cc.buffalo.edu
CONSBIO: Conservation and GIS	listserv@uwavm.u.washi
CONSLINK: Biological Conservation	listserv@sivm.si.edu
CSANR-L: Sustainable Agriculture and Natural Resources	listserv@wsuvm1.csc.wsu.edu
ECOL-ECON: Ecological Economics	listserv@csf.colorado.edu
ECOLOGY: Politics and Environment	listserv@emuvm1.bitnet
FAOLIST: Food and Agriculture Organization, Open Discussion	listserv@irmfao01.bitnet
L-ENEWS: Alternative and Efficient Energy in LDCs	listserv@unicamp.br
WATER-L: Water Quality	listserv@wsuvm1.csc.wsu.edu
X-ENEWS: Energy Efficiency in LDCs Newsletter	listserv@fem.unicamp.br

Please send updates, questions or comments to:

Anne O'Toole, Africa Bureau Information Center, Washington, D.C. (703) 312-7190 or email *aotoole@usaid.gov*.

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Annex D

References and Information Sources

Annex .1 References and Information Sources for Environmental Review Assembled by the USAID Bureau for Africa, Office of Sustainable Development

Annex .2 Bibliography of Environmental Assessment Resources in the Food Security Resource Center (FSRC)

Annex .3 Bibliography of Participatory Rural Appraisal (PRA) Resources in the Food Security Resource Center (FSRC)

References and Information Sources for Environmental Review Assembled by the USAID Bureau for Africa, Office of Sustainable Development

African Development Bank. 1997. *Environmental Assessment Guidelines: Education.* Louis Berger International, Inc., Coverdale Organization, Inc., and Tufts University. (March).

African Development Bank. 1997. *Environmental Assessment Guidelines: Energy.* Louis Berger International, Inc., Coverdale Organization, Inc., and Tufts University. (March).

African Development Bank. 1997. *Environmental Assessment Guidelines: Fisheries.* Louis Berger International, Inc., Coverdale Organization, Inc., and Tufts University. (March).

African Development Bank. 1997. *Environmental Assessment Guidelines: Irrigation.* Louis Berger International, Inc., Coverdale Organization, Inc., and Tufts University. (March).

African Development Bank. 1997. *Environmental Assessment Guidelines: Population and Health.* Louis Berger International, Inc., Coverdale Organization, Inc., and Tufts University. (March).

Altieri, Miguel. 1988. *Environmentally Sound Small-Scale Agricultural Projects*. Revised edition. Arlington, Virginia: Coordination in Development (CODEL) and Volunteers in Technical Assistance (VITA). Guidelines for planning, project design, and implementation of agriculture projects with a community development emphasis. Includes technical and ecological information. Aimed at the general user. *To order*: see below.

Bassan, Elizabeth, and Wood, T. 1985. *Environmentally Sound Small-Scale Energy Projects*. Arlington, Virginia: CODEL and VITA. Guidelines for planning, project design, and implementation of energy projects. Addresses use of natural resources for energy in a way that maintains ecological well-being. Aimed at the general user. *To order*: see below.

Brown, Michael, and Wyckoff-Baird, B. 1992. *Designing Integrated Conservation and Development Projects*. Washington, DC: Biodiversity Support Program. Discusses the incorporation of environmental conservation into development projects. Includes case studies and recommendations. *To order*: World Wildlife Fund Publications, PO Box 4866, Hampden Post Office, Baltimore, Maryland 21211. Telephone: (410) 516-6951, Fax: (410) 516-6998.

Catterson, Thomas and Knausenberger, Walter. 1997. *Beyond Compliance: Environmental Review and Public Law 480 Food Aid Programming*. USAID Bureau for Africa, Office of Sustainable Development, AFR/SD. SD Technical Publ. 85 p. Washington, D.C. *To order* contact the Africa Bureau publications dissemination office, AFR/SD/PSGE, Washington, DC., fax: (703)235-3826.

CODEL. 1981-86. Series on environmentally sound small-scale projects. Listed as published by CODEL and VITA. Arlington, Virginia: CODEL and VITA.

Dixon, Talbot, and LeMoigne. 1989. *Dams and the Environment.* Washington, DC: The World Bank. *To*

order: Distribution Unit, Office of the Publisher, The World Bank, 1818 H Street, N.W., Washington, D.C. 20433.

Ffolliott, Peter, and Thames, J. 1983. *Environmentally Sound Small-Scale Forestry Projects*. Arlington, Virginia: CODEL and VITA. Guidelines for planning, project design, and implementation of forestry and agroforestry projects. Meant for the general practitioner, with an emphasis on community development. *To order*: see below.

Harza Engineering Company. 1980. *Environmental Design Considerations for Rural Development Projects*. Washington, DC: USAID. A manual for identifying potential societal benefits and undesirable environmental impacts that may accompany small rural projects. The sectors covered are: roads; electrification; water supply and sanitation; irrigation and on-farm water management; and small industries. *To order*: USAID, Center for Development Information and Evaluation, Washington, DC 20523.

International Environmental and Natural Resource Assessment Information Service. 1996. *World Directory of Country Environmental Studies*. Washington, DC: World Resources Institute. (May).

Jacobs, Linda. 1986. *Environmentally Sound Small-Scale Livestock Projects*. Arlington, Virginia: CODEL and VITA. Guidelines for planning, project design, and implementation of livestock and range management projects. Includes material on waste management, health, and husbandry. *To order*: see below.

Knausenberger, Walter I., Booth, G., Bingham, C., Fisher, W and Gaudet, J.J. 1996. *Africa Bureau Environmental Guidelines for Small-Scale Activities in Africa*. USAID Bureau for Africa, SD Technical Paper 18. 205 pp. *To order*: contact the Africa Bureau publications dissemination office, AFR/SD/PSGE, Washington, DC.

Roe, Dilys, Dalal-Clayton, B., and Hughes, R. 1995. *A Directory of Impact Assessment Guidelines*. Nottingham, United Kingdom. Environmental Planning Group, International Institute for Environment and Development. International Environmental and Natural Resources Assessment Information Service (INTERAISE) Project.

Sadler, B. and Verheem, R. 1996. The International Study of Effectiveness of Environmental Assessment, Strategic Environmental Assessment. Ministry of Housing, Spatial Planning and the Environment, Publication #53.

Southerland, Mark. 1994. *Evaluation of Ecological Impacts from Highway Development*. Washington, DC: U.S. Environmental Protection Agency. (April).

Tillman, Gus. 1981. *Environmentally Sound Small-Scale Water Projects*. Arlington, Virginia: CODEL and VITA. Guidelines for planning, project design, and implementation of water resource development projects. Suggests low-cost techniques to avoid adverse impacts of water development. *To order*: see below.

Tobin, Richard. 1996. *Bilateral Donor Agencies and the Environment: Pest and Pesticide Management*.

USAID Bureau for Africa, Office of Sustainable Development. Technical Paper No. 42. 98 pp. December.

UNEP. 1996. Environmental Impact Assessment Training Resource Manual. United Nations Environment Program. Environment & Economics Unit. Nairobi, Kenya. Prepared by Australian Environmental Protection Agency (Barton, Australia) for the United Nations Environment Program, Nairobi, Kenya. 710 pp.

USEPA. 1990. *Suspended, Canceled and Restricted (SCR) Pesticides*. Washington, DC: USEPA Pesticides and Toxic Substances. No. 20T-1002.

USEPA. U.S. Environmental Protection Agency Technical Information Packages (TIPs).

Below is a list of technical brochures from a series published by the US EPA and meant for activities outside the United States. This is not a bibliography of the entire series but a selection of brochures that relate directly to these guidelines. For more information, please contact: The Center for Environmental Research Information, USEPA, PO Box 19963, Cincinnati, Ohio, 45219-0963. Telephone: (513) 569-7562. Fax: (513) 569-7566. When ordering documents, the EPA document number or the exact title is necessary.

USEPA. 1992. *Environmental Impact Assessments*. TIPs Series. Washington, DC: USEPA. Document no. EPA/600/M-91/037.

_____. 1992. *Pesticide Usage Guidelines*. TIPs Series. Washington, DC: USEPA. Document no. EPA/600/M-91/035.

_____. 1992. *Pesticides Waste Disposal*. TIPs Series. Washington, DC: USEPA. Document no. EPA/600/M-91/028.

_____. 1992. *Risk Assessment*. TIPs Series. Washington, DC: USEPA. Document no. EPA/600/M-91/034.

_____. 1991. *Small Community Wastewater Systems*. TIPs Series. Washington, DC: USEPA. Document no. EPA/600/M-91/032.

_____. 1991. *Solid Waste Disposal*. TIPs Series. Washington, DC: USEPA. Document no. EPA/600/M-91/030.

_____. 1991. *Ensuring Safe Drinking Water*. TIPs Series. Washington, DC: USEPA. Document no. EPA/600/M-91/012.

World Health Organization. 1997 (draft). *Health Care Waste Management: A WHO Handbook for the Safe Handling, Treatment and Disposal of Wastes*. Geneva. 192 p.

World Bank. 1991. *Environmental Assessment Sourcebook*. 3 volumes. Washington, DC: The World Bank Environment Department. Provides guidelines for environmental assessment, focusing on those operations with major potential for negative environmental impacts, such as new infrastructure, dams, and highways. Discusses World Bank environmental policies and procedures, as well as "best practice" guidelines regarding design choices. Volume II includes sector guidelines for agriculture; rural development; population; health and nutrition; transportation; urban development; water supply and sewage; energy; and industry. *To order*: Publications Sales Unit, Department F, The World Bank, 1818 H St. NW, Washington, DC 20433. The latest edition is available free of charge.

Volume I: Policies, Procedures, and Cross-sectoral Issues

Volume II: Sectoral Guidelines

Volume III: Guidelines for Environmental Assessment of Energy and Industry Projects

World Bank. *Environmental Assessment Sourcebook Updates.* A periodic set of updates to the subject sourcebook issued in the form of topical bulletins. Started in 1993. In July 1997, issue no. 18 was released, on Health Aspects of Environmental Assessment. Send inquiries to Environment Department, World Bank, 1818 H Street NW, Washington, DC, 20433. Fax: 202 477 0568.

Wyatt, Alan, et al. 1992. *Environmental Guidelines for PVOs and NGOs: Potable Water and Sanitation Projects*. Arlington, Virginia: Water and Sanitation for Health Project (WASH). Provides a framework to help project designers avoid, minimize, or mitigate the potential adverse impacts of small- and medium-scale water supply and sanitation projects in rural and urban areas. Guidelines are used by USAID to evaluate grant proposals that involve water supply and sanitation activities. *To order*: see below.

Ordering information: Environmental Health Project Officer, Office of Health and Nutrition, Environmental Health Division, Global Bureau, USAID, RRB, Washington, DC 20523-3700. Telephone: (202) 712-5403.

Bibliography of Environmental Assessment Resources in the Food Security Resource Center (FSRC)

Prepared by FAM – November 25, 1997

USAID/Egypt. *Threshold Decision Based on Initial Environmental Examination*, Healthy Mother/Health Child Project, Egypt. May 1994.

Environmental screening. Environmental assessment sourcebook update. April 1993, No. 2. Environment Department, World Bank. 4p.

Geographic Information Systems for environmental assessment and review. Environmental assessment sourcebook update. April 1993, No. 3. Environment Department, World Bank. 4p.

Sectoral environmental assessment. Environmental assessment sourcebook update. October 1993, No. 4. Environment Department, World Bank. 8p.

Public involvement in environmental assessment: Requirements, opportunities and issues. Environmental assessment sourcebook update. October 1993, No. 5. Environment Department, World Bank. 8p.

Privatization and environmental assessment: Issues and approaches. Environmental assessment sourcebook update. March 1994, No. 6. Environment Department, World Bank. 8p.

Coastal zone management and environmental assessment. Environmental assessment sourcebook update. March 1994, No. 7. Environment Department, World Bank. 8p.

Cultural heritage in environmental assessment. Environmental assessment sourcebook update. September 1994, No. 8. Environment Department, World Bank. 8p.

Implementing Geographic Information Systems in environmental assessment. Environmental assessment sourcebook update. January 1995, No. 9. Environment Department, World Bank. 8p.

Environmental auditing. Environmental assessment sourcebook update. August 1995, No. 11. Environment Department, World Bank. 10p.

International agreements on environment and natural resources: Relevance and application in environmental assessment. Environmental assessment sourcebook update. March 1996, No. 10. Environment Department, World Bank. 8p.

Guidelines for marine outfalls and alternative disposal and reuse options. Environmental assessment sourcebook update. March 1996, No. 13. Environment Department, World Bank. 10p.

Environmental performance monitoring and supervision. Environmental assessment sourcebook update. June 1996, No. 14. Environment Department, World Bank. 8p.

Regional environmental assessment. Environmental assessment sourcebook update. June 1996, No. 15. Environment Department, World Bank. 10p.

Challenges of managing the EA process. Environmental assessment sourcebook update. December 1996, No. 16. Environment Department, World Bank. 8p.

Analysis of alternatives in environmental assessment. Environmental assessment sourcebook update. December 1996, No. 17. Environment Department, World Bank. 10p.

Health aspects of environmental assessment. Environmental assessment sourcebook update. July 1997, No. 18. Environment Department, World Bank. 10p.

UNHCR environmental guidelines. 1996. UNHCR, Geneva.

Experience of UNHCR and its partners with solar cookers in refugee camps. 1996. Umlas, Elizabeth. UNHCR, Geneva.

Environmental assessment sourcebook, Volume I: Policies, procedures, and cross-sectoral issues. 1991. World Bank Technical Paper Number 139. Environment Department, The World Bank. 227p.

Environmental assessment sourcebook, Volume II: Sectoral guidelines. 1991. World Bank Technical Paper Number 140. Environment Department, The World Bank. 282p.

Environmental assessment sourcebook, Volume III: Guidelines for environmental assessment of energy and industry projects. 1991. World Bank Technical Paper Number 154. Environment Department, The World Bank. 237p.

Coherence in environmental assessment: Practical guidance on development co-operation projects. 1996. Organisation for Economic Cooperation and Development. [30]p.

Environmental guidelines for small-scale activities in Africa: Environmentally sound design for planning and implementing humanitarian and development activities. June 1996. Knausenberger et al. SD Publication Series, Technical Paper No. 18, Bureau for Africa, USAID. 202p.

Mainstreaming the environment: The World Bank Group and the environment since the Rio Earth Summit - Fiscal 1995. 1995. The International Bank for Reconstruction and Development/The World Bank. 301p.

Guide to strengthening non-governmental organization effectiveness in natural resources management. June 1996. Brown, Michael and JoEllen McGann. The PVO-NGO/NRMS Project, USAID. 218p.

Environmentally-induced population displacements and environmental impacts resulting from mass migrations. International Symposium, Geneva, 21-24 April 1996. United Nations High Commissioner for Refugees, IOM International Organization for Migration, Refugee Policy Group. 128p.

Refugees and the environment in Africa. Proceedings of a workshop at Bahari Beach, Dar-es-Salaam, Tanzania. 2-5 July 1996. UNHCR. 226p.

Development of a GIS system in UNHCR for environmental, emergency, logistic and planning purposes. UNHCR environment. 1995. Bouchardy, Jean Yves. [50]p.

Water and sanitation guide (Draft). 1997. Baer, Franklin C. IMPACT Food Security and Nutrition Monitoring Project. 37p.

Environmental guidelines for irrigation. United States Man and the Biosphere Programme and USAID. June 1981. Tillman, Robert. 74p.

Environmental guidelines for selected infrastructure projects. 1988. Environment Unit, Asian Development Bank. 130p.

Participation in the irrigation sector. Environment department dissemination notes. June 1995, No. 16. 4p.

UNHCR environmentally-friendlier procurement guidelines. UNHCR Geneva, 1997. 26p.

World Bank and environmental assessment: An overview. Environmental assessment sourcebook update. April 1993, No. 1. Environment Department, World Bank. 4p.

Long-term environmental monitoring system, IFFD Program, CARE Bangladesh. 1996. Rahman, M. Mokhlesur and Sachindra Halder. [50]p.

Technical report: Programmatic environmental assessment, Guinea Bissau. 1997. Krahl, Lane et al. Tropical Research and Development, Inc. [70]p.

Planning for sustainable watershed management: Environmental and institutional assessments. Proceedings of an interdisciplinary workshop, June 26-27, 1990. Potter, Christopher. 109p.

Environmental monitoring, evaluation, and mitigation plans: A review of the experiences of four African countries. 1994. Hecht, Joy E. 60p.

Technical and managerial aspects of environmental and health impact of water resource development projects: Ethiopian experience. 1991. Fekade, Tsegaye et al. 13p.

Programmatic environmental assessment of the USAID/Bangladesh Integrated Food for Development Program. 1991. 102p.

Initial Environmental Examination, Catholic Relief Service Food Transition Strategy Project, Philippines. February 1994.

Initial Environmental Examination, Natural Resources Management (NRM) II, Indonesia. February 1996.

Initial Environmental Examination, Morocco Agribusiness Promotion Project, Argan Oil Plant - Promotion and Investment Fund Activity, Morocco. March 1997.

Initial Environmental Examination, Rural Economic Growth, Cambodia. November 1996.

Initial Environmental Examination, Morocco Agribusiness Promotion Project, Strawberry Plant Nursery Promotion and Investment Fund Activity. September 1997.

Initial Environmental Examination, Food Management and Research Support Project, Bangladesh. November 1997.

Record of Negative Determination from USAID Environmental Procedures, Microenterprise Development Project, West Bank/Gaza. April 1997.

UNHCR and the environment priorities for 1998. 20p.

Environmental Assessment Resources on Order:

Environmentally sound small-scale livestock projects: Guidelines for planning. 1986. Jacobs, Linda. CODEL, HPI, VITA, Winrock.

Environmentally sound small-scale water projects: Guidelines for planning. 1981. CODEL, VITA.

Environmentally sound small-scale forestry projects: Guidelines for planning. 1981. Ffolliott, Peter and John Thames. CODEL, VITA.

Environmentally sound small-scale energy projects: Guidelines for planning. 1985. Bassan, Elizabeth. CODEL, VITA.

Environmentally sound small-scale agriculture projects: Guidelines for planning. 1993. Altieri, Miguel. CODEL, VITA.

If you wish to order documents from this bibliography, please contact

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Bibliography of Participatory Rural Appraisal (PRA) Resources in the Food Security Resource Center (FSRC)

Prepared by FAM – November 19, 1997

Some thoughts on development, people's participation, and research. 1992. Young, Richard H. RAP: Rapid Assessment Procedures: Qualitative methodologies for planning and evaluation of health related programmes. Scrimshaw, Nevin S. and Gary R. Gleason (eds.). International Nutrition Foundation for Developing Countries, Boston. 4p. #1057

Rapid but relaxed and Participatory Rural Appraisal: Towards applications in health and nutrition. 1992. Chambers, Robert. RAP: Rapid Assessment Procedures: Qualitative methodologies for planning and evaluation of health related programmes. Scrimshaw, Nevin S. and Gary R. Gleason (eds.). International Nutrition Foundation for Developing Countries, Boston. 9p. #1057

Participatory Rural Appraisal and participatory learning methods: Recent experiences from MYRADA and south India. 1992. Mascarenhas, James. RAP: Rapid Assessment Procedures: Qualitative methodologies for planning and evaluation of health related programmes. Scrimshaw, Nevin S. and Gary R. Gleason (eds.). International Nutrition Foundation for Developing Countries, Boston. 15p. #1057

Rapid Rural Appraisal (RRA) methodology and its use in nutrition surveys. 1992. Kashyap, Purnima. RAP: Rapid Assessment Procedures: Qualitative methodologies for planning and evaluation of health related programmes. Scrimshaw, Nevin S. and Gary R. Gleason (eds.). International Nutrition Foundation for Developing Countries, Boston. 14p. #1057.

Participatory Rural Appraisal handbook: Conducting PRAs in Kenya. 1991. National Environment Secretariat, Egerton University, Clark University, Center for International Development and Environment of the World Resources Institute. 90p. #1241.

Participatory evaluation: A users guide. 1986. Private Agencies Collaborating Together (PACT). 81p. #1260.

Participatory program evaluation: A manual for involving program stakeholders in the evaluation process. 1993. Aubel, Judi. Catholic Relief Services. 71p. #1261.

Self-evaluation: Ideas for participatory evaluation of rural community development projects. 1992. Rugh, Jim. A World Neighbors Publication. 42p. #1267.

