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**Analytic Tools for  
Natural Resources Management in Africa**

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Prepared by the Study Team for Natural Resources Management (NRM) Activity 1  
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## **Acronyms**

<b>ANR</b>	<b>Agricultural and Natural Resources</b>
<b>APE</b>	<b>Action Program for the Environment</b>
<b>ASDGII</b>	<b>Agricultural Sector Development Grant II</b>
<b>CBA</b>	<b>Cost-Benefit Analysis</b>
<b>CILSS</b>	<b>Comité Permanent Inter-Etats de Lutte Contre la Secheresse dan le Sahel</b>
<b>CV</b>	<b>Contingent Valuation</b>
<b>GDP</b>	<b>Gross Domestic Product</b>
<b>IRR</b>	<b>Internal Rate of Return</b>
<b>KEPEM</b>	<b>Knowledge and Effective Policies for Environmental Management</b>
<b>NEAP</b>	<b>National Environmental Action Plan</b>
<b>NGO</b>	<b>Nongovernmental Organization</b>
<b>NPA</b>	<b>Nonproject Assistance</b>
<b>NPV</b>	<b>Net Present Value</b>
<b>NREM</b>	<b>Natural Resources and Environmental Management</b>
<b>NRM</b>	<b>Natural Resources Management</b>
<b>PAAD</b>	<b>Project Assistance Approval Document</b>
<b>PVO</b>	<b>Private Voluntary Organization</b>
<b>SAVEM</b>	<b>Sustainable Approaches to Viable Economic Management</b>
<b>TIP</b>	<b>Trade and Investment Program</b>
<b>VLPA</b>	<b>Village Level Partnership Agreement</b>

# 1. Narrative Summary

In September 1992, the Africa Bureau of the U.S. Agency for International Development (USAID) awarded a contract to the Winrock International Environmental Alliance (WIEA) through the Environmental and Natural Resources Policy and Training (EPAT) Project. The purpose of the contract was to support three studies designed to help the Africa Bureau strengthen the economic analysis used in its project analysis. The first study was designed to analyze how economic theory and various analytic approaches can improve the design and impact of natural resources policy initiatives and programs. The second study was to assess the potential value of natural resources accounting for sub-Saharan Africa (both as a technique for monitoring changes in the resources base and for determining the likely effects of alternative policy interventions). The third study was to review in-depth the economic basis of National Environmental Action Plans (NEAPs) that have been undertaken in several countries.

Other reports provide accounts of activities undertaken in connection with the second and third studies. This report describes briefly the results and accomplishments of the first study.

The team for the first study consisted of:

Dennis King (Team Leader)	Economist	Maryland Institute for Ecological Economics
Pierre Crosson	Economist	Resources for the Future
Mudiayi Ngandu	Economist	Tuskegee University
Jason Shogren	Economist	Yale University School of Forestry and Environmental Studies
Allen White	Economist	Tellus Institute

The Statement of Work for this study called for team members to examine existing USAID documents, including those related to Nonproject Assistance (NPA) and NEAPs (Appendix A). Based on this review, team members were expected to assess the potential for current environmental economic theory to improve the analysis used in USAID's design and selection of natural resources projects in Africa. The ultimate goal of the study was to formulate guidelines for project approval and management and for institutionalized learning.

The Statement of Work called for the study team to complete several reports, conduct a series of seminars with USAID staff and other participants, and draft guidelines for project analysis. Each team member was assigned initially to work on the project for about 35 days. Additional funds were made available for research assistants, travel, and other needs.

At the conclusion of a team planning meeting held September 9-11, 1992, a preliminary work plan was developed for the first study (Appendix B). This plan outlined

approximate time allocations and dates for each of four tasks: review of documents, evaluation of analytical and policy issues, participation in a workshop, and preparation of final guidelines.

Although the study shifted in focus somewhat during the course of the year, team members essentially followed the work plan and generated the outputs specified in the Statement of Work.

## **Document Review**

### **USAID Documents**

The team's first activity was to review USAID documents related to natural resources NPAs and NEAPs (Appendix C). The purpose of this review was to gain familiarity with the analytic tools commonly used by project planners and an appreciation for the real-world conditions under which the analysis is performed. Documents for the following five sub-Saharan countries were included in the review:

The Gambia	Agricultural and Natural Resources (ANR) Program
Ghana	Trade and Investment Program (TIP)
Madagascar	National Environmental Action Plan (NEAP) Sustainable Approaches to Viable Economic Management (SAVEM) Project Knowledge and Effective Policies for Environmental Management (KEPEM) Project
Niger	Agricultural Sector Development Grant II (ASDGII)
Uganda	Action Program for the Environment (APE)

Team members focused primarily on project documents and technical annexes. Each member took primary responsibility for one of the five target countries. This specialization involved background reading and examination of related papers, such as mid-term reviews, strategy papers, and a variety of USAID background materials. In all, several thousand pages of materials were reviewed carefully by each team member.

By the conclusion of this review, team members had acquired a thorough understanding of the goals and objectives underlying USAID's natural resources management (NRM) programs in sub-Saharan Africa. In addition, they learned about the process of project design and selection, including the types of analysis commonly performed, limitations of time and data, and the institutional context in which USAID missions commonly operate.

Where sufficient detail was presented in project documents, team members traced the economic assumptions and analysis through each step, in an effort to check the validity of each statement. (See also Section 2, 13-15.)

### **Review of Outside Documents**

The team was asked at the December 15, 1992 meeting discussed below to review documents from the World Bank, Food and Agriculture Organization of the United Nations, and other donors and research organizations.

In some cases, these documents related to projects that complemented USAID initiatives. In several cases, for example, USAID initiatives were designed to take advantage of opportunities created by economic reform programs of the World Bank. From such documents, team members gained a sense of the extent to which the success or failure of USAID initiatives depends on the actions of other institutions, the overall economic and political environment, and other considerations beyond the control of USAID staff.

### **Discussion Memorandum**

Based on the review of USAID documents, team members conferred and jointly prepared a discussion memorandum that formed the basis of a meeting they held December 15, 1992 with USAID staff, where they sought feedback and developed plans for subsequent work. This memo presented a framework to be used in assessing project design and analysis. It suggested that one potential pitfall in project design is the difficulty of testing the causal links between actions (Level I) and productivity/income (Level V) within the five-level NRM organizing framework of the Africa Bureau. The memo suggested a set of related questions that would more effectively test the causal links. (See also Section 4, 55-57.)