Participatory evaluation: Tools for managing change in water and sanitation. 1993. Narayan, Deepa. World Bank. 122p. #1270.

Rural appraisal: Rapid, relaxed and participatory. 1992. Chambers, Robert. Institute of Development Studies Discussion Paper. 90p. #1988.

Community forestry: Participatory assessment, monitoring and evaluation. 1989. Davis-Case, D'Arcy. FAO. 150p. #2188.

Introduction à la Méthode Accélérée de Recherche Participative (MARP): Rapid Rural Appraisal, Quelques notes pour appuyer une formation pratique. 1991. Gueye, Bara and Karen Schoonmaker Freudenberger. 70p. #2806.

Towards a participatory evaluation methodology: The Southern African pilot learning process. 1989. Seidman, Ann. Clark University. 11p. #4224.

Participatory rapid appraisal for community development: A training manual based on experiences in the Middle East and North Africa. 1991. Theis, Joachim and Heather M. Grady. International Institute for Environment and Development. Save the Children. 150p. #5406.

Recommended resource materials on participatory community evaluation (bibliography). Rugh, Jim. Community-Based Evaluations. November 1993. 3p. #5793.

Whose reality counts? Putting the first last. 1997. Chambers, Robert. Intermediate Technology Publications. 297p.

Participation Forum workshop notes: Participatory evaluation. 1995. USAID. 49p.

Sample of Useful Web Sites on PRA

www.dainet.de/gtz/concepts/engl/rraengl.htm
Located on GTZ site on REMIS: Resource Management Information System. Contains chapter on Rapid Rural Appraisal and Participatory Appraisal.

www.worldbank.org/html/edi/sourcebook/sba104.htm.
Publishes Appendix I: Methods and Tools of The World Bank Participation Sourcebook. This appendix includes the following information on Participatory Rural Appraisal: key tenets of PRA, sequence of techniques, organization of PRA, and PRA tools.

www.unv.org/projects/highland/praw.html
Contains part II of United Nations Volunteers report on Participatory Rural Appraisal Workshop. Entitled "Principles for a proposed participatory rural appraisal model and implications for practice."

nt1.ids.ac.uk/eldis/pra/prabib.htm
Lists Institute for Development Studies PRA bibliography. User can search the database by keyword or select a topic from a detailed list.

If you wish to order documents from this bibliography, please contact

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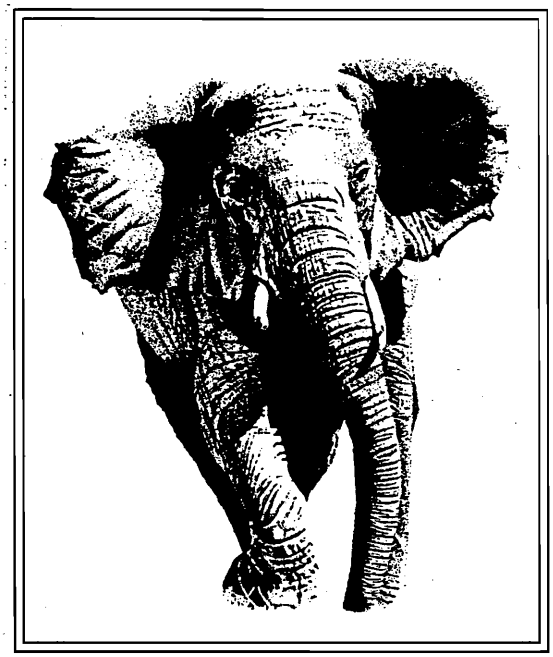
Management Zone Plan



Tarangire National Park

Tanzania National Parks

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The Arusha Manifesto

Over twenty-nine years ago the first President of Tanzania, Mwalimu Julius K. Nyerere, recognized the integral part wildlife plays in this country. In September 1961 at a symposium on the Conservation of Nature and Natural Resources, he gave a speech that has become known as the Arusha Manifesto:

> **"The survival of our wildlife is a matter of grave concern to all of us in Africa. These wild creatures amid the wild places they inhabit are not only important as a source of wonder and inspiration but are an integral part of our natural resources and our future livelihood and well being.**
>
> **In accepting the trusteeship of our wildlife we solemnly declare that we will do everything in our power to make sure that our children's grand-children will be able to enjoy this rich and precious inheritance.**
>
> **The conservation of wildlife and wild places calls for specialist knowledge, trained manpower, and money, and we look to other nations to co-operate with us in this important task - the success or failure of which not only affects the continent of Africa but the rest of the world as well."**

Dear Friends,

Tanzania National Park's long range goal is to have an approved General Management Plan/Environmental Impact Assessment (GMP/EIA) for each of our national parks. However, with the increasing pressures for more tourist development in our parks at this point in time, we do not have the luxury of spending the two years it takes to complete a comprehensive general management plan effort for a park.

To ensure that our parks are not over developed, resulting in the loss of resources and values, TANAPA will be pursuing a slightly different planning approach during the next couple of years. Our planning unit will take the lead in establishing and facilitating interdisciplinary teams that will prepare ***Management Zone Plan / Environmental Impact Assessments (MZP/EIA)*** *for specifically designated parks.*

The same planning process developed by our planning unit to prepare GMPs will be used in preparation of MZPs. Simply stated, a Management Zone Plan is a General Management Plan minus the comprehensive set of actions developed to address all the park's problems and achieve all the identified objectives. Importantly, a Management Zone Plan takes only 3-4 months to prepare. The Management Zone Plan determines what types of use and development are both desirable and feasible in different areas of a park. It also establishes the type, general location, and limits of acceptable use and development for each identified zone in the park and on a parkwide cumulative basis. Like a General Management Plan, our Management Zone Plans will:

1) *establish the park's* ***purpose and significance***
2) *identify* ***exceptional resource values*** *and* ***management objectives***
3) *include a* ***management zoning scheme*** *that identifies what* ***can and cannot occur*** *with specific emphasis on development and use*
4) *determine the* ***limits of acceptable use and development*** *for the overall park and for each zone within the park*
5) *assess the* ***environmental impacts*** *of the zoning scheme and limits of acceptable use*

We all know that there will be continuing pressures for tourist developments in other parks. While I wholeheartedly believe we should encourage investment and the benefits derived from tourism, we cannot allow our nation's spectacular natural resources to be sacrificed for the sake of foreign exchange. Tanzania must avoid the temptation of misusing and thereby depleting our natural resources for short term economic gains and high profits. Because the Management Zone Plans take a shorter time to complete, we will be able to develop a number of these plans during the next several years. These Management Zone Plans will guide development within the national parks and ensure that an appropriate balance between preservation and tourism use/development is achieved.

L. MELAMARI
DIRECTOR GENERAL
TANZANIA NATIONAL PARKS

APPROVAL PAGE

Implementation of this plan has been approved by the appointed officers of Tanzania National Parks and its Board of Trustees.

Ambassador J. Lusinde
Chairman
Board of Trustees
Tanzania National Parks

L. Melamari
Director General
Tanzania National Parks

SUMMARY OF MANAGEMENT OBJECTIVES

- Ensure that tourism and tourism development are within the limits of acceptable use and have the least adverse impact on park resources and the high quality of visitor experience traditionally associated with Tarangire National Park.

- Maintain the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.

- Allow only those tourist activities that contribute to the understanding and appreciation of park resources and only to the extent that natural, cultural, aesthetic, and scenic values are not impaired.

- Provide a diverse range of appropriate visitor use opportunities that are compatible with park resources and conform to the status associated with the national park designation.

- Create opportunities within the park boundary where visitors can experience pristine areas with little or no contact with man-made intrusions or contact with other people.

- Reduce the amount of tourist congestion that occurs in the northern portion of the park

- Minimize the adverse visual impacts of human activity along and within the Tarangire River corridor and within a specified distance of areas with unique natural, scenic, or topographic features, critical concentrations of wildlife, critical water sources, and areas with exceptional resource values.

- Encourage all new development outside the park boundary or as near to the boundary as possible.

- Ensure that all man-made developments, facilities, and structures are designed to be harmonious with the park's natural environment.

- Protect the floodplains and wetlands that support the park's prime resource - the Tarangire River.

- Eliminate all human use of surface water in the park, with the exception of sanctioned walking safaris.

- Prohibit all consumptive use of park resources, except where approved by the park's GMP/EIA.

- Maintain natural ecological processes that perpetuate the greatest degree of biological diversity and ecosystem integrity within the park and where possible within the larger Tarangire ecosystem.

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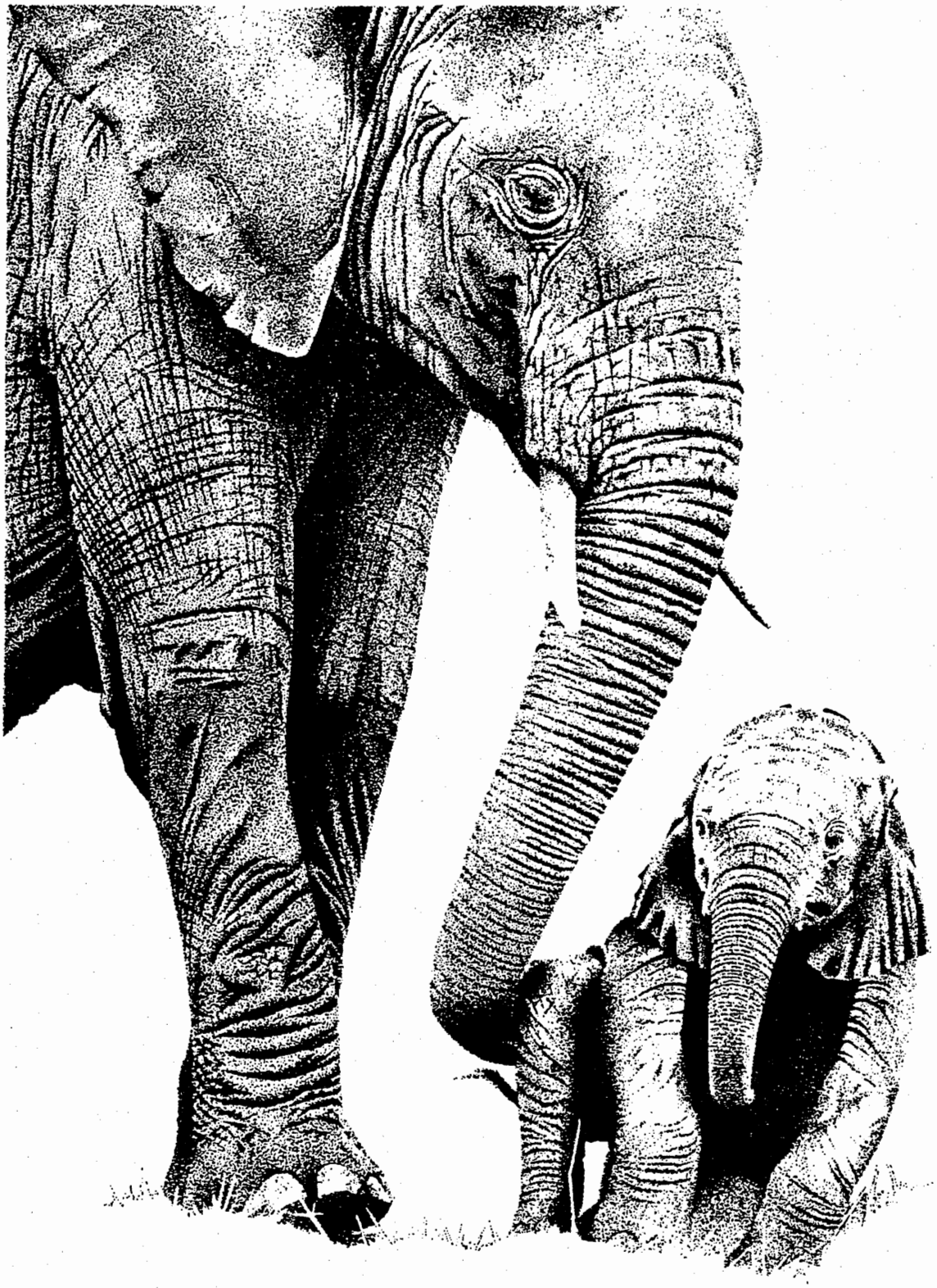


INTRODUCTION

1. BRIEF INTRODUCTION OF THE PARK

Tarangire National Park is the fourth largest park in Tanzania with one of the highest density of elephants of any park in the country. It is part of Tanzania's popular northern tourist circuit that includes Arusha, Mt. Kilimanjaro, Lake Manyara, and Serengeti National Parks as well as Ngorongoro Conservation Area. Many tourists visit Tarangire either as a first stop or last stop on the northern tour circuit.

The park derives its name from the Tarangire River that flows through the center of the national park from south to north/north-west and empties its water into lake Burungi. During the dry season this river is a primary source of water in the Tarangire ecosystem. This park is endowed with wetlands (Silale, Gursi, Larmakau and Nguselororobi Swamps) which act as sponges to supply water to Tarangire River during dry periods. Because of the availability of water, the park has a high concentration and variety of wildlife in the dry season.

1.1 LOCATION

Tarangire National Park is located in northern Tanzania between 3° 40' and 5° 35' south and 35° 45' and 37° East at an elevation of between 1200 meters and 1600 meters above sea level (Figure 1 - Location Map). It comprises a 2600 km^2 portion of the Tarangire ecosystem. The entire ecosystem encompasses approximately 20,500 km^2 of the Masai Steppe, including Mto-wa-Mbu Game Controlled Area on the north, Lolkisale and Simanjiro Plains Game Controlled Areas on the east, Mkungunero Game Controlled Area to the south and Kwakuchinja Open Area (Mweka College Demonstration Area) on the west. (Figure 2 - Vicinity Map). The park is located 118 km south-west of Arusha, east of the Great North Road and within the administrative districts of Babati, Monduli, Kiteto, Simanjiro, and Kondoa.

1.2 ACCESS

The park is accessible on the tarmacked Great North Road (Arusha-Dodoma) from Arusha to the turn off at Kwakuchinja village near Minjingu phosphate mine. All tourist access into the park is through an entrance gate located in the northwestern

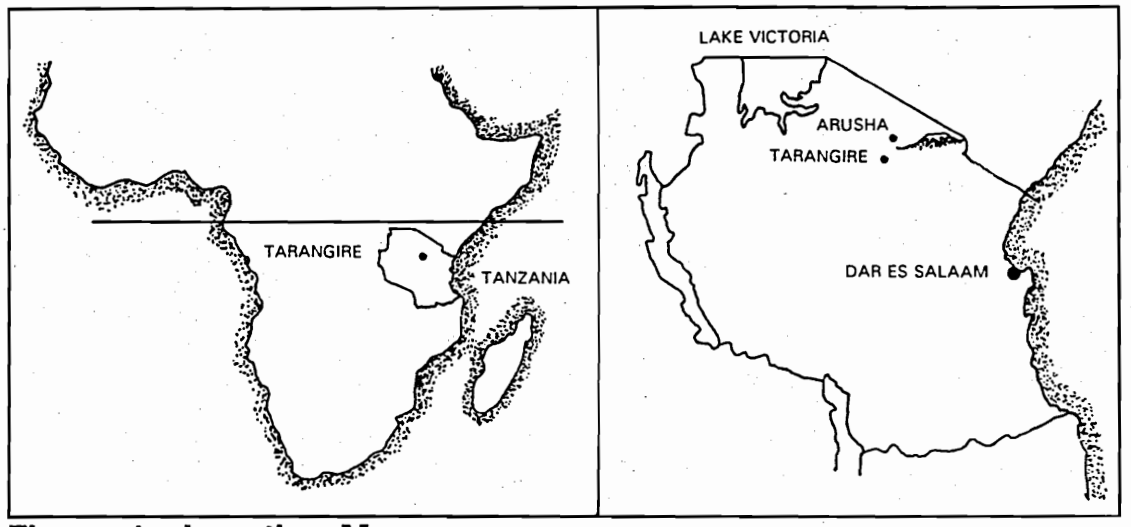


Figure 1: Location Map

corner of the park near the park headquarters. An 8 km gravel road connects the park entrance with the Great North Road. All other access points into the park are for administrative use only including Loibor Serrit Ranger post on the south-eastern boundary and the former ranger post at Chubi near the south western corner of the park boundary.

1.3 PARK INFRASTRUCTURE

The park has five ranger posts that are located in various strategic locations within and along the park boundary. The park headquarters is located near the park entrance gate in the extreme northwestern portion of the park adjacent to the park boundary. The headquarters office block contains the administrative offices for the Chief Park Warden, Warden of Tourism, Field Ecologist, Warden Antipoaching, Warden Community Conservation and Accounts. The garage and workshop for the park are located behind the administration headquarters building. The senior staff residential housing and resthouse are located within 500 meters east of the administrative offices. The junior staff village is located south of the senior staff, 1 km from the administrative offices. (Figure 3, Management Zone Plan; the symbol ● indicates location of ranger posts).

Kuro	(central)
Sangaiwe	(north-west)
Mamire	(west)
Loibor Serrit	(east)
Boundary Hill	(north-east)

The main park entrance, where visitors register, pay fees, and purchase park guide books (when they are available) consists of a gate, a small visitor contact building and toilet.

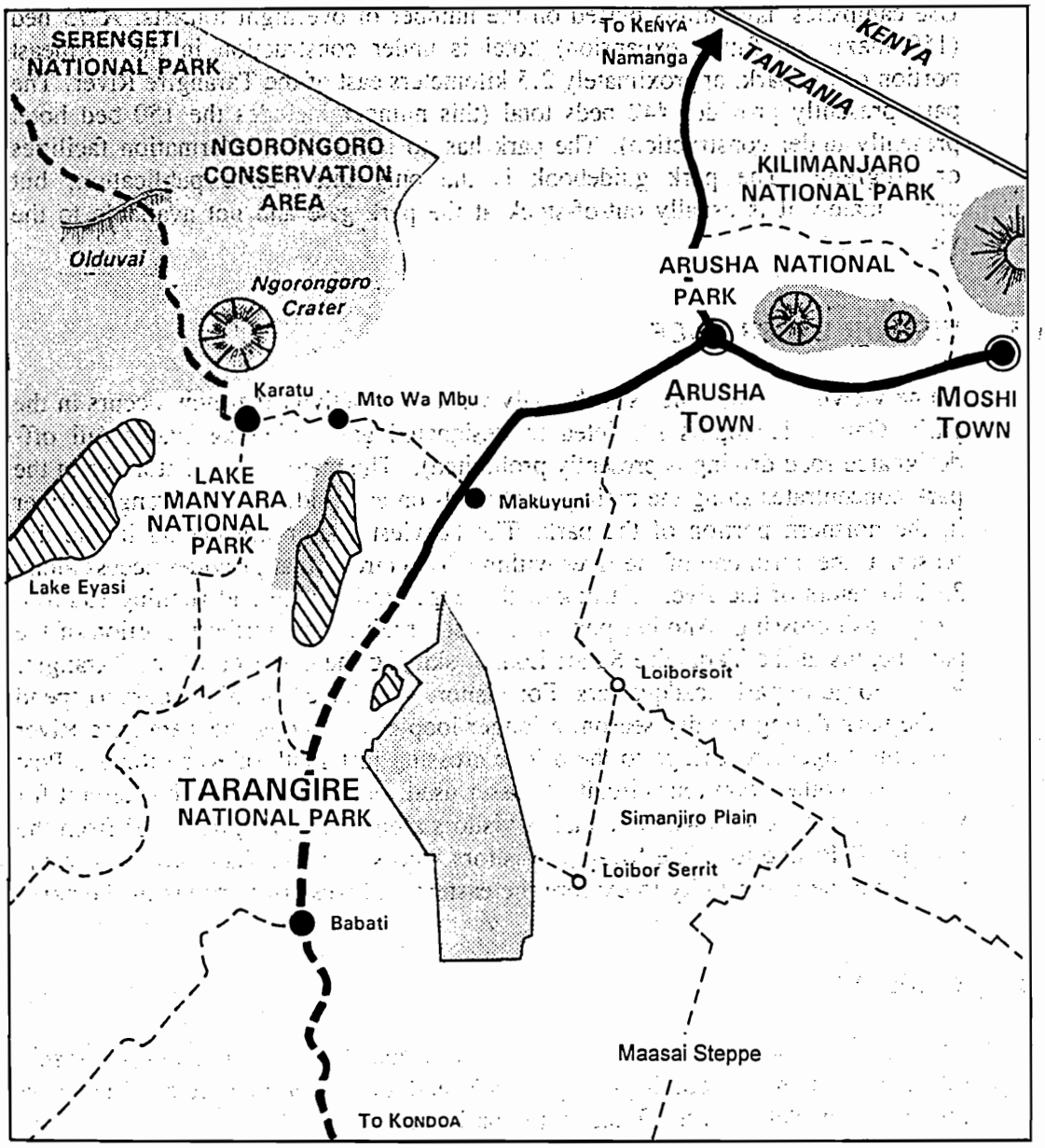


Figure 2 Vicinity Map

1.4 EXISTING VISITOR FACILITIES

Presently, one tented lodge (85 beds) and one permanent luxury tented camp (16 beds) provide overnight accommodations for visitors. Other tourist accommodations include ten campsites located along the northern portion of the Tarangire River valley. Two out of the 10 campsites are Public campsites and the remaining 8 are Special Use campsites (Appendix A). Neither the Public campsites nor the Special

BEST AVAILABLE

Use campsites have limits placed on the number of overnight tourists. A 75 bed (150 maximum future expansion) hotel is under construction in the northeast portion of the park, approximately 2.5 kilometers east of the Tarangire River. The park presently provides 442 beds total (this number includes the 150 bed hotel presently under construction). The park has no interpretive/information facilities or programs. The park guidebook is the only interpretive publication, but unfortunately it is usually out-of-stock at the park gate and not available to the visitor.