In addition, the discussion memo outlined some primary issues that had been identified concerning the context and character of natural resources interventions. The team noted particularly the development and population issues that are closely intertwined with natural resources issues in Africa, the opportunities for policy change, the pervasive risk and uncertainty, the need for ground-level incentives to change behavior, and the need for USAID's analysis to explore more widely alternative approaches to specific NRM problems. The document noted that, for any given problem or set of problems, there is usually a range of potential interventions (projects or NPA). In the USAID documentation the team reviewed, there was little or no discussion of a range of possible strategies that could be used to address the identified problems.

The discussion memo pointed to the complex nature of analytic problems surrounding the design and selection of natural resources projects. Based on this memo and subsequent meetings with USAID staff, it was decided that the team members focus on two central themes: 1) biodiversity protection in Madagascar and 2) sustainable

agricultural development in Africa, with particular emphasis on The Gambia. The team was divided into two country groups as follows: King and Shogren (Madagascar); and Crosson, Ngandu, and White (The Gambia).

## **Case Studies**

The purpose of the two case studies was to examine the range of alternative analytic tools that could offer relevant insights into likely program impacts (Section 3). Rather than dealing at a theoretical level with the various tools available, the respective groups could focus on concrete examples of program selection and design.

### **Case Study 1: Biodiversity Protection in Madagascar**

A case study on the theoretical problems associated with valuing biodiversity in Madagascar was completed in June 1993. The team members proposed different measurement criteria and concepts of value. The report notes that ecosystems and biodiversity provide a flow of direct and indirect services to economic systems--all of which can, in principle, be valued. These services include filtration of nonpoint sources of pollution from urban and rural runoff, maintenance of the gaseous composition in the atmosphere, regulation of the hydrological cycle, pollination of crops, control of potential pests, and soil generation and maintenance. Market prices, however, often fail to reflect the full range of services provided by biodiversity. These biodiversity services have direct value to humans, either as consumption or producer goods. But ecosystems also have non-consumptive uses; they provide aesthetic and other non-use values.

The authors note that various techniques have been proposed for eliciting the non-use values people place on environmental goods. These techniques include contingent valuation, hedonic pricing, travel-cost methods, and experimental laboratory markets. All of these approaches are designed to provide "willingness to pay" or "willingness to accept" measures of the value of environmental goods.

Work of other economists who have estimated the value of park creation in Madagascar is cited using the travel-cost method; the authors point out, however, that this work fails to consider the potential environmental damage caused by ecotourism and the ensuing opening of lands to settlement and logging. The authors also suggest that applying more sophisticated analytic tools to biodiversity issues in Madagascar will require copious amounts of data not readily available.

The case study's conclusion is that project planning for biodiversity protection in Madagascar needs to pay particular attention to the incentives and institutions that contribute to the popularity of shifting cultivation, to explore a broader range of direct and indirect approaches to resources protection, to account for risk and uncertainty, and to consider the history of ecotourism efforts in other regions.

## **Case Study 2: Sustainable Agricultural Development in Africa, with Particular Reference to The Gambia**

A case study on sustainable agriculture in Africa, with particular reference to The Gambia, was also completed in June 1993. This study begins by summarizing major factors that impede agricultural development in Africa and outlines some causes of natural resources degradation. Inappropriate pricing policies, poorly specified systems of property rights, and nonproductive government institutions are identified as major causes of Africa's poor agricultural performance and as major stumbling blocks to the adoption of more sustainable farming techniques.

The study states that the quest for agricultural sustainability can be viewed as a matter of finding the proper weights to assign productivity growth from 1) improved NRM and 2) improved technology and expansion of input use. Policies to promote sustainable agriculture in Africa are hampered, however, by a dearth of knowledge about agriculturally induced depletion of natural resources. Without better information, it is difficult to design policies that strike an optimal balance between the two sources of productivity growth.

Sustainable agricultural development in Africa is also hampered by a high level of uncertainty. Population growth and migration, changing demand conditions, technical change, and political instability can overwhelm the best planned development initiatives. Given the volatility of the environment, policymakers in USAID or in African governments cannot eliminate risks, but they can test the sensitivity of their program outcomes to variations in assumptions about key underlying conditions, according to the study. They also must learn from mistakes. By monitoring programs already under way and by learning lessons from previous programs, policymakers can design new programs to achieve greater effects.

The study suggests using economic and social indicators collected by the ANR Program to conduct four analytical steps: 1) sketch of the trajectory of agricultural performance over time; 2) assessment of the sustainability of the trajectory; 3) analysis of the contribution of ANR to elevating the trajectory to a secure, sustainable level; and 4) consideration of resources management issues that lie beyond the scope of ANR, such as the roles of greater input use and alternative land-tenure arrangements.

In effect, the report proposes recreating the ANR design process to ask whether a broader analytic framework would have led to different program features.

## **Related Issues**

In addition to the country studies, team members generated documents related to issues that emerged as important cross-cutting themes during the document review and as recurring themes during discussions of project planning and management (Section 4). The first issue centers on the role of land and resources tenure in shaping the incentives for

**NRM.** The second focuses on analytical requirements for NPA initiatives, including integrated risk management.

### **Land and Resources Tenure**

Considerable research has documented the significance of land and resources tenure arrangements in the success or failure of agricultural and NRM initiatives around the globe. Opinions differ as to the contributions of Africa's land-tenure systems to natural resources degradation; opinions also differ as to the advantages of alternative tenure institutions. There is widespread agreement, however, that tenure arrangements shape the incentives that agriculturalists and other natural resources users face on a daily basis.

Clearly, USAID's NRM initiatives must be informed by analysis of prevailing tenure institutions. In recognition of this, team member Mudiayi Ngandu traveled through Burkina Faso, Mali, and Côte d'Ivoire from January 17 to February 3, 1993. During his trip, Dr. Ngandu participated in a workshop held in Bobo Dioulasso dealing with Sahelian forestry codes.<sup>1</sup> The workshop brought together policymakers, forestry experts, rural inhabitants, and forest dwellers from five Francophone Sahelian countries, along with representatives of donor organizations and regional institutions. Candid discussions during the meeting led to agreement on a number of key points concerning forest tenure.

First, African officials participating in the discussions agreed that better NRM could be achieved by enhancing the security of natural resources tenure or ownership by local village communities (or individuals, where appropriate). This entails a move away from the colonial legacies of paternalism and repressive approaches to forest policing. A second area of consensus related to the need for forest service employees to move away from their colonial roles as police agents and collectors of fines and taxes. Participants agreed that foresters need to assume greater responsibility for various extension activities.

Other aspects of the forestry code workshop are presented in Dr. Ngandu's trip report, which is summarized in Section 4 (45-54). The author makes it clear that changing tenure arrangements present an important array of concerns for USAID project planners. Land and resources tenure arrangements are increasingly dynamic, particularly in the Sahel. Rather than forming a fixed set of institutional constraints on project design, resources tenure institutions are evolving. USAID's natural resources initiatives will be influenced by tenure institutions, but will also alter them. As population pressures intensify, tenure institutions will change rapidly, with great significance for the design and selection of NRM initiatives.

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<sup>1</sup> The workshop was organized jointly by the Comité Permanent Inter-Etats de Lutte Contre la Secheresse dans le Sahel (CILSS) and the Land Tenure Center of the University of Wisconsin at Madison.

## Analytical Requirements

Based on discussions with other team members and with USAID staff at various levels, Team Leader Dennis King prepared a draft on the analytical requirements for NPA initiatives (Section 4, 55-57). King notes the long chains of cause-and-effect relationships that characterize many USAID initiatives in NRM in Africa. The people-level impacts from specific NRM initiatives may occur over decades. During this time, rapid population growth, widespread poverty, declining agricultural productivity, increasing environmental degradation, political and economic instability, and frequent changes in foreign aid strategies combine to create an extremely volatile environment for planning and evaluating long-term initiatives. Meanwhile, economic, institutional, and environmental disruptions may greatly alter intended outcomes. At the least, these changes make it difficult to measure or document the effects of USAID initiatives.

An approach of integrated risk management recognizes that long-term NRM initiatives differ fundamentally from conventional development projects. In particular, NPA is designed to alter the entire economic and institutional context in which interventions are occurring. As a result, more sophisticated analytic tools are needed to evaluate and design such initiatives.

Managers of integrated risk management for natural resources initiatives must remember to:

- recognize the pervasiveness of uncertainty and risk;
- carefully examine proposed cause-and-effect links;
- consider a full range of alternatives;
- distinguish between changes in behavior (transformation) and shifts in behavior (transfer);
- focus on sufficient, rather than necessary, conditions for success of an initiative; and
- institutionalize a process of lessons learned.

The author suggests that integrated risk management approaches can be incorporated into the Africa Bureau's NRM organizing framework.

## Synthesis

The various activities and discussions undertaken by team members have led to the development of a coherent synthesis. The accompanying report, *Testing Hypotheses and Managing Risks*, details this synthesis. The central point is the need to incorporate a more

explicit approach towards hypothesis testing into program design. All development programs contain scores of assumptions. Some of these will prove true; others may prove false. Planners can benefit from identifying the key assumptions embedded in their programs. Using the NRM analytic framework and other tools, they can subject their assumptions to careful scrutiny and identify key variables for monitoring. Planners can also develop contingency plans to account for the prospect that certain assumptions prove false.

These analytic tools must also be accompanied by a new set of management tools: more flexible contracting procedures, more explicit contingency planning, better institutionalization of information gathering and learning, and greater acknowledgment of risk and the possibility of failure.

Although much work remains, the team's activities have laid the groundwork for improving USAID's ability to assess NRM initiatives. This work will contribute to helping projects generate more consistent and certain payoffs in terms of people-level impacts.

## 2. Preliminary Activities

### Document Review

#### Tracing the Logic of Past Initiatives

Under the Statement of Work, EPAT/WIEA was charged with showing "how economic theory and various analytic approaches may be used to improve the design and impact of natural resources policy initiatives and programs" (see Appendix A, III, 62). Although an improved analytic toolkit could have broad applicability, the immediate task was to support the operational activities of USAID's Africa Bureau and relevant missions.

The Statement of Work called for a team of economists to undertake, as its first activity, a review of project documents and other materials showing the types of analysis currently used in designing natural resources projects. The purpose of this review was to examine the analytic procedures and decision-making processes that contributed to project design and selection, not to evaluate the projects substantively.

*NPA and NEAP background papers.* The five team members extensively reviewed USAID literature on natural resources projects in five sub-Saharan countries: The Gambia, Ghana, Madagascar, Niger, and Uganda. They focused particularly on documents related to NPA and NEAP activities. Since most activities under consideration had just recently or not yet begun, the team relied primarily on background papers.

The team sought to identify decision points in the project planning process and to reconstruct the information sets that were available to the planners. The emphasis throughout this review was to identify potential improvements in the toolkit available to project planners. Rather than finding fault in project documents in retrospect, team members asked whether the analytic tools themselves were flawed. They asked whether alternative analytic techniques could have improved project planning.

Team members posed a wide range of questions in the following areas:

- Informational needs for project design
  - Did project planners have access to all relevant information?
  - Was the available information sufficiently accurate?
  - Would additional information have affected project design or selection?
  - How could more or better information have been made available?
- Sensitivity to key parameters
  - What specific parameters or indicators were crucial to project success?
  - Could these have been monitored in real time in the initial stages of project implementation?

- Would it have been possible during the project design stage to have identified the leading indicators of project success or failure?
- Opportunities for mid-course corrections
  - Were there opportunities in the early stages of the projects to assess their likely trajectory?
  - Could project goals, objectives, or approaches have been altered in mid-course to improve the chances of success?
  - Did opportunities exist within the administrative structure to make such corrections?

Answering these questions proved difficult. Project documents do not necessarily incorporate all the information available to project planners or reflect their realistic expectations for future outcomes. Inevitably, project documents do not reveal much about the various alternatives considered. To have obtained this information, the team members would have needed to conduct extensive interviews with USAID mission staff.

In many cases, project documents are prepared under severe time constraints and omit or make passing reference to background analysis. Thus, the basis for some parameters is unclear. For example, the Project Assistance Approval Document (PAAD) for the TIP in Ghana estimated a technology adoption rate of 17%, but did not attribute this estimate to any particular source. The project documents thus provided only a limited view of the analysis undertaken in project design. In many documents, the original analysis is summarized and presented in qualitative form, which makes it difficult to assess the analytic rigor or the approaches used.

*Limitations of traditional tools.* For the most part, team members found the available analysis reasonably good, given the constraints under which it was conducted. Macroeconomic background information was generally plausible, and the sectoral data was clearly discussed. Documents such as the Gambia PAAD presented detailed cost-benefit analyses (CBA). These, too, appeared capably executed within the framework of the *USAID Manual for Project Economic Analysis*. Other project documents relied more heavily on qualitative analysis. For example, the Uganda APE used a self-described "quick and dirty" approach to estimate the magnitude of project benefits on the assumption that an incomplete accounting showed sufficient benefits to justify the project. Data and methodology limitations led the project planners to avoid any formal effort to value the biodiversity components of the project, to forecast tourism revenues, or to value the benefits to land and water from the project. Since benefits greatly exceeded costs, even without these components, non-marketed goods were simply omitted from the analysis.