1.5 VISITOR EXPERIENCE

Game viewing from vehicles is the only visitor use activity that now occurs in the park. Game viewing is restricted to designated game viewing tracks (all off-designated road driving is presently prohibited). The majority of visitor use in the park concentrates along the main gravel roads on each side of the Tarangire River in the northern portion of the park. The heaviest visitor use occurs in the dry season at the north end of the river within a loop circuit that provides access along 35 kilometers of the river, starting at the Engelhard Bridge and running south to a dry wash crossing. Another popular tourist circuit in the northern portion of the park begins at the Tarangire Safari Lodge, skirting the east side of the Tarangire River Gorge to park headquarters. For visitors who have 3 to 3½ hours to spend in the park during the dry season, a longer loop circuit along the Tarangire River from the Engelhard Bridge to the bridge crossing just south of Kuro Ranger Post provides another loop tour circuit. A lesser used, but popular loop tour circuit for visitors who have 4 to 4½ hours takes visitors along the Tarangire River from the Engelhard Bridge to Silale Swamp. Visitors who stay more than two days in the park have the opportunity to explore the eastern and western portions of the park.

1.6 VEGETATION

Tarangire National Park is situated in the wooded steppe in an arid Acacia savannah belt that is dominated by *Acacia* and *Commiphora* species. The most important vegetation types found in the park are:

- Riparian woodland
- *Acacia tortilis* parkland
- Wetlands and seasonal flood plain
- *Acacia-Commiphora* woodland
- Riverine grassland
- *Combretum-Dalbergia* woodland
- *Acacia drepanolobium* woodland
- Rocky hilltop outcrops [kopjes] vegetation
- Deep gully vegetation
- Grasslands with scattered baobab trees

1.7 WILDLIFE

Tarangire National Park is a dry season refuge for a majority of the migratory wildlife in the Tarangire ecosystem. The park is very rich in mammals and birds. It is estimated that during the dry season total biomass of large mammals inside the park is well in excess of 35 metric tons/km^2. Some of the more important wildlife species include: African Elephant, Lesser and Greater Kudu, African Buffalo, Cheetah, Fringe-eared Oryx, Leopard, Lion, Masai Giraffe, Spotted Hyena, Common Zebra, White-bearded Wildebeest, Warthog, Eland, Olive baboon, Bat-eared Fox, Mountain Reedbuck, Impala, Common Waterbuck, Bushbuck, Coke's Hartebeest, Gerenuk, and Bohor Reedbuck.

The park has more than 550 species of birds. Particularly rich bird life occurs in the open Acacia woodlands, in and along the wetlands (Silale Swamp), and in the flood plain of Tarangire river. A few species that warrant mention: Yellow-collared Lovebird, Masai Ostrich, Martial Eagle, White and Pink-backed Pelicans, Saddle-bill Stork, Goliath Heron, Hammerkop, Bateleur Eagle, Helmeted Guinea-fowl, Kori Bustard, Long-toed Lapwing, Brown Parrot, White-bellied Go-away-bird, Madagascar Bee-eater, African Hoopoe, and a variety of kingfishers, weavers, owls, doves, plovers, sandpipers, francolins, and ducks.

1.8 GEOLOGY AND SOILS

Tarangire National Park is situated within the eastern portion of the East African Rift Valley. The geology is based on three types of rock formations: the pre-Cambrian gneiss rocks; lake deposits and alluvial deposits. However, much of the park is underlain by gneiss and other pre-Cambrian crystalline rocks which give rise to different physical features. These parent rocks are of varying resistance to weathering and erosion. The harder un-weathered rocks stick out as outcrops and form prominent features in the park like the Sangaiwe hills on the central western boundary, Boundary Hill on the north eastern boundary, and other numerous smaller kopjes in the park.

The major soil types are the well drained red-loams that become alluvial along river valleys, alluvial on ridges and colluvial on hill slopes. They become increasingly stony along hill slopes due to lack of depth. The other soil types originating from lake deposits and sediments vary from clays to sands and are normally very saline. The third soil type is made up of alluvial deposits that are predominantly vertisols, commonly known as black-cotton soils. These clay soils are the expanding type that are poorly drained. They become wet and impassable to vehicles during the rains and dry up and crack during the dry season.

1.9 PHYSICAL FEATURES

The southern half of the park and the extreme northern corner are relatively flat while the rest of the park is gently undulating. The park's landscape is dotted with rocky outcrops (kopjes) with scattered baobabs, especially in its northern and central portions. Tarangire hill is located on the western side of the river in the center of the northern half of the park. This well-known topographic feature stands at over 1600 meters above sea level and forms the highest feature in the entire Tarangire valley. The Tarangire river is the main perennial river and traverses the park from south to north/north-west. The general drainage pattern of the area is north-westwards towards the soda lakes of Burungi and Manyara.

1.10 CLIMATE

Precise figures for many climatic parameters are not available, meteorological records are fragmentary and recording stations are widely separated. Tarangire National Park is located in a semi-arid area characterized by a prolonged dry season lasting up to 7 months. It lies in a typical bimodal rainfall region of northern Tanzania. The annual rainfall pattern consists of the short rains between November and December followed by a dry spell in January and long rains occur any time between February/March to May/June. The short rains are erratic, unreliable and variable in distribution. The annual average rainfall is about 650 mm. Temperatures are highest from December to February and lowest in June and July. The average maximum temperature is 27° C while average minimum is 16° C.

2. *ESTABLISHMENT HISTORY*

Prior to 1950, the area which is now Tarangire National Park had little human settlement and was not used for livestock grazing due to the high concentration of tsetse flies which transmitted sleeping sickness to both livestock and the human population. This one factor played a major role in protecting this area from human exploitation. The areas to the east of the park, the Masai Steppe, are some of the region's most important grazing lands for both wildlife and livestock. Only during very severe droughts when all the surrounding grazing lands were overgrazed, would the Masai pastoralists be forced to use the Tarangire area for cattle grazing. The only other historical human use of the area was by fishermen who took up temporary residence in the park to harvest catfish from the Silale swamp.

The Tarangire Game Reserve was gazetted in 1957 in recognition of its importance as a dry season watering area for wildlife. Prior to its gazettement as a game reserve, the area was a well-known hunting area for rhino. The Tarangire Game Reserve lands were included as part of a larger area to establish Tarangire National Park. Tarangire National Park was established by a Presidential Decree signed on 14 May 1970 under Section 3 of the 1959 National Parks Ordinance. The Decree was published in the Gazette of the United Republic of Tanzania (No. 25, Vol II) on 19 June 1970.

3. *PURPOSE AND SIGNIFICANCE OF THE PARK*

Neither the proclamation notice for Tarangire National Park nor the National Park Ordinance state the specific purposes for setting this area aside as a national park. However, prior to gazettement, the area was known for its importance as a dry season watering place for much of the wildlife in southern Masailand. Through an interdisciplinary team planning process, the Management Zone Plan team identified the following as the purpose and significance of Tarangire National Park:

3.1 PARK PURPOSE

- a critical dry season watering place for both resident wildlife and much of the migratory wildlife of southern Masailand.

- one of Tanzania's most important wetlands and hydrological regimes that support a variety and abundance of both fauna and flora.

- the unique association and mosaic of habitats and landforms that give Tarangire a distinctive character not duplicated anywhere else in Tanzania.

- habitat for endangered, threatened, endemic, and rare species and species of special concern or species of exceptional value.

- the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.

3.2 PARK SIGNIFICANCE:

- possesses, second only to the Serengeti/Ngorongoro ecosystem, the highest concentration of wildlife during the dry season of any area in Tanzania (Lamprey 1964).

- is one of the few protected areas in Tanzania with a hydrological regime that ensures a permanent year round water source for the park's most exceptional resource - the Tarangire River.

- is known for its river valley, wetlands, gently rolling hills, rocky outcrops, acacia woodlands, and numerous baobab trees.

- is the only national park in Tanzania's northern circuit where one can easily view a large concentration of elephants during almost any time of the year.

- is one of the few protected areas in Tanzania where one can easily see concentrations of oryx.

- possesses within its acacia habitat one of the highest known diversity of breeding birds in a single vegetation type (Moreau, 1966).

- protects one of the finest birdlife spectacles and picturesque landscapes in Tanzania - the Silale Swamp.

- has an exceptional number of acacia species (16) when compared to other acacia habitats in Africa (Clark J., 1992).

- comprises an exceptional association of *Acacia tortilis* and baobab trees that has become synonymous with the name Tarangire National Park.

- provides a landscape with a distinctive combination and balance of openness for game viewing and a mosaic of habitats and vegetative cover types that provide for both spectacular scenery and species diversity.

- has an uninterrupted history as an area with a significant variety and concentration of wildlife dating back 9000 years as evidenced by the prehistoric pictographs at Kisesse, Kolo, and Pahi (located approximately 40 kilometers southwest of the park boundary), depicting rhinoceros, giraffe, roan antelope, elephant, buffalo, hyena, ostrich, warthog, zebra, reedbuck, kudu, oryx, snakes, and crocodiles.

- has achieved a reputation of being uncrowded and unspoiled.

- is one of the most easily accessible protected areas on Tanzania's northern circuit.

4. *CONSTRAINTS*

The following constraints guided this planning effort.

4.1 THE TANZANIA (TANGANYIKA) NATIONAL PARKS ORDINANCE

The Tanzania (Tanganyika) National Parks Ordinance, Chapter 412 - Supp. 59 of the Laws (Principal Legislation) 1959, gives wide ranging authority to the Board of Trustees for the management and operation of national parks. Precedents established by the Board of Trustees since 1959 give evidence to the fact that permanent human settlement, hunting and trapping, and grazing by domestic livestock is prohibited in national parks and that other types of consumptive use of park resources have been kept to a minimum.

4.2 THE APPROVED NATIONAL POLICIES FOR NATIONAL PARKS IN TANZANIA (MARCH 1994)

The approved National Policies for National Parks in Tanzania (March 1994) state that:

- Recreational and subsistence hunting will be prohibited in all national parks.

- Agricultural activities will be prohibited in all national parks.

- Grazing activities by any type of domestic livestock will be prohibited in all national parks.

- All Human settlement (with the exception of essential Tanzania National Parks staff and permitted research/advisor personnel, and essential tourism support staff) will be prohibited in all national parks.

- All other types of consumptive uses of park resources will be prohibited in national parks, except where authorized by an approved General Management Plan/Environmental Impact Assessment (GMP/EIA).

- Tanzania National Parks (TANAPA) will encourage that all major developments (hotels, lodges, permanent tented camps, visitor centers, general park administration structures, park housing, park maintenance facilities etc) be located outside national park boundaries. Major facilities or developments will be constructed within national park boundaries only if approved by the park's GMP/EIA or Management Zone Plan/EIA (MZP/EIA) and only if:

  - there is no practicable alternative to such use of park lands.

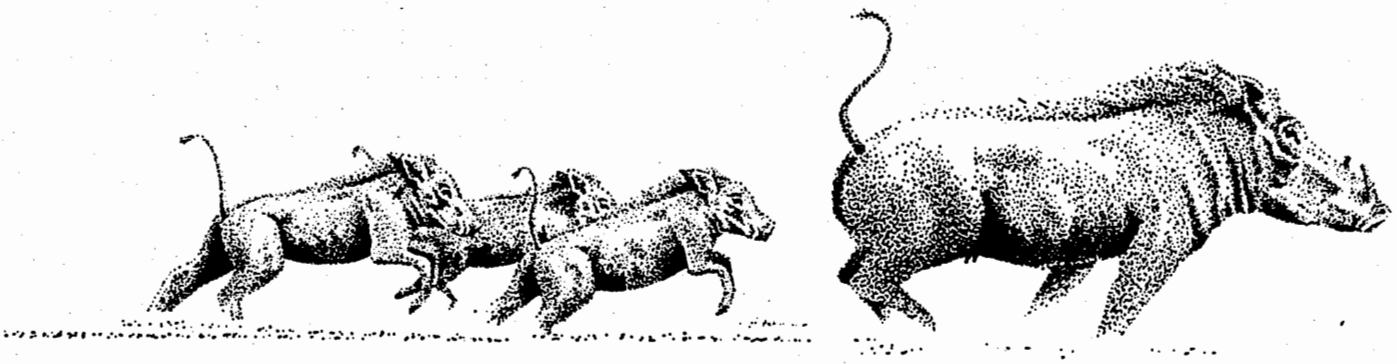
  - all criteria are met for special park uses.

  - the development will be located in development zones established in the park's approved GMP/EIA or MZP/EIA.

  - there is a complete and thorough environmental impact site assessment of the action.

  - facilities or structures do not exceed one-story in height (no occupancy above ground level).

- Off-Road recreational driving for scenic/wildlife viewing will be discouraged, but may be allowed in specific zone(s) of a park if approved by the park's GMP/EIA or MZP/EIA.



THE PLAN

5. PLANNING PERSPECTIVE

Tanganyika National Parks Ordinance, Chapter 412-Supp. 59 of the Laws (Principal Legislation) 1959, the Tanzania Wildlife Conservation Act of 1974, and the Approved National Policies for National Parks in Tanzania, 1994 provided primary direction for this park planning effort. Through an interdisciplinary team planning process, the Management Zone Plan identified the park's purpose and significance, exceptional resources values, management objectives, and developed a management zoning scheme within the context of an environmental impact assessment.

6. EXCEPTIONAL RESOURCE VALUES

The known exceptional natural and cultural resources and unique biological attributes of the park were identified using the following criteria:

- outstanding examples of the natural, scenic, geological, ecological, floral, faunal, and recreational values for which the park was established
- populations of sensitive, rare, endemic, threatened, or endangered plants and animals that are particularly vulnerable because of their small population sizes and/or genetic isolation
- habitat necessary for the continued survival of globally threatened and endangered species of fauna
- resources that are unusually sensitive to human use or activity
- major known archaeological or important cultural resources

6.1 TARANGIRE RIVER

Tarangire River is an approximately 120 kilometer lifeline of Tarangire National Park, the northern portions of which provide water year-round for wildlife in the greater Tarangire ecosystem. The river enters the park from the southwest, flows through almost the entire length of the park before exiting at the park's northwestern boundary. The river and natural waterholes within the park boundary attract animals during the dry season, providing both an important wildlife habitat and some of the most spectacular wildlife viewing in northern Tanzania.

6.2 LARGE AND VISIBLE POPULATION OF ELEPHANTS

It is estimated that there are between 1,550 and 3,300 elephants in the park during the dry season, over a ⅓ of which are also present in the wet season (1990 aerial survey, TWCM). Although these mammals migrate in-and-out of the park on a cyclical basis with the dry and wet seasons, the park has the deserved reputation of being a place where one can see elephants at almost any time of the year.

6.3 BAOBAB TREES / MOSAIC OF VEGETATION

Baobab trees dominate much of the park's landscape and are as much a trademark of Tarangire National Park as elephants. These trees with their massive girth and contorted form, with appendages that resemble roots more than branches, are a curiosity to tourists and provide an important habitat for a host of animals, insects, and birds.

The park also provides a variety of environments within its boundary. The combination and variety of landforms and vegetation types create a uniquely scenic landscape that is both diverse and ecologically complex. The principal features of the park are the floodplains and associated grasslands, riparian woodland, mbugas (seasonal floodplains), *Acacia tortilis* parklands, *Acacia Commiphora* woodlands, *Combretum Dalbergia* woodlands, *Acacia drepanolobium* woodlands, deep gully vegetation, and rocky hill vegetation.

6.4 DRY SEASON REFUGE:- SILALE SWAMP, WETLANDS, AND MBUGAS

Tarangire National Park is well known as a dry season refuge for wildlife from the Masai Steppe. During the dry season, large concentrations of animals move into the park, especially the northern portion, where permanent water sources exist. The rainy season begins in March and at its peak, animals disperse from the park and spread over an area of more than 20,500 sq km of Masai country. At the beginning of June the long rains end, the Masai steppe dries up rapidly and the migratory species return to the northern portion of Tarangire National Park between August and September.

Silale Swamp, a vast wetland in the center portion of the park, is saturated with water throughout most years, providing a green oasis that is a major attraction to both wildlife and tourists. These wetlands are important because they act as a sponge, releasing water slowly, allowing the Tarangire River to provide water to wildlife even in some of the driest years. The panoramic view of this extensive mbuga with its open water, green grasses, and abundant birdlife is further accentuated by the volcanic cone known as Oldonyo Ngahari, a perfect backdrop; all of which comprises one of the park's most picturesque settings.

6.5 BIRD LIFE

Over 550 species of birds have been recorded in the park. The acacia savannah in Tarangire National Park is also among one of the richest in the world for breeding species of birds in one habitat.

6.6 THREATENED AND ENDANGERED SPECIES

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) identifies the following species that are believed to be present in Tarangire National Park:

APPENDIX I

Black rhinoceros	(*Diceros bicornis*)	[no recent sightings]
Cheetah	(*Acinonyx jubatus*)	
African elephant	(*Loxodonta africana*)	
Leopard	(*Panthera parclus*)	
Pangolin	(*Manis temminchii*)	

Appendix I includes all species threatened with extinction which are or may be affected by trade and are subject to strict regulations. Tarangire National Park has no species listed under Appendix II.

The 1990 IUCN Red List of Threatened Animals includes the following species that are believed to be present in Tarangire National Park:

African hunting dog	(*Lycaon pictus*)	**Endangered**
Cheetah	(*Acinonyx jubatus*)	**Vulnerable**
African elephant	(*Loxodonta africana)*	**Vulnerable**
Black rhinoceros	(*Diceros bicornis*)	**Endangered**

7. MANAGEMENT OBJECTIVES

Because this is a Management Zone Plan rather than a comprehensive General Management Plan, the following management objectives focus primarily on visitor use and development and to a more limited degree on natural resources management. A full range of management objectives along with those that follow will be incorporated into the comprehensive Tarangire General Management Plan when it is prepared at a later point in time. The following Management Objectives will guide managers in achieving the "desired future" for Tarangire National Park.

7.1 NATURAL RESOURCES MANAGEMENT

- Eliminate all human use of surface water in the park, with the exception of sanctioned use for walking safaris.

- Protect the floodplains and wetlands that support the park's prime resource - the Tarangire River.

- Prohibit all consumptive use of park resources, except where approved by the park's GMP/EIA or MZP/EIA.

- Maintain natural ecological processes that perpetuate the greatest degree of biological diversity and ecosystem integrity within the park and where possible within the larger Tarangire ecosystem.

- Eliminate or mitigate any impacts that threaten biological resources.

- Determine the extent of plant and animal diversity, monitor the changes that are occurring, and identify the sources of change; initiate any necessary actions that are consistent with the 1994 National Policies for National Parks in Tanzania and the park's natural resource management objectives.

- Protect threatened, endangered, and endemic species, as well as species determined to be of exceptional resource value.

- Protect the park from wildfires.

- Establish a baseline to determine resource conditions, monitor changes, and identify sources of change; eliminate or mitigate any human-caused impacts that threaten abiotic, biotic, and scenic park resources.

7.2 VISITOR USE, EXPERIENCE, AND DEVELOPMENT

- maintain the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.

- Ensure that tourism and tourism development are within the limits of acceptable use and have the least adverse impact on park resources and the high quality of visitor experience traditionally associated with Tarangire National Park.

- Allow only those tourist activities that contribute to the understanding and appreciation of park resources and only to the extent that natural, cultural, aesthetic, and scenic values are not impaired.

- Provide a diverse range of appropriate visitor use opportunities to avoid limiting visitor use to a*one dimensional type of park experience.

- Create opportunities within the park boundary where visitors can experience pristine areas with little or no contact with man-made intrusions or contact with other people.

- Provide opportunities for visitors to experience a broader range of park landscapes and resources.

- Reduce the amount of tourist congestion that occurs in the northern portion of the park

- Minimize the adverse visual impacts of human activity along and within the Tarangire River corridor and within a specified distance of areas with unique natural, scenic, or topographic features, critical concentrations of wildlife, critical water sources, and areas with exceptional resource values.

- Encourage all new development outside the park boundary or as near to the boundary as possible.

- Prohibit all temporary or permanent structural development within the Tarangire River corridor and in areas where during the dry season there are high concentrations of wildlife.

- Ensure that all man-made developments, facilities, and structures are designed to be harmonious with the park's natural environment so as not to detract from scenic views or vistas within or adjacent to the park.

- Eliminate all off-road driving except in designated areas; ensure that all designated roads avoid or have minimum adverse impact on unique natural, scenic, or topographic features, critical concentrations of wildlife, critical water sources, and areas with exceptional resource values.

- Provide (TANAPA working with the Department of Civil Aviation) airstrips at appropriate locations outside park boundaries.

7.3 LOCAL COMMUNITIES

- The objectives for local community programs and benefits will be detailed in the park's GMP/EIA.

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* *A social science/leisure research term - by either tradition or design, an area has only one type of recreation or tourist activity.*

8. *MANAGEMENT ZONE PLAN OVERVIEW*

8.1 DIVERSE VISITOR EXPERIENCE

The Tarangire National Park Management Zone Plan (MZP) focuses on diversity, providing for a wide range of "appropriate" visitor experiences consistent with policies, acts, ordinances and management objectives. The Core Preservation Zone, Conservation General Use Zone, the Semi-Wilderness Zone, and the Wilderness Zone described below play a key role in establishing this range of visitor experiences.

The difference in the types and levels of use as well as the types of physical development for each zone is fundamental to the zoning plan. For example, this planning effort determined that it would not be desirable or appropriate to expand the existing tourist-van road circuit system in the northern portion of the park to a parkwide road system. A parkwide network of game viewing roads would lead to a one-dimensional park experience and also have severe adverse impacts on park resources. It was determined that a range of experiences from low impact walking safaris to carefully planned designated road and off-road game viewing will provide a more balanced use that will best serve the interests of visitors and also give better protection to park resources.

8.2 MANAGEMENT APPLICATION

The zones established under this MZP will permit a better understanding of what activities "can and cannot" occur in different parts of the park. In addition, the management strategies outlined for each zone will guide the actions of the Warden-in-Charge and staff in maintaining the integrity of the zoning system and the individual zones. This plan will provide direction for day-to-day management and operations as well as for long-term decision making to ensure that a range of experiences continue to be provided. As the park's personnel change, the zoning plan will continue to direct the actions of future Wardens-in-Charge, visitor use specialists, resource management specialists, rangers and maintenance personnel, providing continuity over time. If future research, surveys, and assessments produce new information about the significance of natural or cultural resources, park management with TANAPA Headquarters approval, may make minor adjustments to the zone boundaries to reflect this information. Nevertheless, the idea of a continuum of experiences will be reflected in all management decisions. No major changes in the zoning scheme can be made unilaterally at the park level. However, the MZP should not be viewed as a static document. If conditions warrant, a Warden-in-Charge may request that the MZP be revised with approval from the TANAPA Director General. The TANAPA Planning Unit, working with

the park will be responsible for plan revision, including the preparation of appropriate environmental impact assessment documentation.

8.3 LIMITS OF ACCEPTABLE USE

This plan does not attempt to determine a "carrying capacity" of how much use and development the area can tolerate. Rather, it requires that "limits of acceptable use" (LAU) be determined. The LAU system represents a reformulation of the carrying capacity concept, **with primary emphasis on the conditions (both physical and social) desired in the area rather than on the maximum amount of use and development the area can tolerate.** This system requires managers and planners to define desired conditions and to undertake actions to achieve and maintain these conditions unless and until there are signs of resource damage, degradation, or ecological change. This MZP presents the **desired conditions (both social and physical) for both use and development** in Tarangire National Park.

The limits of acceptable use (LAU) for Tarangire National Park focus on the maximum number of beds established for those zones designated for overnight stays and the number of vehicles per kilometer in the most frequented zone of the park. The LAU was determined by the best professional judgement of an interdisciplinary team of park managers, planners, and researchers, using the best available information to achieve a desired condition - an appropriate balance between preservation and tourism use/development.

8.4 RATIONALE FOR THE ZONING CONCEPT

The zoning designations are based on different management emphases. Primary consideration was given to the following criteria:

- Protection of exceptional resource values
- Constraints imposed by the landscape and ecological determinants
- Provision of a diverse range of appropriate visitor experiences and visitor use levels subject to the desired management objectives and resource limitations
- Elimination of uses and activities that either damage park resources or create an undue burden on park management
- Strict control and limitations to ensure the appropriate level, type, and placement of development within the park

9. MANAGEMENT ZONE PLAN ACTIONS

The first series of actions listed in 9.1 apply to all zones of the park. Following the parkwide actions, the document identifies five specific park zones and one subzone. The specific guidance for each zone and subzone is described using the following 8 categories: resources values, visitor use and experience, access, facilities and development, limits of acceptable use, maintenance, natural resources management, and cultural resources management.

9.1 PARKWIDE ACTIONS:

- Prohibit consumptive use of surface water by humans, with the exception of sanctioned use for walking safaris.

- Prohibit new construction or expansion of existing air strips within the park boundary.

- Prohibit any further development of hotels and lodges within the park boundary.

- Prohibit all recreational "high profile" types of activities (hang gliding, ballooning, para-sailing, mountain bicycles, and any other activity deemed by TANAPA to be high profile) within the park boundary.

- Prohibit all off-road driving within the park, except in the Semi-Wilderness Zone.

- Monitor day use numbers to evaluate the need to place daily use limits on the number of day users entering the park.

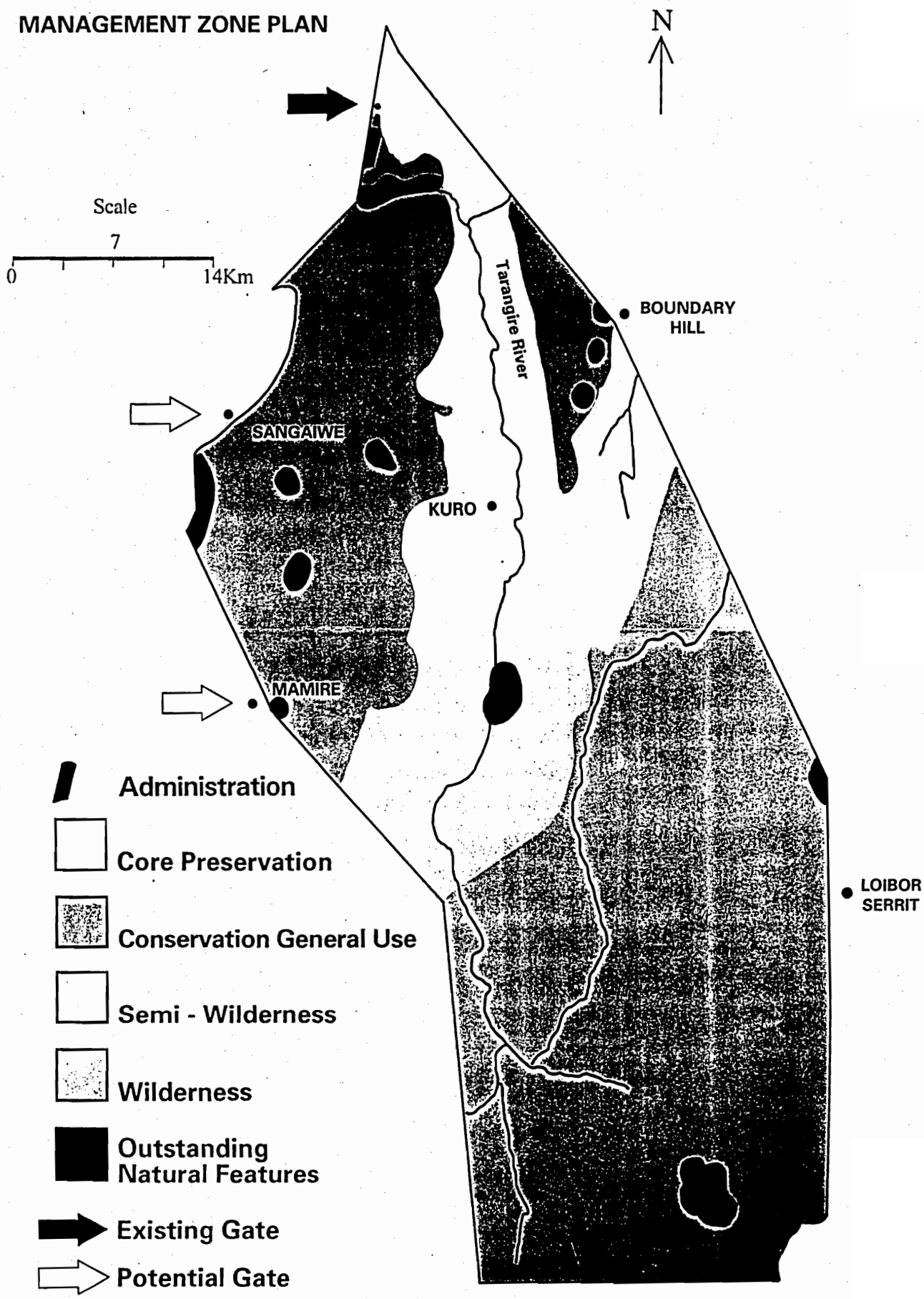
- Suppress all wildfires within the park boundary where feasible.

- Allow pre-emptive prescribed early burning along park boundaries. All other prescribed fires within the park will be prohibited until the park has an approved Fire Management Plan.

- All research activities within the park will be allowed under the existing special use permit system. Researchers will not be allowed to drive off-road unless approved by the TANAPA Director General.

- Make all park roads gravel and accessible to 2WD vehicles; improve drainage and provide maintainable gravel surfacing (5-10 centimeters gravel); widen only as needed to improve drainage; maximum road width will not exceed 4 meters; selective use of passing turnouts; armor drainage crossings with low water crossings (drifts) or culvert pipes.

Figure 3 Tarangire National Park Management Zone Plan


MANAGEMENT ZONE PLAN
N
Scale
7
0
14Km
Tarangire River
BOUNDARY HILL
SANGAIWE
KURO
MAMIRE
LOIBOR SERRIT
Administration
Core Preservation
Conservation General Use
Semi - Wilderness
Wilderness
Outstanding Natural Features
Existing Gate
Potential Gate

9.2 CORE PRESERVATION ZONE (37,746 hectares)

(See Tarangire National Park Management Zone Plan Map - Figure 3)

9.2.1 Resource Values - The Tarangire River, and the permanent water source that it represents, has long been known for its dry season concentrations of elephant and other wildlife. This acacia and baobab tree-lined river valley, along with the scenic grandeur of the Silale Swamp and its diverse and abundant birdlife, represent the very essence of Tarangire National Park.

9.2.2 Visitor Use and Experience - This zone will accommodate one of the highest levels of use within the park. The resources in this zone form the nucleus of its status as a national park. The game viewing circuit on the east and west side of the river and the road to and along Silale Swamp will continue to be the park's principal attraction. Game viewing from a vehicle is the highest use of this zone and nothing should conflict or detract from this use. Contact with other tourists during the peak season will be frequent. Contacts will be somewhat less during the non-peak season. Visitors will be able to stop in order to stand near their vehicle (not in excess of 10 meters from their vehicle) to stretch and relax. Only at designated locations will visitors be encouraged to walk 50 meters or less to selected observation points, outstanding natural features, or special use sites of interest, but only if dangerous animals are 200 meters from the designated area. Walking safaris will be prohibited. ***Picnicking will be allowed in designated areas only. Training for tour guides and new interpretive opportunities (parkwide) will be developed to give visitors a better understanding and appreciation of the park's significance and its resources.*

9.2.3 Access - This zone will be accessible by both the existing north entrance park gate and a***new major park entrance gate that will be located on the west side of the park in the Conservation General Use Zone West.* No off-road vehicle use will be permitted. Access will be along designated roads only.

9.2.4 Facilities and Development - All development, with the exception of designated gravel roads, picnic sites and low profile pit toilets, will be prohibited within this zone. Existing developments not in compliance with this zone will be removed. This zone will be for day use only and no overnight stays will be permitted. **No additional tour circuit roads will be constructed in this zone between the two existing east and west road circuits that parallel the Tarangire River.** The existing tour road system will be upgraded to all weather gravel roads and drifts will be constructed to improve access in the rainy season. Development and human activities occurring in other zones of the park will not be visible from or impair the view or visitor experience in the Core Preservation Zone.

** *General actions depicted by italicized sentences will be planned and assessed in detail at a later date during the preparation of the comprehensive General Management Plan (GMP) for Tarangire National Park.*

9.2.5 Limits of Acceptable Use - The quality of the overall visitor experience for Tarangire National Park will be based on the number of vehicles per kilometer during a peak season day on the existing described roads (east and west loop roads along both sides of the Tarangire River and the ridge road overlooking Silale Swamp - 171 kilometers of road) within the Core Preservation Zone. The interdisciplinary team responsible for this plan assumes that the Core Preservation Zone is and will continue to be the primary attraction for 95% of all tourists who visit the park. The interdisciplinary team also feels that it is an erroneous assumption (numerous precedents worldwide) to think that TANAPA can, during the peak season, encourage or entice a large percentage of visitors away from the park's prime attraction - the Core Preservation Zone. ***Additional tour road circuits in other zones are needed and will serve to diversify visitor opportunities for all visitors and especially those who stay more than one day in the park or for repeat visitors.* However, it is the plan's contention that these additional road circuits in other park zones will not substantially reduce the visitation pressure on the Core Preservation Zone. The majority of visitors will not feel that they have had a quality visitor experience unless they "experience" firsthand the unique concentration of wildlife that occurs along this river during the dry season in the Core Preservation Zone.

EXISTING: NUMBER OF VEHICLES PER KILOMETER

Estimated number of vehicles per kilometer on a peak season day on the existing described roads (east and west loop road along both sides of the Tarangire River and the ridge road overlooking Silale Swamp - 171 kilometers of road) in the Core Preservation Zone is:

Approximately 1 vehicle per 2.7 kilometers

Calculations for the number of vehicles per kilometer for existing conditions included the number of beds and the number of day user estimates on a parkwide basis. It is important to note that the 150 beds under construction by Consolidated Sopa Hotel is not included in the 1 vehicle per 2.7 kilometers estimate (see Appendix B).

PLAN ACTION: NUMBER OF VEHICLES PER KILOMETER

Estimated number of vehicles per kilometer on a peak season day on the existing described roads (east and west loop road along both sides of the Tarangire River and the ridge road overlooking Silale Swamp - 171 kilometers of road) in the Core Preservation Zone will be:

Approximately 1 vehicle per 1.6 kilometers

Calculations for the number of vehicles per kilometer for the proposed action included the number of beds and the number of day user estimates on a parkwide basis. However, it was estimated that only 75% of the total number of tourists staying overnight in the Conservation Use Zone West would visit the Core Preservation Zone, while 100% and 50% respectively from the Conservation Use Zone East and the Semi-Wilderness Zone would visit the Core Preservation Zone. It was estimated that Wilderness Zone users would not visit the Core Preservation Zone. It is important to note that existing number of beds, the 150 bed Consolidated Sopa Hotel and the additional beds in the plan action were included in the 1 vehicle per 1.6 kilometers estimate (Appendix B).

EXISTING: ACCOMMODATIONS TO BE RELOCATED WITH LIMITS OF USE

- 10 Special Use Campsites (no limits of use)
- 3 Public campsites (no limits of use)
- 1 Administrative Campground (no limits of use)

PLAN ACTION:

- ***No overnight use or accommodations will be allowed in this zone; all existing overnight accommodations will be relocated.***

9.2.6 Maintenance - Activities will include maintaining roads, protecting resources, and restoring areas disturbed by human activities. Power tools will be used for routine maintenance activities. Heavy equipment will be used only during the dry season and during the time of day when game viewing is minimal, or when an emergency (flood, fire, or other catastrophic event) could endanger resources, visitor safety, or access.

9.2.7 Natural Resources Management - The natural character and natural processes associated with lands in this zone will be preserved to the greatest extent possible while accommodating high levels of vehicle game viewing. Any apparent adverse effects of visitor use will be mitigated, and disturbed areas (adverse human impact) that cause significant visual impairment will be restored. Visitor use will not be permitted in areas with sensitive species and environments. Unavoidable human impacts will be confined to resistant and less sensitive areas. Park Wardens will be responsible for preventing or mitigating resource damaging activities. ***Specific management actions (parkwide) to address the threats outside the park associated with the loss of wildlife corridors will be addressed as part of the General Management Plan.*

9.2.8 Cultural Resources Management - Presently there is little information on prehistoric, historic sites or contemporary cultural use sites within the park.

Additional survey and research will be undertaken to determine the extent and significance of cultural sites in the park. On-site investigations and clearance by professional cultural specialists will be required prior to any ground disturbance associated with any action.

9.3 CONSERVATION GENERAL USE ZONE (WEST) (55,495 hectares)

9.3.1 Resource Values - Permanent water sources in this zone also concentrate wildlife during the dry season but not to the same extent as in the Core Preservation Zone. The opportunity to see elephant, oryx, cheetah, leopard, buffalo, warthogs, and impalas provide a year-round attraction for tourists. This portion of the park provides one of the best opportunities anywhere along the northern Tanzania tour circuit for viewing concentrations of oryx. The combination of diverse topography and a mosaic of different vegetation types makes this one of the more interesting areas of the park to explore.

9.3.2 Visitor Use and Experience - This zone will accommodate moderate levels of use. Contacts with other tourists will be moderately frequent in the peak season and less so during off-season. Game viewing from vehicles will be the primary visitor activity. Visitors will be able to stop in order to stand near their vehicle (not in excess of 10 meters from their vehicle) to stretch and relax. Only at designated locations will visitors be encouraged to walk 50 meters or less along designated trails to selected observation points, outstanding natural features, or special use sites of interest, but again only if dangerous animals are 200 meters from the designated area. Walking safaris will be prohibited. ***Picnicking will be allowed in designated areas only. Training for tour guides and new interpretive opportunities (parkwide) will be developed to give visitors a better understanding and appreciation of the park's significance and its resources.*

9.3.3 Access - Although this zone will be accessible by the existing north entrance gate, a significant number of visitors, mainly those with accommodations in this zone, may choose to access the park using the ***new park entrance gate that will be located in this zone on the west side of the park.* No off-road vehicle use will be permitted. Access will be along designated roads only. ***Additional vehicle game viewing circuits will be developed in this zone to expand game viewing opportunities.*

9.3.4 Facilities and Development - The following types of development will be permitted in this zone (Appendix A: Definitions of Overnight Accommodations):

- One pre-existing Wildlife Lodge, Permanent Tented Camps, Special Campsites (non-permanent tented campsites), and Public Campsites (non-permanent tented campsites). All camps and campsites will be located as near the park boundary as possible to reduce access related congestion within the park.***The location of these*

overnight accommodations within this zone will be determined by an interdisciplinary team.

- ***Additional ranger posts, visitor information/interpretive facilities, small parking pulloffs, trailheads, short nature trails, and short trails to overlooks and points of interest, will be considered in this zone.*

- The game viewing tour road system (both existing and the potential expansion) will be rehabilitated/constructed to an all weather gravel road standard and drifts will be constructed to improve access in the rainy season.