Team members agreed that the analysis used in project documents was credibly performed, but that major questions remained. From an informational perspective, it was unclear whether project planners had taken advantage of all the available information or

whether this information was accurate. Partly because of the nature of the project documents, it was also impossible to determine whether the analysis preceded project design and selection or was undertaken in retrospect. In other words, it was impossible to determine the extent to which project design and selection interacted with economic analysis.

In many cases, it did appear that project approval depended, at least in part, on certain key technical parameters. For example, the Gambia PAAD featured a positive net present value (NPV) at a 10% discount rate and an internal rate of return (IRR) of 21%. A sensitivity analysis indicated that these results depended particularly on assumptions about product prices and the rate of diffusion of improved resources management practices. The PAAD used "conservative" estimates of diffusion rates, but no explicit discussion was presented of the likelihood of achieving these levels.<sup>2</sup> In view of the sensitivity of the analysis to such parameters, neither NPV nor IRR gives much assurance of project success. Project documents did not indicate whether special efforts would be made to monitor these key variables or whether contingency plans had been developed in the event these parameters failed to meet expected values.

The sensitivity of NPV and IRR results to key parameters is a particularly important issue for the design of NPAs. Since these activities aim for substantial sectoral reform, they involve a high degree of short-run uncertainty about relative price levels, production, and other key variables. Moreover, the political pressures surrounding sectoral reform add another layer of ambiguity about the future. Of all mission activities, NPAs are perhaps most in need of more powerful analytic tools.

Based on this review, the team concluded that such standard analytic approaches as CBA, calculations of expected rates of return, and country macroeconomic surveys simply do not provide sufficient information for projects that involve high degrees of both risk and uncertainty. Even when these analytic procedures are well executed, they provide insufficient information for the design, selection, and management of complex project and NPA activities.

## **Discussion Memorandum Summary**

The discussion memorandum dated December 11, 1992 from the study team of NRM Activity 1 to individuals invited to participate at the December 15, 1992 meeting summarized the objectives of that meeting, described the analytical framework approach the team used to review USAID documents, and provided general observations based on the team's initial synthesis of country programs and projects in The Gambia, Ghana, Madagascar, Niger, and Uganda. Participants included representatives of USAID's Bureau for Africa/Analysis, Research, and Technical Support (ARTS) [now the Office of Sustainable Development] and Bureau for Research and Development/Energy [now

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<sup>2</sup> Terminology is ambiguous; does "conservative" imply 50%, 75%, or some unspecified level of probability?

Bureau for Global Programs, Field Support, and Research]; the EPAT Project; study team; as well as outside collaborators.

The team's objectives for the December 15, 1992 meeting were to discuss its preliminary observations regarding NRM initiatives and programs in the five African countries mentioned above and to seek feedback on the analytical approach it was using to review documents.

The team adopted a framework consistent with the NRM organizing framework and basic economic principles. In its review of USAID documents related to NRM project and NPA activities in the five African countries, the team focused its attention on the basic economic and policy analysis contained in these documents (logic, data, and methods).

The team used the NRM organizing framework to seek answers to the following questions:

***What are the natural resources problems?***

- What evidence suggests that existing NRM practices result in unsustainable rates of exploitation of agricultural, forest, or other resources?
- How are the environmental costs of these current practices and rates of exploitation evaluated? Environmental costs include lost productivity, damages to human health, and other adverse effects.

***What is causing these problems?***

The team's view is that the causes of these problems must lie in inadequate incentives to natural resources managers, where incentives are created by managers' objectives and constraints. These objectives and constraints are shaped, in part, by markets, government policies, and general processes of economic development.

Natural resources managers can include officials in national, regional, and local levels of government, as well as private-sector groups (individuals within a village, village groups, migrants, or commercial firms from outside the area).

The team identified the following possible reasons for inadequate incentives:

- Managers lack clear and enforceable property rights in the resources.
- The payoffs to sustainable NRM are too long-term, given income levels and explicit or implicit discount rates.
- Policies and/or institutions give little incentive to natural resources managers to internalize environmental costs.

- Weak infrastructure (e.g., transportation or communications) reduce the payoff to investment in more productive and sustainable practices.
- Government agencies lack a commitment to sustainable NRM and/or reward rigid enforcement of NRM regulations rather than promote NRM.
- Too little investment in education and training of natural resources managers makes the managers insensitive to potentially high private and social payoffs from improved NRM.

***How are NPA strategies designed to alter these causes and encourage the adoption of sustainable NRM practices?***

- What specific measures or actions are proposed to alter these causes of the problem?
- What are the arguments that the proposed measures can and will do the job?

***How will program performance be monitored and evaluated over time?***

- Do the documents supporting USAID projects and programs identify how performance will be monitored and evaluated over time?
- How will this monitoring be used to support a cumulative process of learning for this and future projects and programs?

#### General Observations

The team's discussion memorandum also included the following observations that resulted from its synthesis of country programs and projects.

*Development context.* These programs are operating in the context of rapid population growth and lack of sustained agricultural development. As a result, many natural resources problems addressed by the programs are byproducts of the degradation of existing agricultural land and the conversion of forests to agriculture.

*Level of policy change.* As a simple dichotomy, policy change can operate at two levels. The first level assumes that the limits of existing government or institutional capacity constrain potential policy choices and then seeks feasible policy choices given these constraints. The second level attempts first to change these government or institutional capacity constraints, thereby improving the set of feasible policy choices. It is then assumed that improved policy actions will be chosen. For the documents the team reviewed, much of the policy change is designed to operate at the second level.

*Uncertainty.* At several levels, uncertainty permeates these programs but is given little attention. The high level of uncertainty associated with NRM interventions in Africa stems from the high level of uncertainty about the conditions necessary for success. The

team found it was usually possible to identify and evaluate at least some key sources of uncertainty that could impede program success. Such an evaluation involves: 1) identifying the critical factor that affects the probability of program success and 2) testing the sensitivity of the results to variations within a logical range of values for the critical factor. By taking these two steps during program development, it may be possible to modify strategies to avoid, minimize, or mitigate potential adverse effects of uncontrollable events.

*Links between strategies, causes, and problems.* The NRM organizing framework posits that NRM problems arise because the incentives of natural resources managers result in unsustainable rates of natural resources exploitation. The causal sequence in this framework can be stated as *incentives* of natural resources managers cause *behavior* that results in unsustainable *outcomes* (the environmental problems).

Successful strategies to achieve desired outcomes must explicitly consider the underlying incentive structure that results in particular behavior patterns. Based on the team's initial document review, the sequence between strategies and outcomes often omits the links between incentive changes and behavioral changes. Thus, it is often unclear 1) how the chosen strategy would change the incentives of natural resources managers and 2) how the change in incentives would change behavior to eliminate or reduce the cause of the problem.

*Range of actions and strategies explored.* For any given problem or set of problems, there is usually a range of potential interventions (projects and NPA). In the USAID documentation the team reviewed, there is little or no discussion of a range of possible strategies that could be used to address the identified problems. Therefore, it is not possible to assess the range of actions explored, the selection process, or the underlying economic rationale.

### Country Projects and Programs

As part of its analysis, the team reviewed USAID documents related to NRM projects and programs and NPA activities in the five sub-Saharan countries mentioned above. A specific list of documents reviewed was available at the December 12, 1992 meeting (Appendix C).

### 3. Case Studies

#### Case Study 1: Biodiversity Protection in Madagascar

The perceived threat to regional and global biodiversity is forcing policymakers to rethink the link between economic development and environmental preservation. Prompted by ecologists, economists increasingly are asked to value the complex and vast array of current and potential services provided by biological diversity. Although the science of measuring biodiversity and the actual losses being suffered is far from complete, the fear that human development will render extinct valuable species has forced international action, culminating in the Convention on Biological Diversity signed by all attending countries, except the United States, at the Earth Summit held Rio de Janeiro, Brazil in 1992.

#### Definitions of Biodiversity

What is biodiversity? It is often defined as the totality of genes, species, populations, and ecosystems in a region. Genetic diversity refers to the variation of genes within a species. Species diversity refers to the variety of species within a region. Populations are the grouping of a species within a specific area. Ecosystem diversity refers to the variety of systems of living things in relationship to their environment within a region. Biodiversity means habitats for many types of organisms; including animals, vegetation, fungi, and bacteria; which species are dominant; and the complex spatial and temporal patterns that occur.

The measurement of biodiversity is still a much debated topic. One of the most basic problems in addressing threats to biodiversity in an economic context is arriving at a useful definition that adequately describes what biodiversity entails. Although biologists have proposed a hierarchy of measurable indicators cutting across multiple biological and spatial scales, economists have just recently begun to propose systematically explicit decision-theoretic frameworks for addressing biodiversity preservation.

Consider two diversity functions: 1) pure diversity measure and 2) preservation measure. The pure diversity measure categorizes diversity as a set that is the maximum, over all members of the set, of the distance of that member from its closest relative in the set plus the diversity of the set without that member. The preservation measure,  $D_p(X)$ , maximizes the separation between the members in the non-extinct and extinct subsets, where  $d(s, X)$  is the pairwise distance between a member and all other members of the surviving set. Estimation of both functions has been accomplished for a set of 14 cranes. However, characterization and estimation of pure diversity and preservation of more complex systems involving multiple species and ecosystems such as those in Madagascar have not been achieved. This remains a major challenge for biodiversity and conservation policy.

Both definitions allow economists to characterize biodiversity as a problem of resources allocation in the sense that each initiative--policy, program, and project--is designed to affect pure diversity, preservation diversity, or both in a predefined system. In this context, biodiversity becomes an asset valued by human populations, and its enhancement contributes to human welfare.

### Value of Biodiversity

Determining an economic value of biodiversity has become one of the most difficult environmental policy issues to emerge in the last decade. Like clean air, clean water, and all other environmental assets, ecosystems and biodiversity provide a flow of direct and indirect services to economic systems. These various services are wide-ranging and include basic life support and filtration of nonpoint sources of pollution from urban and rural runoff, maintenance of gaseous composition in the atmosphere, regulation of the hydrological cycle, pollination of crops, control of potential pests, and assistance in generating and maintaining quality soil.

How these services are valued by the economic system, however, depends on whether, and at what level, they are priced. As in the case of clean air, clean water, and unimpaired vistas, the market fails to assign the "right" price to biodiversity goods that are not bought and sold and for which ownership rights are not clear. If one can measure the economic value of the full range of services, one can compare resources-allocation decisions across both market and nonmarket goods, with the underlying objective of improving the efficiency of the economic system while maintaining environmental quality.

For biodiversity, valuation for purposes of pricing presents a plethora of problems. Most can appreciate the multiple values created by diversity in genes, species, populations, and ecosystems. These include habitat preservation for valuable plant and animal species, stability in the hydrologic cycle, preservation of genetic material, medicinal uses, pest and flood control, and conservation of soil quality. All these contribute measurable and valued benefits to human welfare and, as such, should be priced accordingly. When the price is wrong or non-existent, the biodiversity asset will be overexploited. This is the basic underpinning of environmental economics.

Biodiversity imposes the difficulty of assigning economic value to goods that most people will never use directly. Economists have responded to this problem by introducing the concept of *total value*. This is the argument that an individual can value an environmental good without ever using or planning to use it. (The existence of the good implies economic value.) Such is the case of preserving remote arctic or rainforest habitats or endangered species of whales. Most advocates of such protection will never

come into contact with such resources directly. Yet, as is evidenced by their politics and donations, they value such habitats and species. The United States courts have recently upheld the argument that no-use values constitute a valid representation of value.

An alternative view is that the total value elicited from respondents is not really a measure of total value, but a surrogate measure of general preferences toward the environment--what one might call "warm glow" effect. Contingent valuation (CV) techniques are an approach to measuring such value by asking people how much they are willing to pay to preserve an environmental good that is not priced through conventional market mechanisms. Eliciting an individual's or group's value through contingent valuation allows the respondent the opportunity to reveal his or her preferences and, by implication, value for the specific biodiversity service in question.

A strength, but also a potentially confounding limitation of CV, is that it leaves room for the respondent to reveal views toward the environment in general, over and above a specific biodiversity service. For example, there is evidence of surrogate bidding for several environmental goods; i.e., no significant difference in values for improved quality in one specific location as compared to the value for regionwide improvements. Other reports support the warm glow argument, finding evidence that the average willingness to pay to prevent 2,000 birds from dying in oil-filled ponds was not significantly different from the value to prevent 20,000 or 200,000 birds from dying. In addition, the bimodal distribution of value measures in many CV studies--zero and a positive value around US\$30-50--suggests that these values may serve a function similar to charitable contributions. Not only does the respondent want to support a worthy cause, he or she also received a warm glow from donating to it.

CV has its critics, and its usefulness in developing countries is far from proven. Critical to accurate valuation is the assumption that respondents will give honest and internally consistent responses to questions. Moreover, it further assumes that questionnaires are a reliable vehicle for compiling such information. This, in turn, depends on the sociocultural milieu in which the survey is administered. Values for environmental goods developed in a CV study are only as reliable as the input data on which they are based.