9.3.5 Limits of Acceptable Use - The maximum number of beds in this zone will not exceed 304 (the 304 figure does not include the Administrative campground). The following number and type of overnight accommodations will be restricted to the following for this zone (Appendix A: Definitions of Overnight Accommodations):

EXISTING: ACCOMMODATIONS, TO BE MAINTAINED

- 1 Wildlife Lodge (84 bed maximum) -Tarangire Safari Lodge (pre-existing)

- 1 Permanent Tented Camp (16 bed maximum allocated) - Ker&Downey (prior existing lease agreement, under construction)

PLAN ACTION: EXISTING PLUS THE FOLLOWING ADDITIONAL ACCOMMODATIONS:

- 1 Permanent Tented Camp (not to exceed a 16 bed maximum)

- 8 Special Use Campsites (each not to exceed a 16 bed maximum); ***Sixteen Special Use Campsite locations will be selected to be used on a rotational basis so that the 8 campsites can be rotated on a yearly basis to reduce adverse impacts.*

- 3 Public Campgrounds (each not to exceed 10 tents or 20 bed maximum)

- 1 Administrative Campground (not to exceed 80 bed maximum; used primarily for College of African Wildlife Management field exercises)

9.3.6 Maintenance - Activities will include maintaining roads and facilities, protecting resources, and restoring areas disturbed by human activities. Power tools will be used for routine maintenance activities. Heavy equipment will be used only during the dry season and during the time of day when game viewing is minimal, or when an emergency (flood, fire, or other catastrophic event) could endanger resources, visitor safety, or access.

9.3.7 Natural Resources Management - The natural character and natural processes associated with lands in this zone will be preserved to the greatest extent

possible while accommodating moderate levels of vehicle game viewing. Any apparent adverse effects of visitor use will be mitigated, and disturbed areas (adverse human impact) that cause significant visual impairment will be restored. Visitor use will not be permitted in areas where sensitive species and environments occur. Unavoidable human impacts will be confined to resistant and less sensitive areas. Park resource specialists will be responsible for preventing or mitigating resource damaging activities.

9.3.8 Cultural Resources Management - Presently there is little information on prehistoric, historic sites or contemporary cultural use sites within the park. Additional survey and research will be undertaken to determine the extent and significance of cultural sites in the park. On-site investigations and clearance by professional cultural specialists will be required prior to any ground disturbance associated with any action.

9.4 CONSERVATION GENERAL USE ZONE (EAST) (7,708 hectares)

9.4.1 Resource Values - This portion of the park, adjacent to the important dry season habitat of the Core Preservation Zone, comprises many of the equally important movement corridors for wildlife that connect the dry and wet season grazing areas. Baobab trees, scattered across an area of gentle rolling ridges and shallow valleys, intermixed with kopjes, leaves a lasting landscape impression in the minds of visitors. This unique landscape has become synonymous with Tarangire National Park.

9.4.2 Visitor Use and Experience - This zone will accommodate high levels of use once the 150 bed Consolidated Sopa Hotel is operational. Contacts with other tourists will be frequent in the peak season and less so during off-season. Game viewing from vehicles will be the primary visitor activity. Visitors will be able to stop in order to stand near their vehicle (not in excess of 10 meters from their vehicle) to stretch and relax. Only at designated locations will visitors be encouraged to walk 50 meters or less along designated trails to selected observation points, outstanding natural features, or special use sites of interest, but again only if dangerous animals are 200 meters from the designated area. Walking safaris will be prohibited. ** *Picnicking will be allowed in designated areas only. Training for tour guides and new interpretive opportunities (parkwide) will be developed to give visitors a better understanding and appreciation of the park's significance and its resources.*

9.4.3 Access - Most visitors will access this zone using the existing north park gate entrance. No off-road vehicle use will be permitted. Access will be along designated roads only. ***Additional vehicle game viewing circuits will be planned and developed in this zone to expand game viewing opportunities.*

9.4.4 Facilities and Development - Only the following types of development will be permitted in this zone (Appendix A: Definitions of Overnight Accommodations)

- One hotel and Special Use Campsites (non-permanent tented campsites). Any Special Use Campsites in this zone will not be visible from any location within the Core Preservation Zone.***The location of the Special Use Campsites within this zone will be determined by the general management plan.*

- ***Additional ranger post(s), small parking pulloffs, trailheads, short nature trails, and short trails to overlooks and points of interest, will be considered in this zone.*

- The game viewing tour road system (both existing and potential expansion) will be rehabilitated/constructed to an all weather gravel road standard and drifts will be constructed to improve access in the rainy season.

9.4.5 Limits of Acceptable Use - The maximum number of beds in this zone will not exceed 182. The number and type of overnight accommodations for this zone will be restricted to the following (Appendix A: Definitions of Overnight Accommodations):

EXISTING: ACCOMMODATIONS TO BE MAINTAINED

- 1 Hotel (150 bed maximum) - Consolidated Tourist and Hotels Investment Limited, Tarangire Sopa Hotel; (pre-existing condition).

PLAN ACTION: EXISTING PLUS THE FOLLOWING ADDITIONAL ACCOMMODATIONS:

- 2 Special Campsites (each not to exceed a 16 bed maximum)

9.4.6 Maintenance - Activities will include maintaining roads and facilities, protecting resources, and restoring areas disturbed by human activities. Power tools will be used for routine maintenance activities. Heavy equipment will be used only during the dry season and during the time of day when game viewing is minimal, or when an emergency (flood, fire, or other catastrophic event) could endanger resources, visitor safety, or access.

9.4.7 Natural Resources Management - The natural character and natural processes associated with lands in this zone will be preserved to the greatest extent possible while accommodating high levels of vehicle game viewing. Any apparent adverse effects of visitor use will be mitigated, and disturbed areas (adverse human impact) that cause significant visual impairment will be restored. Visitor use will not be permitted in areas with sensitive species and environments. Unavoidable human impacts will be confined to resistant and less sensitive areas. Park resource specialists will be responsible for preventing or mitigating resource damaging activities.

9.4.8 Cultural Resources Management - Presently there is little information on prehistoric, historic sites or contemporary cultural use sites within the park. Additional survey and research will be undertaken to determine the extent and significance of cultural sites in the park. On-site investigations and clearance by professional cultural specialists will be required prior to any ground disturbance associated with any action.

9.5 SEMI-WILDERNESS ZONE (37,336 hectares)

9.5.1 Resource Values - Few tourists presently take the time to visit this more remote location of the park. Here, the Tarangire River occupies a unique location between rolling acacia ridges on the west and a broad panorama of the southern end of Silale Swamp on the east. During the dry season, this area provides a good location for viewing water independent species like the gerenuk, oryx, dikdik and lesser kudu. Movement of elephant, zebra, wildebeest, eland, and buffalo between dry and wet season habitats occurs here but is not as prevalent as in other areas of the park.

9.5.2 Visitor Use and Experience - In this zone there will be a sense of remoteness and solitude, but not of isolation from all human activity. **Use within this zone will be restricted to those visitors who are registered in Special Campsites in this zone.** Off-road vehicle game viewing will be the only activity in this zone during the dry season. All off-road vehicle game viewing will be prohibited during the wet season to protect the area from excessive vegetation loss and soil erosion. During the wet season day hikes (with an armed ranger and tour guide) will be the only activity allowed in this zone.

9.5.3 Access - This zone will be accessible by the existing north entrance gate and the ***new park entrance gate that will be located in the Conservation General Use Zone West.* Access to Special Use Campsites will be along designated roads. Off-road vehicle game viewing will be allowed in all areas of this zone with the exception of locations designated as sensitive resource areas. In addition, TANAPA may from time to time indicate parts of this zone to be closed to off-road traffic if excessive use is made of some areas.

9.5.4 Facilities and Development - All development with the exception of designated Special Campsites (Appendix A: Definitions of Overnight Accommodations) and ***additional ranger post(s)* will be prohibited in this zone. ***The location of these overnight accommodations and ranger posts (if required) will be determined by the general management plan.*

9.5.5 Limits of Acceptable Use - The maximum number of beds in this zone will not exceed 48. Accommodation will be restricted to the following in this zone (Appendix A: Definitions of Overnight Accommodations):

EXISTING:

- No existing accommodation facilities

PLAN ACTION: NEW ACCOMMODATIONS

- 3 Special Use Campsites (each not to exceed a 16 bed maximum); ***Six Special Use Campsite locations will be selected to be used on a rotational basis so that the 3 campsites can be rotated on a yearly basis to reduce possible adverse impacts.*

9.5.6 Maintenance - Activities will include maintaining roads and facilities, protecting resources, and restoring areas disturbed by human activities. Power tools will be used for routine maintenance activities. Heavy equipment will be used only during the dry season and during the time of day when game viewing is minimal, or when an emergency (flood, fire, or other catastrophic event) could endanger resources, visitor safety, or access.

9.5.7 Natural Resources Management - The natural character and natural processes associated with lands in this zone will be preserved to the greatest extent possible while accommodating moderate levels of off-road vehicle game viewing. Visitor use will not be permitted in areas with sensitive species and environments. Unavoidable human impacts will be confined to resistant and less sensitive areas. Localized adverse impacts due to off-road game viewing may require temporary closure of certain areas in this zone to allow for rest and rehabilitation. Park resource specialists will be responsible for preventing or mitigating resource damaging activities.

9.5.8 Cultural Resources Management - Presently there is little information on prehistoric, historic sites or contemporary cultural use sites within the park. Additional survey and research will be undertaken to determine the extent and significance of cultural sites in the park. On-site investigations and clearance by professional cultural specialists will be required prior to any ground disturbance associated with any action.

9.6 WILDERNESS ZONE (126,653 hectares)

9.6.1 Resource Values - The inherent inaccessibility of this portion of the park has allowed this area to remain, in effect, a de facto "wilderness area". This plan will formalize management actions to perpetuate this area of the park as a Wilderness Zone where the influence of man will continue to be minimal. This zone will serve an important research function as a baseline to evaluate change. It will serve to provide low impacting visitor use of a large portion of the park that has previously had no use while at the same time "banking resources" for the future. The area comprises a picturesque landscape with its mosaic of swamps, woodlands, and ridges and is an important migration route for large ungulates.

9.6.2 Visitor Use and Experience - This zone will provide a unique opportunity for the more hardy and adventurous visitor to have a remote experience with a maximum amount of solitude. It will be reserved exclusively for extended walking safaris (overnight non-permanent remote camps). All permanent structures will be prohibited (no designated campsites and no designated trails). Cross country orienteering and discovery will be encouraged. Campsites will be prohibited within 100 meters of any designated outstanding natural feature or sensitive resource area.

9.6.3 Access - This zone will be roadless and access will be by foot only. All use of vehicles will be prohibited except in case of emergency rescue, and in emergency anti-poaching situations. Access to the boundary of this zone will be provided by the existing Loibor Serrit Road on the northern boundary of this zone and the proposed boundary roads on the east, south, and west boundary of this zone.

All research, administrative, and maintenance access will be by foot only, unless it is determined that vehicle access is necessary to respond to human life, anti-poaching or endangered species emergency.

9.6.4 Facilities and Development - No developments will be permitted in this zone, and there will be no further modifications to the environment. A boundary road will be developed along the perimeter of this zone to provide both protection and access to the zone perimeter. ***Additional boundary perimeter ranger post(s) will be considered in this zone.*

9.6.5 Limits of Acceptable Use - The maximum number of beds (self-reliant overnight camping in personal tents) will not exceed 40 per night. Group size will not exceed 10 tourists (excluding an armed ranger, guide, and porters). No more than 4 walking safari groups will be permitted in this zone at anyone time and no more than 8 groups per month.

EXISTING:

- No tourist use occurs in this zone at the present time

PLAN ACTION:

- Self-reliant, non-permanent remote tent camping (Appendix A)

9.6.6 Maintenance - Maintenance activities will be for the purpose of protecting resources and restoring areas disturbed by human activities. No recurring maintenance will take place. Park management will adopt the "minimum tool concept". Power tools and heavy equipment will not be permitted in this zone unless it is determined that such tools and equipment are necessary to respond to human life, anti-poaching or endangered species emergency.

9.6.7 Natural Resources Management - This zone will generally appear to have been affected by the forces of nature with the imprint of man's work substantially unnoticed. The natural environment will be preserved to the extent possible while accommodating low-density use. Naturally occurring species will be maintained and populations of sensitive species will be protected. Use might be controlled or dispersed if necessary to protect park resources; however, with the anticipated low use, these measures are not expected to be needed. Park resource specialists will be responsible for preventing or mitigating resource damaging activities.

9.6.8 Cultural Resources Management - Presently there is little information on prehistoric, historic sites or contemporary cultural use sites within the park. Additional survey and research will be undertaken to determine the extent and significance of cultural sites in the park. On-site investigations and clearance by professional cultural specialists will be required prior to any ground disturbance associated with any action.

9.7 OUTSTANDING NATURAL FEATURE SUBZONE

9.7.1 Resource Values - This subzone represents isolated features of outstanding natural or scenic significance within other zones that require special protection and include areas critical to wildlife concentrations, essential water sources, and unique topographic formations. Many of these subzones are too small to be shown on Figure 3. A 1:50,000 Tarangire Management Zoning Map, located at Tarangire Park Headquarters, provides the level of detail to allow on-the-ground identification of all zones as well as the following sites in the Outstanding Natural Feature Subzone:

- Leminyon Plains
- Tarangire River Gorge
- Ridge Point
- Tarangire Hill
- Boundary Hill
- Boundary Hill Springs A
- Boundary Hill Springs B
- Poachers Baobab Hide
- Bwawa Mbili
- Chemchangeu Springs
- Sangaiwe Hills
- Kitibong Hill
- Heidodonga Hill
- Mingonyo Water Pools
- Oldonyo Ngahari
- Mkungunero Water Holes

9.7.2 Visitor Use and Experience - These subzones will accommodate varying levels of use. Due to the differing nature and character of these various features, some of these subzones may be viewed from a distance and others will allow direct foot access. All activities in these subzones will be governed by the requirements of the zone in which they are located. ***Some form of interpretation (outdoor panel exhibits or pamphlet guides) will be considered.*

9.7.3 Access - Access to outstanding natural features within the Wilderness Zone will be by foot only. In other zones, vehicles and designated access roads will be permitted but will not be allowed within 50 meters of the outstanding natural feature. Access within the core area of each of these subzones (the primary feature) will be by designated trails only.

9.7.4 Facilities and Developments - No roads or developments will be permitted where this subzone is located in the Wilderness Zone. Where this subzone occurs in other management zones, all development will be prohibited with the exception of designated access roads, parking and foot trails.

9.7.5 Limits of Acceptable Use - The limits of acceptable use and requirements of each Outstanding Natural Feature subzone will conform to the limits and constraints of the zone in which it is located.

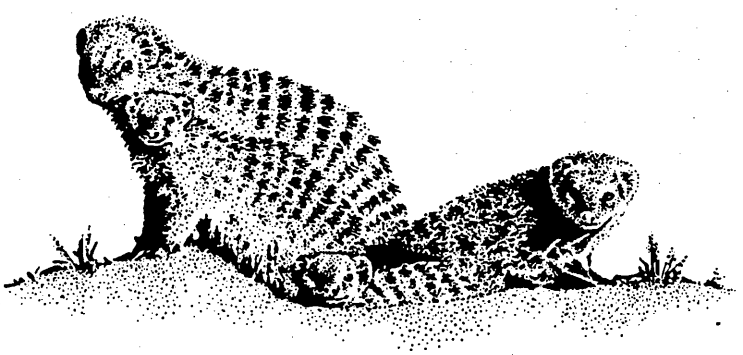
9.7.6 Maintenance - Maintenance activities will be for the purpose of protecting resources and restoring areas disturbed by human activities. Park Management will adopt the "minimum tool concept". Power tools and heavy equipment will not be permitted within 50 meters of the natural feature.

9.7.7 Natural Resources Management - The natural character and natural processes associated with lands in these subzones will be preserved to the greatest extent possible while accommodating low to moderate levels of use. Any apparent adverse effects of visitor use will be mitigated, and disturbed areas (adverse human impact) that cause significant visual impairment will be restored. Visitor use will not be permitted in areas with sensitive species and environments. Unavoidable human impacts will be confined to resistant and less sensitive areas. Park resource specialists will be responsible for preventing or mitigating resource damaging activities.

9.7.8 Cultural Resources Management - Presently there is little information on prehistoric, historic sites or contemporary cultural use sites within the park. Additional survey and research will be undertaken to determine the extent and significance of cultural sites in the park. On-site investigations and clearance by professional cultural specialists will be required prior to any ground disturbance associated with any action.

9.8 ON-THE-GROUND ZONE IDENTIFICATION

To enable park personnel, tour operators, and visitors to identify the zones and subzones while in the park, "on-the-ground" identification will be provided. Although zone boundaries will not be physically marked in every instance, the zone boundary descriptions will be on file at park headquarters along with a 1:50,000 scale zone map. These two reference items will allow zone boundary determinations to be made to ensure that a certain action, activity, or use will not violate the zoning scheme.



10. DERIVATION OF ENVIRONMENTAL IMPACT TOPICS

To determine the consequences of the plan described in Section 9. specific impact topics were identified based on resource knowledge and information. Other topics deemed important by the interdisciplinary planning team were also included. The rationale for topic selection is discussed below by major category. The environmental consequences of the plan are described by impact topic in the following sections.

10.1 BIOLOGICAL AND PHYSICAL RESOURCES

The following biological and physical resources and attributes were selected as impact topics because they were identified as exceptional during the planning process:

- the Tarangire River/Silale Swamp (water quantity and quality)
- elephants
- baobab trees and vegetation mosaic
- a wildlife dry season refuge - the river, wetlands, springs and mbugas
- threatened and endangered species
- wilderness and scenic character - (selected as a natural resource impact topic because of the relationship between the perceptual significance of these values and the visitor experience).

10.2 SOCIOECONOMIC ENVIRONMENT

Several user groups and interests were also identified as having the potential to be affected by the plan:

- the visitor experience
- the tourist industry
- park operations
- park revenue

10.3 CULTURAL RESOURCES

Cultural resources were included as an impact topic because three well known archeological sites located near to but outside the park were identified that need increased protection. Little is presently known about the status of cultural sites within the park boundary.

11. ENVIRONMENTAL IMPACTS

11.1 IMPACTS ON THE TARANGIRE RIVER/SILALE SWAMP (WATER QUALITY AND QUANTITY)

The plan will prohibit any future construction of hotels, lodges, other types of overnight accommodations, and any other types of development within the 37,746 hectare Core Preservation Zone which includes Silale Swamp and an approximately 60 kilometer long corridor of the Tarangire River. The plan will require that the existing 10 special campsites (non-permanent tented camps), the existing 3 public campsites, and the 1 existing administrative camp that are now located in the Core Preservation Zone be relocated to one of the other zones that can accommodate the particular type of campsite. The plan will prohibit the consumptive human use of surface water within the park with the exception of sanctioned walking safaris use in the Wilderness Zone. These plan actions will greatly reduce impacts on water quality (both surface and subsurface) by prohibiting all types of development that contribute to vegetation reduction, soil compaction, erosion, siltation, trash, hazardous spills (petrol and oil from vehicle maintenance), and human fecal contamination. These actions will give an appropriate level of protection status to two of the park's most exceptional resource values - Water Quality and Water Quantity.

It is common knowledge (failure in past efforts to locate potable water by drilling boreholes) that it is extremely difficult to find potable ground water within the park boundary. While little is known about the ground water regime characteristics in the park, the plan action to set limits on the level of development and use can only enhance the status of both the quality and quantity of ground water - one of the park's most vital resources.

IMPACTS ON WATER QUALITY AND QUANTITY IF THE PLAN IS NOT IMPLEMENTED

Both uncontrolled, unplanned, and poorly planned development would continue to be the norm for development activity within the park. TANAPA could expect an increase in the number of development requests along with pressure to allow construction of both numbers and types of facilities and development that would have significant adverse impacts on both the quality and quantity of surface and ground water resources. Without the management zoning plan it would be difficult to resist pressure to allow such developments, leading to significant degradation of park resources.

11.2 IMPACTS ON ELEPHANTS

Tarangire National Park has one of the highest concentrations of elephants of any park in Tanzania. The park is well known as a location where tourists have the best opportunity consistently to see large numbers of elephants. It is estimated that between 1,550 and 3,300 elephants are in the park during the dry season, ⅓ of which are present in the wet season. The Tarangire River system and water holes provide the only natural dry season water supply for the entire 20,500 square kilometer Masai Steppe. The plan's management zoning scheme will provide added protection to elephant migration routes and habitat within the park boundary by setting overall limits of development and use within the entire park, by prohibiting development in critical corridor or habitat zones, and by setting strict limits of acceptable use and development in other zones. The Wilderness Zone, with both walking safari tourism and the associated perimeter road system, will greatly improve the level of protection for this 126,653 hectares of the park, benefiting both elephant migration routes and habitat within the park boundary. However, another significant threat to the elephant and the elephant habitat within the park is the continuing loss of wet season grazing habitat outside the park boundary because of increased cultivation and settlement within critical migration corridors leading to and from the park. Now, even in the wet season, the elephants seem more and more hesitant to leave the park due to conflicts with the increasing number of settlements within the primary migration corridors adjacent to the park. Continuing year-round use of the park by existing elephant numbers may have a devastating effect on the park's vegetation regime with a corresponding adverse impact on the park's elephant population. Since this Tarangire Management Zone Plan focuses more on suitability of site development and use within the park boundary, the critical issue of protection of migration corridors outside the park boundary will, have to be deferred until the preparation of the Tarangire General Management Plan/Environmental Impact Assessment.

IMPACTS ON ELEPHANTS IF THE PLAN IS NOT IMPLEMENTED

Without this plan, the pressures to allow tourist development within primary elephant corridors and habitat within the park boundary will continue. Since concentrations of elephants have traditionally occurred within the park boundary along the length of the Tarangire River, extensive tourist development (both overnight accommodations and roads) would be expected to proliferate along the river (****lease dispute precedent with Consolidated Sopa Hotels, 1993*). The types and levels of development along the river would disrupt long established elephant

****February 1993, after the preparation of an environmental impact assessment by TANAPA, and pressure from tour operators, local, national, and international conservation organizations, individuals, and the press, Consolidated (SOPA) Tourist and Hotels Investment Limited agreed to relocate their lodge site away from the banks of the Tarangire River to a somewhat more environmentally compatible location in the Conservation General Use Zone, approximately 2.5 kilometers east of the river.*

movement patterns and add additional stress to an elephant population that is already being stressed by human intervention outside the park boundary.

11.3 IMPACTS ON BAOBABS AND VEGETATION MOSAIC

The abundance of baobabs, the picturesque rolling terrain dominated by a variety of acacia species, along with the previously mentioned concentration of elephants cumulatively symbolize the identity of Tarangire National Park. The concentration of baobabs and the variety of acacia woodlands are both special trademarks of the park. The management zone plan will provide for controlled and planned development and use to provide additional protection for these two exceptional resource plant species. Prohibiting development in the 37,746 hectare Core Preservation Zone and the 126,653 hectare Wilderness Zone, setting strict limits on the amount of development and use in the 63,203 hectare Conservation General Use Zone and the 37,336 hectare Semi-Wilderness Zone will provide an additional measure of protection for the perpetuation of the park's flora.

However, the most severe long term threat to baobabs, acacias, and the park's vegetation may be damage caused by overgrazing, stripped and felled trees caused by the year-round concentration of elephants and other migratory wildlife that increasingly stay within the park year-round due to increasing cultivation and settlement pressures outside the park. The park's present prescribed burning program may also be contributing to the unnecessary destruction of vegetation, thereby transforming the Park from a mosaic vegetation type to a grassland savannah. Since this Tarangire Management Zone Plan focuses more on suitability of site development and use within the park boundary and since the critical issue of long term protection of the park's vegetation scheme also concerns issues outside the park, solutions to the major problems associated with vegetation issues will have to be deferred until the preparation of the Tarangire Comprehensive General Management Plan.

IMPACTS ON BAOBABS AND VEGETATION MOSAIC IF THE PLAN IS NOT IMPLEMENTED

Without this plan, the pressures to allow uncontrolled and poorly planned tourist development would continue in the northern portion of the park where there are numerous acacias and the density of baobabs is high. Most reputable developers would probably take advantage of standing baobabs and acacias to enhance the landscape scheme around a facility; therefore, adverse impacts on these two species would probably be negligible on facility sites. On the other hand, developers are not as sensitive when designing and constructing access roads and parking areas. Unacceptable tree or vegetation loss might be expected to occur if access roads and parking lot plans (associated with facility development) are not reviewed carefully.

11.4 IMPACTS ON A WILDLIFE DRY SEASON REFUGE - RIVER, WETLANDS, SPRINGS AND MBUGAS

The Tarangire River system and associated wetlands, springs, and mbugas within the park boundary provide a critical natural dry season refuge, providing the primary water supply for wildlife within the entire 20,500 square kilometer Masai Steppe. The plan's management zoning scheme will provide greatly increased protection for the park's critical dry season habitat and natural water supply by prohibiting development and setting the limits of acceptable use in both the 37,746 hectare Core Preservation Zone and the 126,653 hectare Wilderness Zone and by setting strict limits of acceptable development and use within the 37,336 hectare Semi-Wilderness Zone and the 55,495 hectare Conservation General Use Zone (West). Critical dry season refuge areas within the park will be managed and protected primarily to ensure benefits to wildlife. Tourism will play a secondary role.

IMPACT ON A WILDLIFE DRY SEASON REFUGE IF THE PLAN IS NOT IMPLEMENTED

Dry season refuge areas (rivers, wetlands, springs and mbugas) where large concentrations of wildlife congregate will continue to be the focus for tourist related development pressures within the park. The potential for hotel/lodge/tented camp operations to dominate and have exclusive use of these exceptional resource areas will mean that human related activities will dominate and overshadow some of the park's most significant natural resource areas. The majority of tourists, therefore, will never have the opportunity to experience some of the park's most exceptional wildlife and water dominated landscape areas in a setting relatively free of man's influence.

11.5 IMPACTS ON THREATENED AND ENDANGERED SPECIES

By prohibiting development and limiting use in the 126,653 hectare Wilderness Zone and by providing for planned development and by setting acceptable limits of development and use in all other park zones, the plan will ensure that an adequate amount of habitat is placed in a protected status that will increase benefits for rare, endemic, threatened, and endangered species. The plan will also encourage some visitors to experience and use other areas of the park rather than focusing their attention only on the northern portion of the park adjacent to the Tarangire River. By encouraging more diverse visitor use throughout the park, the plan will increase and expand surveillance, thus helping deter illegal activities that might adversely impact threatened and endangered species.

IMPACTS ON THREATENED AND ENDANGERED SPECIES IF THE PLAN IS NOT IMPLEMENTED

The increasing pressures now being brought to bear by the tourism industry in Tanzania to promote mass tourism at the expense of the park's resources will continue. Without planned and controlled development and use, the entire park will continue to be viewed by many as an unlimited opportunity for development of overnight accommodations and game viewing tracks. If the majority of the park becomes saturated with developments, roads and activities, unacceptable levels of pressure and stress would be placed on the park's threatened and endangered species.

11.6 IMPACTS ON WILDERNESS AND SCENIC CHARACTER

This plan supports the internationally recognized concept of "Wilderness" as an integral and essential category for the Tanzania National Parks system (*National Policies for National Parks in Tanzania*, 1994). Wilderness Zones will be defined as roadless areas of meaningful and manageable size where there are no man-made structures and the influence and presence of man is minimal. The plan to put 126,653 hectares of the park in a Wilderness Zone will prohibit all development as well as any use of motorized vehicle or equipment in this zone. This plan moves Tanzania National Parks toward a policy of "eco-tourism" (fewer tourists paying more for a quality experience with an emphasis on resource preservation) and away from the more traditional "mass tourism" approach which emphasizes increased tourist numbers and development at the expense of park resources and values. This plan is based on the premise that the future trend in nature tourism and the market share will move away from crowded and overdeveloped protected areas to locations where people can escape the crowds and lose themselves in more pristine natural landscapes and habitats where man leaves only footprints and is a short term visitor. The 1993 approved Kilimanjaro Comprehensive General Management Plan and this Tarangire Management Zone Plan both establish wilderness areas in their respective parks, setting a precedent for all present and future national park planning efforts in Tanzania. These designated wilderness areas will allow Tanzania to provide low impacting use of large areas of two national parks where previously no use was allowed and at the same time to "bank" a significant portion of its valuable resource base to ensure the preservation and perpetuation of these valuable assets into the 21st century and beyond.

IMPACTS ON WILDERNESS CHARACTER IF THE PLAN IS NOT IMPLEMENTED

A few tourist industry developers seem intent on exploiting Tarangire National Park to its fullest use and development potential with little or no consideration for the parks's natural resources. If this Tarangire Management Zone Plan is not strictly followed and implemented, the park's resources will be sacrificed to mass

tourism and short term revenue gains. Uncontrolled development and use of the park would create an irreversible loss to park resources. The adverse impact associated with an excessive number and size of hotels, lodges and tented camps and the network and degradation of game viewing tracks generated by such developments would cause irreversible loss to the wilderness and scenic character of the park.

11.7 IMPACTS ON THE VISITOR EXPERIENCE

The cumulative impact of the 1990 decision to allow Consolidated Tourist and Hotels Investment Limited to build a 150 bed hotel while maintaining the existing number of beds (10 Special Campsites, 1 Permanent Tented Lodge and 1 Permanent Tented Camp) along with the actions to be implemented by this plan (the addition of 3 Special Campsites and 1 Permanent Tented Camp) will create severe adverse impacts on the quality of the visitor experience in the Core Preservation Zone during the peak season. An increase in the number of vehicles represented by the change from the present **1 vehicle per 2.7 kilometers** (assumes existing conditions: no 150 bed Consolidated Sopa Hotel and no additional proposed beds) to this plan's **1 vehicle per 1.6 kilometers** (assumes existing conditions, the 150 bed hotel, and the plan additions) moves Tarangire's Core Preservation Zone in the direction of mass tourism and the type of overuse that is now associated with the more heavily used portions of Masai Mara Game Reserve in Kenya with 1 vehicle per 1.2 kilometers, averaging 10 vehicles around one wildlife event (C.G. Gakahu 1992), and the most heavily used portion of Kruger National Park in South Africa with 1 vehicle per 0.75 kilometers (Joubert, 1992). Existing conditions and the plan action additions (without the 150 bed Consolidated Sopa Hotel) would represent only **1 vehicle per 2.4 kilometers** in the Core Preservation Zone.

This analysis demonstrates the adverse impact which occurs with respect to crowding when even one additional major hotel is located in the park, directly adjacent to the park's most exceptional resource area. Hotels and lodges by their very nature are high profile and high impacting because they are massive structures that concentrate intensive use within one localized area of a park (C.G. Gakahu, 1992). This previous decision to allow even one Consolidated Sopa Hotel directly adjacent to the Core Preservation Zone in Tarangire will increase the number of vehicles in the northern portion of the Core Preservation Zone by 28.6 vehicles per day. At the same time, this plan action to add 3 low impacting Special Campsites in the Semi-Wilderness Zone will increase the number of vehicles in the Core Preservation Zone by only an estimated 4.9 vehicles per day. The plan action to add 1 low impacting Permanent Tented Camp in the Conservation General Use Zone West will increase the number of vehicles in the Core Preservation Zone by only an estimated 2.3 vehicles per day. The advantage of having more, smaller, dispersed, low impacting camps located away from prime resources rather than

having fewer, large, high impacting hotels close to the park's prime resources within national parks is now obvious from TANAPA's experience in Tarangire.

Studies in other national parks have shown that the area within a 36 kilometer radius of any hotel or lodge in a national park is always severely adversely impacted (both adverse resource and adverse visitor experience impacts) because of the number of game viewing vehicles that tend to concentrate near the hotel in order to save petrol, thereby maximizing profits (Gakahu, 1992). This 36 kilometer radius around the Consolidated Sopa Hotel that will be intensively used for game viewing will cause severe adverse impacts to 72 kilometers of the park's most prime game viewing habitat along the east and west tour roads adjacent to the Tarangire River in the northern portion of the park.

The adverse impacts of Consolidated Sopa Hotel are compounded by the fact that this primary game viewing road from the park gate along the east side of the river to the hotel will be used by the hotel as an access route for both tourists and supply trucks.

Unfortunately the 1990 decision to place the Consolidated Sopa Hotel in the heart of Tarangire National Park now severely limits TANAPA's options to comply with National Policies for National Parks in Tanzania and 7 major management objectives of the Tarangire Management Zone Plan i.e.:

- maintain the scenic quality, aesthetic attributes, and the type of traditional low impact camping experience that has become synonymous with Tarangire National Park.

- Ensure that tourism and tourism development are within the limits of acceptable use and have the least adverse impact on park resources and the high quality of visitor experience traditionally associated with Tarangire National Park.

- Reduce the amount of tourist congestion that occurs in the northern portion of the park

- Minimize the adverse visual impacts of human activity along and within the Tarangire River corridor and within a specified distance of areas with unique natural, scenic, or topographic features, critical concentrations of wildlife, critical water sources, and areas with exceptional resource values.

- Encourage all new development outside the park boundary or as near to the boundary as possible.

- Prohibit all temporary or permanent structural development (except bridges and tour circuit roads) within the Tarangire River corridor and in areas where during the dry season there are high concentrations of wildlife.

- Ensure that all man-made developments, facilities, and structures are designed to be harmonious with the park's natural environment so as not to detract from scenic views or vistas within or adjacent to the park.

The Consolidated Sopa Hotel has unfortunately absorbed a disproportional high number of beds and has localized intensive use in one of the park's prime exceptional resource areas. Having absorbed such a high proportion of beds with respect to maintaining an acceptable number of vehicles per kilometer within the Core Preservation Zone, the Consolidated Sopa Hotel now restricts this plan's option to provide more, smaller, more widespread, less impacting types of overnight accommodations that would better serve TANAPA policy and plan objectives. While the plan action, itself, increases the number of vehicles per kilometer, it was necessary to require a minimal addition of low impacting beds in zones of the park where there are presently no beds. These few additional beds will help disperse use but will contribute minimally to TANAPA's objective of providing a traditional low impact camping experience that is synonymous with Tarangire National Park.

This plan action, including existing beds and with the 150 bed Consolidated Sopa Hotel allows for 534 beds. ***Tarangire Core Preservation Zone will now have to support similar use levels as some of the more heavily used areas within the Masai Mara.***

IMPACTS ON THE VISITOR EXPERIENCE IF THE PLAN IS NOT IMPLEMENTED

With no zoning scheme and no "limits of acceptable use", Tarangire National Park and the Core Preservation Zone in particular will, given the current level of tourism development demands, be forced to yield totally to a mass tourism type of experience.

11.8 IMPACTS ON THE TOURIST INDUSTRY

All future tourism development within the park will have to comply with this approved management zoning plan and the newly adopted 1994 Development Lease Consideration/EIA Procedures. The tourist industry will be required to commit more time, manpower, and resources to get the required approvals to plan and construct facilities and roads within the park. Working closely with interdisciplinary TANAPA management and planning teams, this expanded commitment by the tourist industry will ensure that an appropriate balance between use and preservation is achieved and that the park resources are not sacrificed for short term economic gain. This plan and new leasing procedures will ensure that park resources - the lifeline of the tourist industry - are sustained and perpetuated to ensure long term economic benefits for both the tourism industry and the country. This expanded commitment on both the part of TANAPA and the tour

industry will ensure that the eloquent words enshrined in the Arusha Manifesto are translated into meaningful actions. This move toward eco-tourism (fewer tourists paying more for a quality experience with a management emphasis on strict limits of acceptable tourist use and development) and away from mass tourism will create a level of healthy competition among tour operations that will, over time, reduce the number of substandard tour operations and maintain Tanzania's reputation for a quality wildlife experience.

IMPACTS ON TOURIST INDUSTRY IF THE PLAN IS NOT IMPLEMENTED

The pressures to promote mass tourism along with uncontrolled, unplanned, and poorly planned and constructed tourist development will continue to be the rule rather than the exception. Park resources will be sacrificed for short term economic gains and uncontrolled mass tourism will continue to encourage substandard tour development and operations. The tourist industry will continue to maximize short term economic gain from the national parks at the expense of irreversible degradation of park resources. This trend may lead to reduced visitor satisfaction over time with loss of revenue to the tour industry due to a park system wide drop in tourist numbers.

11.9 IMPACTS ON PARK OPERATIONS

Tarangire National Park Headquarters will maintain a permanent copy of the approved Tarangire Management Zone Plan as well as a 1:50,000 scale base map of the entire park along with map overlays, depicting the management zoning scheme and the park's exceptional resources. This plan and detailed management zone map will give Tarangire park headquarters a strict edict for managing and controlling all use, facility and road development within the park, including all activities, use and development associated specifically with the tourism industry. This plan will now allow TANAPA to guide and manage the future of this park in a coordinated, rational, and systematic way, using an approved document that was developed by an interdisciplinary team of park managers, planners, and researchers, using the best available information. Park management will be required to comply with the strict edicts of this management zoning plan in both their day-to-day park activities and in their long range planning for park operations. The guidance and direction provided to park managers by this plan will greatly enhance the overall effectiveness of park operations.

IMPACTS ON PARK OPERATIONS IF THE PLAN IS NOT IMPLEMENTED

Park management will continue to operate without short-term or long-term guidance and direction. Lack of a coordinated and planned approach as to what "can and cannot" occur within the park will continue to contribute to arbitrary decision-making. Conflicts and controversy over the appropriate use of the park would be

expected to continue and/or escalate between various user groups and TANAPA management.

11.10 IMPACTS ON PARK REVENUE

Special Campsites (see Appendix A) have had a long-standing tradition associated with Tarangire National Park. The revenue for TANAPA for each person using a Special Campsite (maximum 16 beds per Special Campsite) is $40 US per person/per night. The present TANAPA fee structure requires hotels, wildlife lodges, and permanent tented camps to pay TANAPA ONLY $10 US per person/per night. Also, TANAPA receives no revenue from food or beverage sales from hotels, lodges and permanent tented camps. The perpetuation of this $10 US per person/per night fee structure for hotels, lodges, and permanent tented camps is depriving TANAPA of vast sums of revenue (throughout the National Park system as well as Tarangire) while encouraging those types of development that have the greatest adverse impact on park resources.

Unfortunately, the current fee structure and the decision to allow the Consolidated Sopa Hotel (decision made prior to this planning effort) will have a significant negative impact on park revenue. Had Consolidated Sopa Hotel not been built, this plan (staying within the desired "Limits of Acceptable Use") would have been able to recommend the establishment of 10 new additional Special Campsites along with the existing 10 Special Campsites. The revenue generated from 20 Special Campsites would be approximately $4,556,880 US per year. The revenue generated per year by the 150 bed hotel and the 10 existing Special Campsites would be only approximately $3,046,655 US. By accepting the Consolidated Sopa hotel, TANAPA loses approximately $1,520,255 US per year in revenue.

IMPACTS ON PARK REVENUE IF THE PLAN IS NOT IMPLEMENTED

The pressure to allow additional hotel, lodge and permanent tented camp development within the park will continue, allowing an emphasis in a type of revenue generation that least benefits TANAPA directly. Uncontrolled and difficult to control, poorly planned, and poorly designed tourism developments, like the Consolidated Sopa Hotels allowed recently in Serengeti and Tarangire National Parks and the Ngorongoro Conservation Area would be expected to flourish in other National Parks. This trend may lead to reduced visitor satisfaction over time with loss of revenue to TANAPA due to a park system wide drop in tourist numbers.

11.11 IMPACTS ON CULTURAL RESOURCES

While little is known about the location or status of cultural resources

(archeological or historical sites) within the park, the management zone plan scheme to control and limit the level of development and use within the park will increase overall protection status to all resources in the park. This plan will not directly benefit the three known archeological rock art sites - Kisesse, Kolo, and Pahi - (located approximately 40 kilometers southwest of the park boundary). However, this plan does acknowledge the need to survey and evaluate the protection needs of all significant cultural resources both within and adjacent to the park as part of the comprehensive Tarangire National Park General Management Plan effort.

Impacts on Cultural Resources If the Plan is Not Implemented

Uncontrolled and poorly planned developments will greatly increase threats to all park resources, including any archeological and historical sites that may be present but as yet are unidentified.

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APPENDIX A: OVERNIGHT ACCOMMODATION DEFINITIONS:*

- **Hotel:**
  one level, permanent, steel reinforced cement foundations with permanent hard walls, continuous structure with multiple interior bedrooms, dining room, bar, gift shop, offices, reception, and storage under one primary roof structure with interior plumbing and power; swimming pool optional; essential onsite staff housing; essential parking and storage space only. Biodegradable trash buried and burnables burned by tour operator. Non-burnables removed from the park by tour operator.