Even if one goes past the warm glow and elicits meaningful non-use values for biodiversity and ecosystem services, he or she must still appreciate that many individuals are simply unfamiliar with most of the services and functions that ecosystems and biodiversity provide. For example, a recent survey of 200 Scottish citizens revealed that more than 70% were completely unfamiliar with the definition of biodiversity.

Familiarity is central to understanding the value of biodiversity. Unfamiliarity will decrease the reliability of the value estimates. Respondents unfamiliar with biodiversity will be less able to value changes in its provision.

What do value measures mean when an individual is unfamiliar with the asset he or she is being asked to value? Two outcomes are possible. If unfamiliarity is widespread, CV studies probably will systematically underestimate the value that better informed individuals would assign to biodiversity. This will occur if individuals tend toward a narrow view of biodiversity benefits. On the other hand, respondents may well want to form conjectures and accumulate experience with biodiversity in order to more accurately assess how it enters into his or her preferences. If a respondent does not know his or her preferences for biodiversity, the willingness to pay for a given quantity may exceed "real" value if preferences were better articulated. This is the case of overvaluing the unfamiliar asset or the asset whose benefits materialize in the future and are substantial. Increasing knowledge of the benefits of such an asset may render first estimates of value inaccurately high. This suggests that the value of biodiversity needs an explicit criteria on time and resources decision constraints and knowledge.

#### Sources of Biodiversity Loss

In developing countries like Madagascar, biodiversity loss is foremost a byproduct of habitat destruction. If one can understand the economic forces behind such destruction, one can begin to devise mitigation strategies. First, habitat destruction arises from public ownership of large areas of land with open-access property right regimes and little government capacity to manage the land. These economic incentives encourage the overexploitation of wildlife, trees for timber, grazing lands, and crop lands. Second, the system of constraints creates an environment in which alternatives are difficult to find. For example, constraints on information and technology provide a limited opportunity set from which to choose alternatives to current practices. Third, land tenure is often insecure since local people in remote rural areas have little or no influence over national laws, policies, social changes, and economic forces. Lack of secure land tenure provides little incentive to maintain the habitat necessary for biodiversity conservation. Fourth, there is a divergence in the temporal objectives of the management agencies and the local populations--the long-term communal benefits of conservation versus the short-term individual benefits that encourage development.

*Open access and improper market prices.* At the most basic level, the threat to biodiversity exists because it is a nonrival and non-excludable good. It is nonrival in that, once it is protected, it is protected for everyone. It is non-excludable in that it is difficult to divide up and sell on the market. As a result of these characteristics, biodiversity in and of itself has no value reflected by market prices. In contrast, the commodity resources of the habitat (e.g., minerals, timber, and game) are valued on the market, and the supply and

demand reflect the relative scarcity of these goods. Therefore, there is pressure to harvest the commodity goods at the expense of biodiversity. This lack of a complete market implies that the unintended effects of private economic decisions can create biodiversity loss--an externality exists.

*Insecure land tenure.* Land tenure insecurity promotes excessive resources extraction. Local residents have little incentive to conserve if they are unsure whether their kin will have access to the same land. Some argue that biodiversity is best promoted by changing land tenure such that property rights are clearly defined; then, if there is an increase in human capital, market incentives will act as the engine to promote improved welfare. Others argue, however, that one should not artificially change land tenure or property rights. Artificially imposed land tenure systems will fail because they ignore the dynamic nature of property rights. Rather, one should invest in activities that reduce the costs of gaining access to a market (e.g., infrastructure or transportation); then, the land tenure system will evolve into one that will improve welfare. The land tenure system is internal to the community and not artificially imposed from above.

*Discounting--best short-term option.* Biodiversity protection aims at achieving the goal of *sustainable development*, the current popular term symbolizing the belief that intergenerational equity must play an explicit and significant role in the management of environmental resources. Demands for biodiversity note that the resources allocation decisions people make today generate costs and benefits that can accrue far into the future. Unless society is myopic, current environmental policy must account for the temporal dimensions of these individual allocation decisions. Although scientists and policymakers have questioned the use of individuals' preferences toward time to construct social discount rates, they nevertheless acknowledge their importance. Without understanding how individuals, especially local people, actually discount the future consequences of their choices, predictions of behavior will be wrongly specified. Consequently, policy that promotes biodiversity but ignores individuals' preferences toward time guarantees unintended results.

Economists have stressed this point, arguing that one must incorporate individuals' preferences toward time into traditional CBA, such that policy predictions based on an independently derived social discount rate will not be biased. Individuals allocate consumption and investment decisions over time so as to smooth their satisfaction over time, and policy must account for this adjustment process. Psychologists and decision scientists have taken this a step further. They argue that not only might different individuals have different preferences, the same individual's preferences might differ by situation. In contrast to the standard economic assumption of individually invariant time preferences, this dynamic has been documented inconsistently in several studies. This work suggests that an individual's preference for time is situation specific and influenced by the opportunities to re-allocate resources over time.

*Proposed solutions.* Some economists have argued that policy efforts reflect wishful thinking about local communities' regard for natural ecosystems. They point out that, since there appears to be a surplus of labor in many areas, attempts to change behavior fall short. Individuals can maintain old harvesting practices even while doing the new activities. Local communities often fail to support a project because it is not in their economic interest to do so.

The marginal benefit per cost of continuing to use the protected areas exceeds the marginal benefits per cost of alternative actions. Therefore, the likelihood of biodiversity loss increases regardless of the new policy. Solutions proposed to prevent this biodiversity loss revolve around basic economic concepts--change constraints or incentives.

*Constraints.* Local people living around the area to be protected face a set of constraints that inhibit their opportunities to adjust to new policy initiatives. Constraints are related to income, time, information, technology, and access to markets. One way to overcome the threats to biodiversity is to alter these constraints, thereby providing a larger and more varied set of opportunities. The projects do not always address the issue of how constraints, such as the legal environment, could be altered to empower private citizens to help enforce the environmental policies. Empowerment implies access to decisions that affect social welfare. This access is critical for any environmental policy reform to be sustainable. The stakeholders in all aspects of the conflict must understand the decision process, the uncertainties, and have incentive to participate. Legal reform, such as reimbursement for citizen action, can bring important players into the equation. The end result is a policy culture that develops a process resulting in more good than bad solutions. For example, lack of information on the potential benefits of biodiversity protection can be altered by increasing human capital.

*Incentives.* Working within the current set of constraints, one can attempt to change behavior using economic incentives either by increasing the benefits of preservation or the costs of habitat alteration. Increasing the benefits of preservation can occur by giving the local population property rights to the stream of economic benefits gained from biodiversity preservation in order to increase the private benefits of habitat conservation so that it approaches the social value of conservation. A long-term investment in habitat results in benefits associated with excludable, non-consumptive use values, as well as those associated with the steady stream of consumptive use benefits issuing from a sustainable harvest of surrounding areas. In addition to refocusing those who would overuse the protected areas, enlisting the help of the local people removes their support and tolerance of overusers.