- **Wildlife Lodge:**
  one level, permanent, steel reinforced cement foundations with permanent hard walls, continuous structure with reception, gift shop, dining room, bar, and offices under one roof with interior plumbing and power; a series of one level, separated, permanent, steel reinforced cement bedroom structures (bandas, cottages etc); swimming pool optional; only essential staff housing; essential parking and storage space only. Biodegradable trash buried and burnables burned by tour operator. Non-burnables removed from the park by tour operator.

- **Permanent Tented Camp:**
  one level, cement or wood platform, tented structure with reception, dining room, and bar; a series of one level, cement or wood platform, separated, permanent tented bedroom structures; swimming pool optional; only essential onsite staff housing; essential parking and storage only. Biodegradable trash buried and burnables burned by tour operator. Non-burnables removed from the park by tour operator.

- **Special Campsites:** (NON-PERMANENT TENTED CAMPS):
  all temporary tented camps; no cement platforms or permanent structures of any type; no permanent toilet structures of any type. All trash packed out by tour operator; camouflage camping techniques.

- **Public Campsites:** (NON-PERMANENT TENTED CAMPS):
  all temporary tented camps, numbered and designated tent sites with perimeter definition for tent locations, fire rings, and parking area; permanent toilet structures; TANAPA regularly scheduled trash pickup collection system and toilet maintenance.

- **Wilderness Campsites:** (NON-PERMANENT TENTED CAMPS):
  non-designated (may be designated in special circumstances) tent campsites and foot trails; access by foot only; no permanent structures or roads of any type. Tour operator or individual user responsible for packing out all trash; camouflage camping techniques.

* All TANAPA Lease and Non-Lease accommodation categories will prohibit the concessionaire or organisation from establishing any type of procedure that will result in discrimination or "exclusive use" of the facility. Anyone will be allowed to book or reserve accommodations for the above types of accommodations.

APPENDIX B: BIBLIOGRAPHY

Clark, John. 1992. Draft Tarangire National Park Management Plan (unapproved). African Wildlife Foundation

Gakahu, C.G., (editor) 1992. Tourist Attitudes and Use Impacts in Maasai Mara National Reserve. Wildlife Conservation International

Joubert, S. 1992. Master Plan for the Management of the Kruger National Park, South Africa.

Lamprey, H.F. 1964. Estimation of the large mammal densities, biomass and energy exchange in the Tarangire Game Reserve and the Masai steppe in Tanzania. East African Wildlife Journal 2:1 - 45.

Moreau, R.E. 1966. The bird faunas of Africa and its islands. Academic Press, London

Snelson, D. (editor) 1986. Tarangire National Park Handbook. Tanzania National Parks / African Wildlife Foundation

1990. Aerial Survey Wildlife Counts, TWCM, Serengeti National Park

1991. Maintaining the Integrity of Protected Areas - Productive Land Management in the Tarangire Region, Tanzania, Volumes I and II. African Wildlife Foundation

1990. Tarangire National Park Development Plan (unapproved). African Wildlife Foundation

IUCN - The World Conservation Union

The African Wildlife Foundation

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The World Conservation Union and the African Wildlife Foundation

TANZANIA

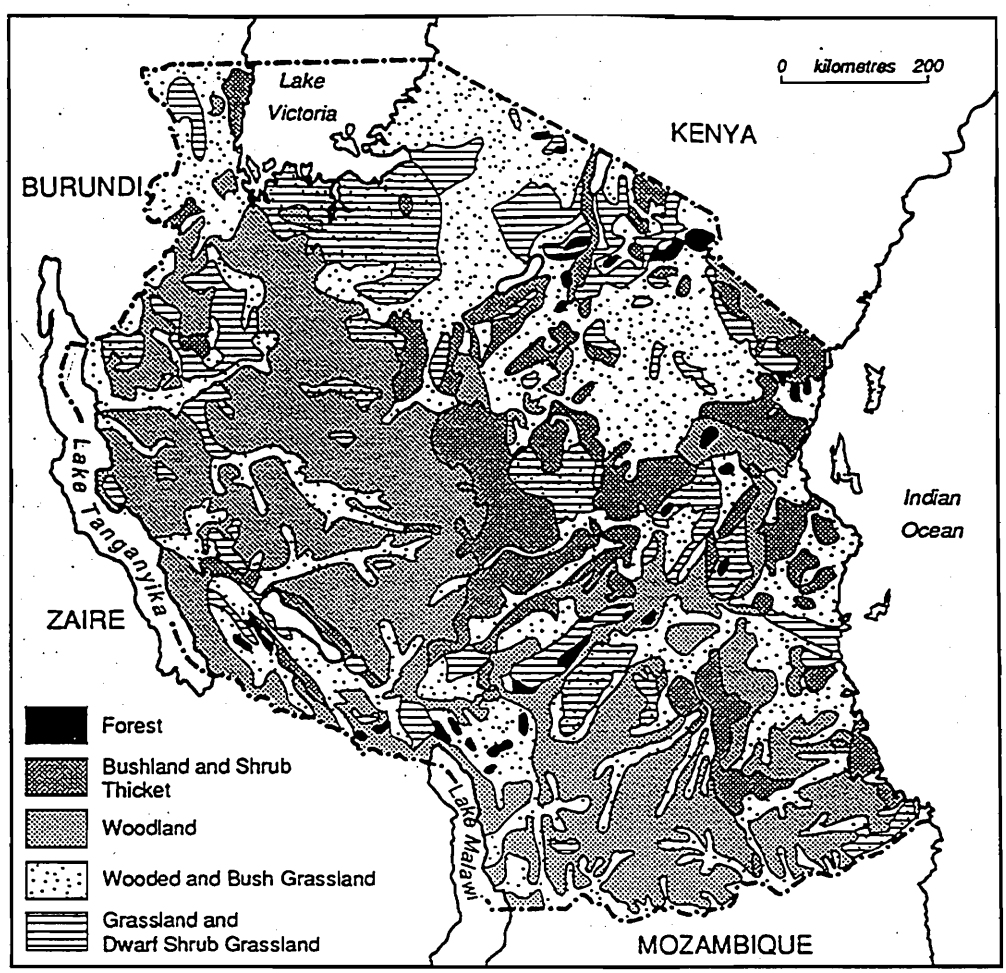
National Environment Action Plan

A First Step

10th June, 1994.

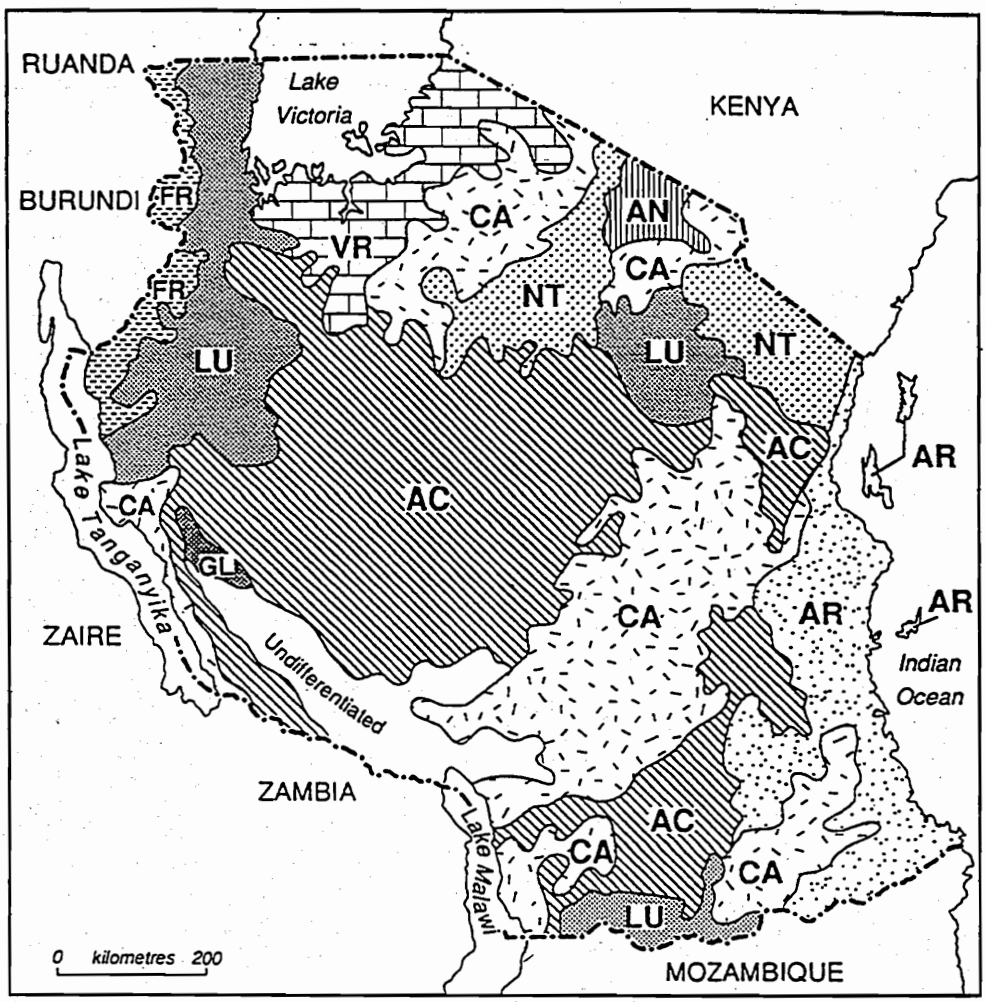
MINISTRY OF TOURISM, NATURAL RESOURCES AND ENVIRONMENT

Figure 5: Map of Major Vegetation Types



Source: Adapted from Handbook of Natural Resources of East Africa, 1/4.0 million map of E. Africa, E. African Literature Bureau, Nairobi, 1976

Soil Map of Tanzania

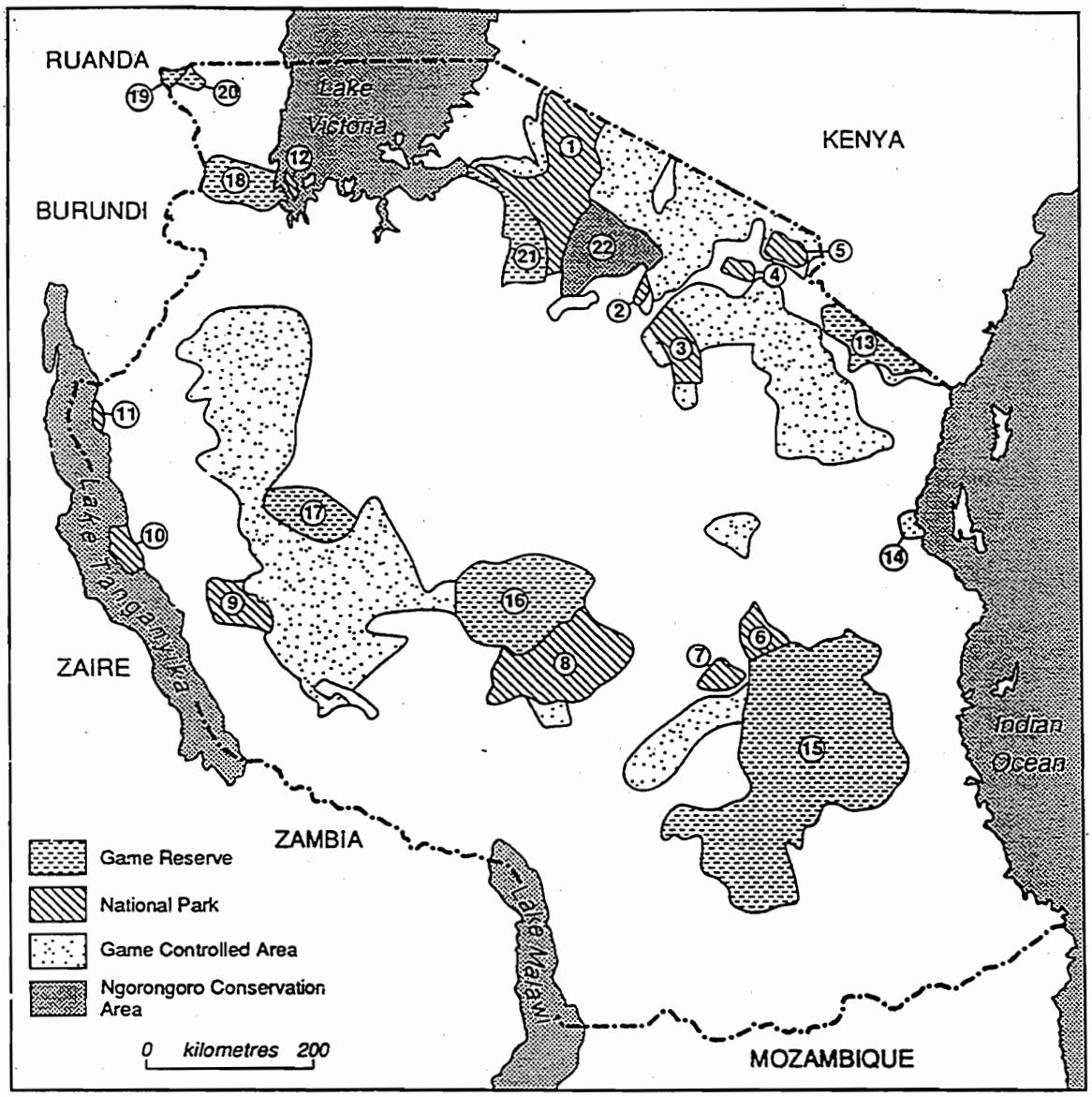


Legend

AC	Acrisols:	Soils with an argillic B horizon (containing illuvial clay and clay skins) with base saturation < 50%
AN	Andosols:	Soils developed from recent volcanic materials
AR	Arenosols:	Very sandy soils which have an identifiable B horizon; clay < 15%
CA	Cambisols:	Soils with a 'structural B horizon' but no argillic horizon
FR	Ferrasols:	Soils with an oxic horizon with a CEC < 16 m.e./100 g clay
GL	Gleysols:	Gleyed soils with hydromorphic properties dominating
LU	Luvisols:	Soils with an argillic B horizon with base saturation > 50%
NT	Nitosols:	Soils with a deep argillic B horizon and merging horizon boundaries, strongly structured with shiny ped faces
VR	Vertisols:	Dark cracking clay

Source: Adapted from FAO-Unesco Soil Map of the World, 1977

Map of Protected Areas of Tanzania



Conservation Areas

1. Serengeti National Park
2. Manyara National Park
3. Tarangire National Park
4. Arusha National Park
5. Kilimanjaro National Park
6. Mikumi National Park
7. Udzungwa National Park
8. Ruaha National Park
9. Katavi National Park
10. Mahale National Park
11. Gombe National Park
12. Rubondo National Park
13. Mkomazi Game Reserve
14. Sadani Game Reserve
15. Selous Game Reserve
16. Rungwa/Kizigo Game Reserve
17. Ugala River Game Reserve
18. Biharamulo and Burigi Game Reserves
19. Ibanda Game Reserve
20. Rumanyika Game Reserve
21. Maswa Game Resereve
22. Ngorongoro Conservation Area

TANZANIA MAINLAND FACT SHEET

1. Location (29° E - 41° E; 1° S - 12° S)

2. Land frontiers

To North: Kenya and Uganda
To West: Burundi, Rwanda and Zaire
To South: Zambia, Malawi and Mozambique
To East: Indian ocean

3. Area

(a) Land 881,289 sq km
(b) Water 61,495 sq km
Total 942,784 sq km

4. (a) Population
22,486,000 (1988 census)
25,151,000 (1992 estimate)

(b) Population density
22 people/sq km (1988)
29 people/sq km (1992)

(c) Population growth rate
1978 - 1988 : 2.8 %

5. Land use

	Ha. (millions)	Proportion
Small holder cultivation	4.1	5%
Large scale agriculuture	1.1	1%
Grazing land	35.0	39%
Forests and woodlands	44.0	50%
Other lands	4.4	5%
Total	88.6	100%

6. Arable land (ha) 3,634,000

7. Major lakes

(a) Victoria 34,850 sq km
(b) Tanganyika 13,350 sq km
(c) Nyasa 5,600 sq km
(d) Rukwa 2,850 sq km

(e) Eyasi 1,050 sq km

8. Mountain summits (meters above sea level)

Mount Kilimanjaro	5,895
Mount Meru	4,566

9. National parks (area in sq km)

(a)	Serengeti	14,750
(b)	Ruaha	13,000
(c)	Ngorongoro	8,320
(d)	Mikumi	3,320
(e)	Tarangire	2,600
(f)	Katavi	2,250
(g)	Kilimanjaro	750
(h)	Rubondo	450
(i)	Lake Manyara	320
(j)	Arusha	120
(K)	Gombe	50
Total		45,130

10. Climate

(a) Rainfall

Main rainy season on the coast is from March to May but there is second season between October and December. Total rain increases towards the North around lake Vicroria. Rainfall is well distributed throughout the year but there is a peak during March and May.

(b) Temperature

Average maximum temperature (degrees centigrade)

	Jan.	Apr.	July	October
Dar es Salaam	31.6	30.1	28.6	31.3
Arusha	28.9	25.3	21.1	27.3
Dodoma	31.4	28.4	26.0	30.2

Average maximum temperature (degrees centigrade)

	Jan.	Apr.	July	October
Dar es Salaam	23.3	22.9	18.3	19 3
Arusha	12.2	16.9	12.6	13 2
Dodoma	19.2	13.5	13.2	16.2

11. Economic indicators

Gross Domestic Product at factor cost (billion shs.)	1992
At current prices	688.0
At constant price	32.2

GDP growth rate at 1976 prices 1985 - 92: 3.69%

Per capita	(shs.)
At current prices	27,355
At constant prices	1,280

12. Foreign Trade

Major export	1992 (million shs.)
Coffee	19,500
Cotton	30,417
Sisal	416
Tea	7,387
Tobacco	8,787
Diamond	2,594
Gold	12,619

Executive Summary

1. The National Environmental Action Plan (NEAP) is Tanzania's first step towards a comprehensive incorporation of environmental concerns into the fabric of national planning and development. The importance of this step is the fact that most Tanzanians depend on the natural resources of the country for their livelihood and future generation will need those resources for their well-being. In towns and cities as well in the countryside the health and well-being of people depend on pollution free water, forests and trees, retention of soil fertility, grasslands, cleaner air and the reduction of pollution from industries. This means that economic development has to occur together with sustainable use of natural resources and environmental sustainability.

2. The current state of the Tanzania environment is matter of concern. This national analysis identifies six major problems for urgent national attention. These are problems of (a) land degradation; (b) lack of accessible, good quality water for both urban and rural inhabitants; (c) pollution; (d) loss of wildlife habitats; (e) deterioration of marine and fresh water systems; and (f) deforestation. Each of these is important to the economic well being of the country and the health of people.

3. Although precise information is not available analysis shows:

(a) that land degradation is reducing the productivity of soils in many parts of Tanzania.

(b) that despite considerable national effort, over half the people in towns and in the countryside do not have access to good quality water for washing, cooking, drinking and bathing.

(c) the pollution in towns and the countryside is affecting the health of many people and lowering the productivity of the environment.

(d) that the loss of habitats for wildlife is threatening the national heritage and creating an uncertain future for tourist industry.

(e) that the productivity of lake, coastal and river waters is threatened by pollution and poor management and,

(f) that Tanzania forest and woodland heritage is being reduced year by year through clearance for agriculture, for woodfuel and for other demands.

4. The reason for the current state of the national environment, include: inadequate land and water management at various levels, lack of financial and personnel resources, the inequitable terms of international trade, the particular vulnerable nature of some environments, the rapid growth of rural and urban population and past distortinary policies. These factors together are creating a new level of demand on all natural resources systems. Other important factors include lack of data and information, inadequate capacity to deal with environmental concerns and to implement programs, inadequate involvement of major stakeholders (eg, local communities,

NGOs, the private sector) in the management of natural resources, inadequate integration of conservation principles and approaches in national planning and development programs. Some issues such as the management of coastal resources, transboundary lakes and the Serengeti national park, fo example have regional and global implications and require cooperation with neighbouring states.

5. To address the pressing issues of natural resource use and environmental management the Government has undertaken a policy and strategy formulation process including an action plan which provides the context for a first step long-term national approach to environmental sustainability. The three elements are summarized in this document. The overall goal of the National Environment Policy is to "achieve sustainable development that maximises the long-term welfare of both present and future generations of Tanzanians".