Increasing the costs of habitat destruction is potentially more difficult. This implies a strict monitoring and enforcement scheme that raises the expected penalty of the overuse of the protected area. Local people can be motivated to exclude themselves from the protected area or buffer zones if it becomes unprofitable to stay--the new, higher marginal costs outweigh the marginal benefits. The question becomes: Does the government have the resources to set up an effective monitoring system that will deter entry and overuse? For most countries where biodiversity is currently being promoted, the answer is generally "no." The vast expanses and multitude of access areas imply that increased enforcement is probably not possible.

Another set is to remove any perverse incentives that already exist that increase the benefit of habitat destruction. Subsidies for land buy where agricultural land receives a higher price than forested land increases the incentive to cut down the trees and begin cropping.

### The Problem in Madagascar

Madagascar, the fourth largest island in the world, is one of the ecologically richest but economically poorest countries. International agencies have dubbed it the prime spot for conserving biodiversity. Large sums of money are being invested to preserve biodiversity there. Biologists estimate that 150,000 of the 200,000 species are unique (75% of species are endemic) to the island of approximately 1,600 km (1,000 miles) length and 450 km (280 miles) width, with 587,000 km<sup>2</sup> (228,880 square miles) of surface area. The biological diversity is represented by the set of unique species--98% (110 out of 112) of all palm species in the world, 93% of primates, 80% of flowering plants, 233 out of 245 reptiles, 142 out of 144 frogs, 29 out of 30 tenrecks, and 8 out of 9 carnivores.

More than 12 million people live on the island (50% under 15 years old). The population density is 17.5 people/km<sup>2</sup> (7.3 ha/person), with an annual growth rate of nearly 3%. Per capita income is about US\$200 per year. Agriculture employs more than 85% of the population, contributing to 43% of the Gross Domestic Product (GDP) and 80% of export earnings. Rice is the main crop, with over 70% of farmers engaged in production on two-thirds of the cultivated land.

Environmental degradation in Madagascar has been increasing rapidly over the last few decades. Soil loss is a severe problem, ranging from the best soil eroding at 11 tns./ha/yr to the worst soil eroding at 400 tns./ha/yr. The economic cost of environmental degradation has been estimated at US\$100-290 million (5-15% of GDP)--75% from deforestation; 15% from drop in productivity of land assets in rainfed agriculture; and

10% from increased maintenance of infrastructure, such as silted dams, clogged irrigation canals, and landslides on roads. In addition, deforestation is occurring at an estimated rate of 200,000 ha/yr, with nearly 80% of the original forest cover already gone.

Economists often argue that the major problem in biodiversity conservation is that the complementarity between agricultural development and conservation of ecosystems is not exploited. They argue farmers and ranchers encroach little on natural ecosystems in countries where crop and livestock yields have improved through research and extension, irrigation investment, and related measures. In contrast, where productivity trends have been flat, increasing demand for agricultural commodities from population pressures, income growth, and expanded exports have led to land use conversion and habitat destruction. This suggests that the link between agricultural yields and successful conservation is vital.

Increasing yields should put less pressure on new land development and habitat destruction, as land development in remote areas now becomes relatively less profitable. If there is pressure to scale back agricultural activities or failure to increase yields, then, with weak enforcement strategies, the land conversion and habitat destruction will increase. Unless agricultural productivity is increased, conservation projects will fail. In Madagascar, tavy (slash-and-burn agriculture) expansion is considered the largest threat to the habitat supporting biological diversity. Expansion rather than increased yields on existing land is of major concern. Tavy is estimated as the largest cost of current harvesting practices--US\$84 million out of \$105 million damages.

*Poverty, transferable risk, and conflict.* Projects in Madagascar often do not address the problems associated with transferring or transforming problems. For example, proposals suggest that several forest reserves be gazetted to national parks. The underlying assumption is that the people who are using the forest in an unsustainable way will also change their ways rather than continue doing what they do at another location or in a different form. New policy that improves local and regional resources quality often does so at the expense of other regions or resources. Conflict will result if a policy promotes solutions that simply transfer the biodiversity problem through time or space. This suggests that a regional perspective must persist even though the incentives must be maintained at the local level.

Understanding the implications of transferability is critical for effective biodiversity policy. Conflict implies that too many resources are being devoted to resolve a problem, with no gain in biodiversity. This result is not immediately obvious. Policymakers often argue that too few resources are devoted to biodiversity protection. If new policy transfers rather than resolves risk, an agent that ignores his or her impact on others will invest too many resources in protection. The agent's initiatives may not improve welfare if transferability is inadequately addressed. Therefore, an effort must be made to assess the

degree to which one problem will be substituted for another. If no attention is given to transferability risks, the Madagascar projects may not lead to the desired result. They may simply create new conflicts no matter how well-intended the policy prescriptions.

#### Effects of Proposed Initiatives on Causes

*SAVEM.* The SAVEM Project was enacted in 1990 with the goal of establishing sustainable human and natural ecosystems in areas of Madagascar where biodiversity is threatened. Its purpose is to identify and initiate systems (including institutions, methods, and behaviors) for the management of protected areas and the peripheral zones adjoining these areas on a sustainable basis. The key outputs include 1) establishment of the National Association for the Management of Protected Areas with sufficient authority and capabilities to perform its management function; 2) establishment and operation of the Biodiversity Planning Service within the Association to provide information; 3) implementation of management plans in five or six protected areas and the adjacent peripheral zones that will balance the needs for economic growth with conservation; 4) support of self-help projects in 50 priority areas; and 5) enhancement of the managerial and technical capacity of the Government of Madagascar and personnel of nongovernmental organizations (NGOs) active in conservation. SAVEM proposed using two main strategies to achieve these objectives: 1) develop institutional and human capital and 2) test the theory that behavior will change from destruction to conservation if local people see the relative economic advantage of conservation.

*KEPEM.* The purpose of the KEPEM Project was to encourage sustainable NRM through a policy and institutional framework of incentives and revenue generation and expenditure, on the assumption that this will lead to increased biological diversity conservation. This project differs from SAVEM in that USAID disperses resources to the Government of Madagascar in exchange for the identification and implementation of agreed policy and institutional actions. The key steps of action were to 1) develop the institutional capacity of the Government of Madagascar to plan, monitor, and evaluate the implementation of the NEAP, strengthen coordination among organizations working to implement the NEAP and to establish an environmental review process for investment projects; 2) facilitate local natural resources initiatives by strengthening regulatory incentives and fostering NGO growth and participation as partners with local groups in improved NRM; and 3) generate revenue, expenditure, and resources pricing through forest product pricing and improved natural forest management and establish a national environmental endowment fund as a sustainable source of financing for environmental initiatives.