6. The following objectives follow from this goal:

(a) to ensure sustainable and equitable use of resources for meeting the basic needs of the present and future generations without degrading the environment or risking health or safety.

(b) to prevent and control degradation of land, water, vegetation, and air which constitute our life support system.

(c) to conserve and enhance our natural and man-made heritage, including the biological diversity of the unique ecosystems of Tanzania.

(d) to improve the condition and productivity of degraded areas including rural and urban settlements in order that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surroundings.

(e) to raise public awareness and understanding of the essential linkages between environment and development and to promote individual and community participation in environmental action.

(f) to promote international cooperation on the environment agenda, and expand our participation and contribution to relevant bilateral, subregional, regional, and global organizations and programs, including implementation of conventions.

7. The National Environmental Policy includes the following principles:

(a) That all development activities in the country shall be undertaken in such a way that the natural resources environment is utilized on sustainable basis. To achieve this, all utilization of natural resources should be based on a sound resource assessment and management plan.

(b) It is the policy of the government to involve all segments of the country in responding to environmental problems. While the Ministry of Tourism, Natural Resources, and Environment has important coordinating, planning and implementation roles, the prime responsibility for environmental management rest on many different people and agencies. At the central government level, sectoral ministries have responsibility for environmental issues under their control. The regional and district government have a vertical role to play in identifying priorities and action plans at local level. In addition, farmers, parastatals, business, NGOs and other private agencies are all expected to play a role.

(c) It is the policy of the Government to promote and encourage environmental education and awareness at all levels of society. The audience should include professional at all levels in government and business, the public at large and those in the education system from primary school through university.

(d) As information about the detailed state of natural resources and the environment is lacking in Tanzania it is the policy of Government to create information centres on environmental issue at both central and local levels. Such information will be available and communicated where possible to the public.

8. The key policy instruments will be:

(a) Environment Impact Assessment - to allow maximization of long-term benefits of development while maintaining the natural resource base.

(b) Environment Legislation - to implement the regulatory elements of policy objectives.

(c) Economic Instruments - these can be incentives through pricing, taxation, and subsidies, or in some cases can use the "polluter pays" principle.

(d) Environmental Indicators and Standards - monitoring of pollution and setting national guidelines for control.

(e) Public Participation - to make sure that the priorities identified are sound, that the problems are understood and that solutions are implementable.

9. To ensure that all government agencies are involved in the process of creating sustainable development, the following measures need to be taken:

(a) to review and/or define all sectoral policies relating to environmental issues and to designate officers responsible for such issues.

(b) to review laws and regulations governing the protection of natural resources and the environment, to update them and to define ways in which they can be

better enforced.

(b) All districts and regions are required to develop a list of priorities for environmental concerns in their areas and a plan for dealing with priority problems.

(c) Each ministry will report on their progress in dealing with environmental issues each year.

(d) The Ministry of Tourism, Natural Resources and Environment shall publish a report annually on progress being made with the environment action plan, at both the central and local levels.

(e) To improve the performance of the private sector, all industries, companies, and institutionions are urged to review their operations to reduce destruction of the natural environment and the pollution of air, land, and water; companies are urged to appoint an environmental officer to deal with these issues. Steps will be taken to better ensure that enforcement procedures are in place where existing laws are being broken.

10. Two broad strategies will be utilized by the government of Tanzania in dealing with environmental problems. First, a number of cross-sectoral initiatives will set the national context, and second, each of the sectors of the economy will work to devise and implement components of the national policy.

11. Cross-sectoral strategies include:

- Environmental/Education, throughout the formal educational systems and also for professionals in and out of government and for the general public.

- Encouragement of public participation based on sound public information and increased awareness of the issues.

- Better information about the key issues and problems.

- Incentives for people, agencies and businesses to improve the environment.

- Law and regulation to deal with people and agencies who fail to comply with national goals.

- Development of a strong institutional structure to meet these new challenges.

- Cooperation with neighboring countries to deal with cross-boundary issues.

12. The action agenda for the near term includes fifteen specific activities requiring government approval, which would implement, the strategies set out in paragraph 5.2. In

addition the agenda lists 65 specific actions that ministries and other agencies need to take, to play their part in the implementation of the national environment action plan.

13. Implementation of the action plan will only be possible through the clear assignment of responsibilities and resources. Ministries with central roles are Agriculture; Water, Energy and Minerals; Lands; Health; Education; and Science and Technology. The Planning Commission, Prime Ministries' office, the universities and research institutions also have important tasks in this effort.

14. However, the Ministry of Tourism, Natural Resources and Environment has the key coordinating role. It is responsible for refining policy, developing effective legislation and regulation, coordinating the whole government's work in environmental protection, providing guidance for all environmental actions through environmental planning and formulation of programs, and publishing reports annually on progress in implementing the action plan. Some of its functions will best be facilitated through an interagency steering committee. The National Environment Management Council, in its advisory role to the Ministry will be responsible for developing the enabling context for the implementation of the plan, particularly in monitoring environmental problems and developing the information system relevant both for problem definition and for policy and strategy refinement overtime. It will also keep under review the progress of implementation at the district level, maintain a dialogue with the same, and submit to the Ministry proposals on strategy and policy measures to support smooth implementation.

15. The above recommendations are based on the existing institutional arrangement so that the NEAP agenda can be initiated. However, a review of institutional responsibility and arrangement is an important part of the NEAP process and should be considered in the light of experienced gained in the implementation of the action plan.

16. The resources available to the Government of Tanzania as it goes through the process of economic restructuring are tightly constrained. Difficult choices will need to be made in assessing the trade-offs between the short lived economic growth and better based sustainable development. While limited new resources may be available existing resources and programs can be retargetted to the strategies and actions of the NEAP. This is often possible in ways which will improve both economic productivity and environmental protection.

17. This is an important turning point in Tanzania's economic and social development. If economic restructuring takes place in the context of national resources and environmental sustainability, the stage can be set for long term sustained growth. Most of the choices are those of the government and people of Tanzania. However, donors can help by targeting assistance on key elements of the action plan and by improving coordination of assistance to support natural resource management and environmental actions.

1.0 THE STATE OF THE ENVIRONMENT 1994

1.1 Introduction

Tanzania, a large and varied country, encompasses 942,800 square kilometres of land and water and is home to some 25 million people; a total which increases at 2.8 percent a year. About 21.5 million people (85%) live in rural areas, but the urban population of 3.5 million is growing rapidly at 7 to 8 percent a year. While Dar Es Salaam accounts for about 43 - 57 percent of the urban population, Mbeya, Morogoro, Mwanza, Arusha and Tanga, among others, are large and growing urban centres. Environmental concerns are important in both rural and urban areas.

Agriculture is the mainstay of the Tanzanian economy. It employs about 80% of the population work force and accounts for about 50% of the GDP and 75% of foreign exchange earnings. From the early 1960s to 1970s, overall economic performance was favourable with a GDP annual growth of about 5% annually. The period between 1973-1984 registered economic decline and severe macro-economic imbalances mainly due to a series of external shocks (quadrupling oil prices, droughts, break up of the East African Community, the Kagera War with Uganda and expansion in debt-servicing) combined with poor economic management policies. Encouraging signs of economic recovery started to set in during the course of the Economic Reform Programme period, with GDP annual growth ranging 4-5% since 1986.

The 3 - 4 million rural families mostly live in more than 8,000 villages (some of which have over 5,000 inhabitants). These rural families are the day-to-day managers of most of the Tanzanian land, water and vegetation resources. The rural environments which they use are very varied. They include the relatively rich upland volcanic soils of Kilimanjaro and Arusha; other high rainfall areas in the northern and western uplands; the southern highlands and around Bukoba, west of Lake Victoria; wide areas of marginally adequate and variable rainfall and marginally fertile soils; and some dry, mostly rangeland areas, especially in Dodoma, Shinyanga and Arusha. Approximately half of the land area is in forest and woodlands, about 40 percent is in grasslands and only 8 percent is cultivated at any one time. The resources that rural people use include:- wood for fuel, housing and fencing and sometimes for industrial processing such as tobacco curing, grazing resources, wildlife, soils, and water. The long-term continued availability of each of these resources is vital to sustainable production for most Tanzanians. Overall, the country has a low population density of about 26 people per square kilometre, but there is great internal variation. In some parts of the north and west highlands densities of several hundred people per square kilometre occur and land is in short supply, while in the dry areas and in the west-central area, population densities are very low.

For a small percentage of rural families, fishing is the main means of livelihood, either from the coastal waters or from inland fresh water lakes and reservoirs, the most productive being Lake Victoria.

The growing urban population is largely dependent on woodfuel or charcoal for energy;

on local water supplies, and is directly affected by the growing urban environmental problems of land, water, air and noise pollution. Urban industries have few pollution controls, waste disposal is organized only for a few, and unplanned urban growth now occurs in several parts of the country, as well as in Dar es Salaam. With the rapid growth of the urban population, food and other needed resources have to be transported to the towns which thereby creates new demands for communication and transport.

In these ways all Tanzanians are directly affected by the environmental issues discussed in this plan. Through the planning and implementation of the National Environmental Action Plan it is the intent to involve many sectors of government and society in better defining the problems, setting priorities and creating solutions. The aim is the long-term sustainability of the natural resources of the country for the continued welfare of all.

1.2 Overview of the Natural Resource Base

This section briefly describes the natural resource base in terms of the principal uses.

In mainland Tanzania, about 50 percent of the total land area is forest and woodland, 40 percent is grassland and scrub and 6 to 8 percent is cultivated. The terms forest and woodland are comprehensive and only 3 percent of the country is covered by dense closed forest. The following table demonstrates the patterns of land use for the whole country.

TABLE 1

LAND USE	HA (MILLION)	PERCENTAGE
Small holder cultivation	4.1	5
Large scale agriculture	1.1	1
Grazing land	35.0	39
Woodlands and Forest	44.0	50
Other land	4.0	5
Total	88.6	100

A large proportion of the woodland is the tse-tse fly infested miombo woodlands which occur over wide areas of west central Tanzania. Mangrove forests are also important resources which are environmentally significant even though they only occupy a relatively small area. The types of forests present in Tanzania are exhibited in Table 2, below.

TABLE 2

TYPE OF FOREST	HA (MILLION)	PERCENTAGE
Closed forest (excl. Mangrove)	1.4	3.2
Mangrove forest	0.1	0.3
Woodlands	42.9	96.5
TOTAL	44.4	100.0

Grassland and scrub includes most of the rangeland area of the country and supports a total of 13 million cattle and 10 million sheep and goats. However, almost 60 percent of this livestock holding is concentrated on 10 percent of the land in the north and central parts of the country. The cultivated area is largely worked by small holders. Shifting cultivation is still common particularly in the drier parts of the rainfed agriculture zone. About one percent of the total land area is held in large farms, which are concentrated in the northern parts of the country.

While only 6-8 percent of the total land area is cultivated, it is estimated that up to 9 percent of soils are medium to high fertility and 23 percent are low-medium fertility. The rest are of low quality. These statistics suggest that there is room for expansion of arable land if other conditions such as access to land and availability of markets are attainable. There is also potential to expand the area under grazing. Some estimates are that 68 percent of the total land area has grazing potential but much of this is now covered by woodland and bush, infested in part by tse-tse fly.

Aquatic resources are important for Tanzania. The country has the biggest lake and river systems in Africa, which include large portions of Lake Victoria, Tanganyika and Nyasa and a variety of other small lakes, swamps and floodplains forming a major wetland resource. Several dams also provide irrigation, fishing and hydroelectricity; the latter are the major power source for urban areas. Marine resources include fish stocks, coral reefs, sandy beaches, mangroves, marine grasses, salt resources and great biological diversity. Marine fisheries are mainly coastal but there is great potential for game fishing and some commercial fishing potential in deep off-shore waters. There is potential for off- shore oil and gas.

Wildlife is an important part of Tanzania's resource endowment, as Tanzania is one of the world's richest and most diverse countries in terms of habitat and animal and plant species. As a recognition of this fact, some 25 percent of the total mainland land area is set aside in protected areas, including forest reserves. The 13 National Parks, 16 game reserves and 50 game controlled areas are important global centres of biodiversity and four (Mt. Kilimanjaro, Selous Game Reserve, Serengeti National Park and Ngorongoro Crater) are World Heritage Sites. These protected areas form the major tourist base for the country.

Biodiversity is one of the country's greatest assets. Tanzania is among the five most diverse countries in Africa for mammals, birds and swallow tail butterflies. For plants, it is

second in Africa. But the country is also important for endemic species; that is species which are found nowhere else. Important sites for endemic species include the great lakes for fish and the "Eastern Arc" mountains, where one quarter of the surveyed flora is endemic.

Energy and mineral resources are another important component of the resource base. The major energy resources are woodfuel, hydropower and coal. There is also potential for natural gas, solar energy and wind energy. Petroleum imports supplement these national resources. The following table (Table 3) shows that the country depends heavily on woodfuel for primary energy use. Coal reserves are estimated at 2,200 million tons but little exploitation has yet taken place.

TABLE 3

ENERGY SOURCE	PERCENT OF USE
Woodfuel and Charcoal	90
Oil Fuel	8
Electricity	1.6
Coal and Others	0.4
TOTAL	100.0

Although minerals only make up a small part of GDP, mining of gold, diamonds, coal, tin, salt, gypsum, sand, lime, gemstones and exploration for gas all occur and have important local impacts on the environment.

1.3 Key Environmental Issues and Challenges

The process which led to the draft NCSSD document (1994) and the draft Policy on Environment for Tanzania all arrived at essentially similar sets of issues and challenges.

These can be summarized under the following framework:-

1. Land Degradation
2. Lack of Accessible Water Supply and Poor Water Quality - Rural and Urban
3. Environmental Pollution
4. Deterioration of Aquatic Systems:- Marine and Fresh Water

5. Loss of Wildlife Habitats and Biodiversity

6. Deforestation

These environmental problems have evolved over a long period of time, dispersed throughout the country. Although the costs relating to these problems have not been quantified because of lack of data, the economic and social costs are high. Moreover, environmental degradation has had, and continue to have, adverse impact on the quality of human life and health. A summary of the current understanding of these issues and challenges and responses to them follows. In each case, the gaps in existing knowledge are identified as a first step towards formulating strategies and action plans to deal with these problems.

1.3.1 Land Degradation

The processes of land degradation are varied and not all easily detected and measured. However, both national and district government officers recognize land degradation as a major issue for the country. In upland areas the severity of soil loss can be gauged by the red-brown color of the streams in flood as they wash away vital top-soil; in some of these areas it can also be judged by visible landslides. In flatter and drier areas the quantity of lost soil can be judged by the silting up of dams and reservoirs within a few years of construction and by the bare topsoil on many farmers fields.

As one example of the progressive nature of the problem, soil loss was measured in Shinyanga region over a long time period. Rates in the 1970's were very high and twice the rates of the early 1960's.

Average	1990 - 1960	1.4	tons/ha/year
	1960 - 1965	105	tons/ha/year
	1970 - 1980	224	tons/ha/year.

Measurements in Dodoma, Morogoro and Arusha regions suggest similar high rates of soil loss.

Perhaps the best measure is in the level of yields from the fields and the decrease in productivity over the years. While rainfall is also an important factor, it is estimated that yields per hectare fell by several percent between 1972 and 1980. Some of this fall is attributed to soil degradation and low inputs of fertilizer to counteract these losses. More specific data is needed to substantiate the extent and degree of land degradation. It is clear, however, that significant losses are occurring and that they affect most parts of the country. UNEP estimates that some thirty percent of the country may be affected by desertification. This estimate is for the drylands of the country but losses in productivity in the steeper higher rainfall areas may be even more important.

5.0 ACTION PLAN TO IMPLEMENT ENVIRONMENTAL POLICY

5.1. The following action plan is a logical sequence of the preceding analysis. In Section '1' of this NEAP, six major environmental problems in Tanzania were described. They were:-

1. Land Degradation
2. Lack of Accessible Water Supply and Poor Water Quality- Rural and Urban
3. Environmental Pollution
4. Deterioration of Aquatic Resources:- Marine and Freshwater
5. Loss of Wildlife Habitats and Biodiversity
6. Deforestation

In section 2, a summary of the proposed national environmental policy sets out the urgent need to create a new cross-sectoral framework to address the complexity of these environmental issues. In section 3, some general and sector specific strategies were outlined to guide the implementation of national environmental policy. In Section '4' the institutional structures and responsibilities were outlined.

Finally this specific action plan -- a first step of an evolving process -- creates an ongoing agenda for the government and people of Tanzania and as such needs regular assessment, feedback and readjustment. This is particularly important as wider public participation is sought and as more detailed information on the nature, the severity and the various local impacts of these problems becomes as available. It is important to remember that the priority environmental issues addressed are the cumulative result of actions and process taking place over a long time. They will not be solved easily or in the short run, but nevertheless their solution is vital to sustainability of the natural resource system of the country on which much of the country's economy depends.

5.2. Creating the Context for Specific Action

The following actions, in keeping with the proposed timetable, need to be taken to begin to create the context for a long term national approach to the environment.

(a) A continuation of the NEAP consultation process including all the major stakeholders (such as public agencies, the private sector, NGOs, academia, community organizations, local people, etc.) both at the national level and in the regions and districts (effective July 1994).

BEST AVAILABLE

(b) Finalization and adoption of draft National Environment Policy as well as NCSSD (June 1995)

(c) The intensification of a national environmental education and public awareness campaign (January 1995).

(d) The integration of the environmental policy and conservation strategy into the country's national planning and programming, and development plan (January 1995).

(e) Research and technology initiatives to better understand the priority issues (start September 1994).

(f) Strengthening of a National Environmental Information System (July 1994).

(g) The incorporation of an environmental assessment approach into all aspects of planning and decision making (July 1995).

(h) Establishment of an overall legislative framework and effective sectoral legislation pertaining to the environment (January 1996).

(i) Intensification of public participation, both as a means of determining priorities especially at the local level, and as a means of initiating environmental action (effective September 1994).

(j) Preparation of priority long-term investment program (including studies, pilot schemes, and investment projects) based on a national program-oriented approach to complement the existing development plan to address major environmental problems (July 1995).

(k) Performance of EIA on selected projects in the development plan (July 1995).

(l) Finalization and implementation of key policies relating to mineral sector, forestry, energy, soil and water conservation (March 1995).

(m) Preparation and implementation of a new land, forestry and wildlife protection acts (June 1995).

BEST AVAILABLE

(n) Establishment of an effective mechanism for donor coordination (November 1994).

(o) A clear definition of the institutional roles and responsibilities for environmental management, in terms of advisory roles, policy and legislation, planning, inter-agency coordination, enforcement, monitoring (July 1995).

(p) Development of a process for specific national assessment of land and water degradation and possible remedial measures (January 1996).

5.2.1 The Continuation of the National Environmental Action Planning Process.

The planning process for the National Conservation Strategy for Sustainable development (NCSSD) began in 1988 and the process for the development of the National Environment Policy have occurred in parallel. The NCSSD process involved very productive national level inter - sectional discussion and a good definition of national perspectives. However, feedback from the regions and districts representatives has only just begun and the translation of national priorities into specific regional, district, and local priorities and actions will need substantial further effort. It is, therefore important that the assessment and planning process continue. Responsibility for this action will be with Ministry of Tourism, Natural Resources and Environment and key collaborators are National Environment Management Council, Regional and District authorities the private sector and NGOs.

5.2.2 The Development and Implementation of a National Environmental Education and Public Awareness Programme.

This action involves at least three distinct initiatives. First, measures must be taken to incorporate basic facts relating to the environmental dimensions of cultural, socio-economic and natural resource use into formal education at all levels. These measures should include the development of a basic set of materials adaptable for use at varying levels in the school system, the training of teachers and finally the modification of the curriculum at all levels. School work should include practical as well as theoretical knowledge. This is a task for the Ministry of Education and Culture with support from the Ministry of Tourism, Natural Resources and Environment, National Environment Management Council and the Universities.

Second, specific training courses should be developed for in-service professionals not only dealing with Environmental Impact Assessment, but also with the environmental issues directly related to their jobs. This training is just as (or more) important for professionals in the regions and districts as for those in the central ministries. This task should be the responsibility of the Universities, training centres, National Environment Management Council and the Ministry of Tourism, Natural Resources and Environment.

BEST AVAILABLE