The stated policy objectives were to 1) coordinate policy in the environmental sector, including the ability to control development in the tourism industry; 2) promote local initiatives; 3) transfer technical information and resources to first-line resources users and

managers; 4) promote free movement of NGOs with local associations, jurisdictions, and individuals; 5) develop woodstock ownership and pricing systems that accurately value forest resources; and 6) develop adequate recovery of revenue from ecotourism.

KEPEM suggested the following policy reforms were necessary to help achieve the objectives: 1) strengthen the capacity of the National Office of the Environment to develop environmental policy by identifying and defining the actors in environmental policy, defining the institutional interactions and cooperation, and developing and implementing a work plan, evaluation criteria, and a standard environmental review; 2) facilitate local-level NRM initiatives by strengthening legislation-based incentives for local users to govern and manage those resources, technological support, removing legal barriers blocking local group and NGO participation in the management, and setting up the National Environmental Trust Fund as an endowment to encourage and facilitate NRM initiatives; 3) generate natural resources revenue through a national schedule of stumpage fees for all classes and categories of wood to better reflect current market prices and replacement costs by establishing improved financial management system for stumpage fee collection, by determining fixed percentage of National Forestry Fund to be invested in the protection and maintenance of natural forests, by initiating management plans to protect forests under exploitation, by establishing an ecotourism board to develop and promote tourism, a hotel tariff earmarked for ecotourism with a percent allocated to local communities for unrestricted use, and investing protected area entry and use fees back into the protected area rather than into central government.

*Ecotourism.* Currently, SAVEM projects that 9,000 visitors will make a net contribution of US\$500 per visit, implying a \$4.5 million annual revenue. SAVEM also projects 25,000 visitors by 1995. Wells and Brandon (1992), however, state that the results of ecotourism have been disappointing. In general, all spending by visitors on transportation, food, lodging, or even park entry fees goes directly to the central treasury or the private corporate interests that have been granted concessions. At popular sites, tourism revenues greatly exceed protected-area operating budgets. It is unusual for any of these revenues to be returned directly for park management and extremely rare for a revenue share to go to local people.

Wells and Brandon quote Hemanta Mishra, who argues that preoccupation with hopes that tourism will catalyze local support or change public attitudes seems to be self-defeating since the benefits from tourism were overplayed by Government authorities and tourist organizations. The concept of selling the idea of a national park from the benefits to the local people from wilderness-oriented tourism has not been successful and is unlikely to have any positive impact within the next decade. In Madagascar, the presence of rare and endangered species attracts small numbers of visitors to several tropical forest

sites. This form of ecotourism or adventure tourism can contribute modestly to local economies but does not have the potential to attract the volume of tourists who flock to Nepal's Himalayan parks or the African wildlife parks.

The strong link between tourism and renewable resources mining in frontier areas is often ignored. Roads and infrastructure for tourism also improve access conditions for those interested in harvesting the resources, legally or illegally. Local people may well respond to changes in the relative price of access, leading to more exploitation than before.

Promoters of conservation projects argue that the largest revenue source to maintain the viability of these projects is ecotourism. With free entry and exit, any excessive economic rents that may have been captured initially will be dissipated as the supply of conservation parks increases. As the supply of conservation parks increases and as ecotourism demand remains relatively constant or grows slowly, the price for ecosystems services will decline. As the price declines, the ability to generate revenue such that the park is self-sufficient becomes increasingly difficult to maintain. Some have argued that the attempt to transplant a rich-country institution like a national park to an alien setting creates conflict between forest dwellers and bureaucrats as pressure to displace local people increases.

The costs and benefits of the nonmarket valuation of the proposed Mantadia National Park break down as follows. Costs include land acquisition, park personnel, infrastructure development, including roads and facilities, and the opportunity cost of foregone uses of the land, including forestry and agriculture. Opportunity costs include fuelwood, crayfish, crab, tenreck, and frog. Benefits include both use and non-use values. Use values include tourism and research. Non-use values are doubtful, at best.

The results of the nonmarket valuation exercise yielded the following information. Foreign visitors had a mean income of US\$60,000 (range was \$3,000 to 300,000). The average age was 39 years, with 15 years of formal education. The average trip was 27 days, with expenditures averaging about \$2,900 (range was \$335-6,363). The average transportation costs to Madagascar equaled US\$1,400, while the transport costs in Madagascar equaled US\$600. Assuming about 3,000 visitors annually, the total willingness to pay to see twice as many or the same lemurs ranged from \$300,000 to \$460,000, implying a stream of benefits of \$3-4.6 million, with a 10% discount rate or \$10-15 million with a 3% discount rate.

### Indicators of Policy Problems

The Madagascar projects need to develop an explicit set of early warning indicators that reflect potential problems. These indicators can include non-increasing agricultural yields, sluggish ecotourism, uneven and untargeted distribution of rents, rate of habitat

destruction, rate of population growth, continued pressure on buffer zones surrounding protected areas, weak monitoring and enforcement, remaining ambiguity in property right regimes, increasing preservation costs as a signal of poor planning, transition costs and unrealistic time horizons, and lack of local participation.

## Conclusions

*Cause-and-effect relationships.* For Madagascar, the key cause-and-effect relationship is between biodiversity loss and habitat destruction through tavy agriculture. To better understand the incentives and constraints that promote this relationship, the projects need to be defined as part of a larger framework that explicitly specifies the political commitment to the project, the legislation conducive to the achievement of objectives, realistic institutional arrangements for project management, compatibility with regional development, systematic attention to land ownership and other access rights to resources for the projects' intended beneficiaries, and commitment to institutional reorientation toward a people-centered approach.

*Range of policy alternatives.* The major link between biodiversity loss and agricultural productivity needs to be further explored. The incentives and constraints that promote tavy agricultural practices need to be clearly specified, as do both direct and indirect policy alternatives that can increase agricultural productivity. Otherwise, decisions of policymakers who do not address the biodiversity-agricultural productivity link will result in unintended consequences.

The range of policy alternatives will depend on the project design and proposed implementation scheme. This set of policy alternatives should be defined by understanding the socioeconomic context, specifying exactly how security of biodiversity and habitat preservation is accomplished, including a well-defined concept of buffer zones, identifying viable alternatives to extensive resources-use practices, realistically assessing whether the project is or can be self-sufficient, estimating the amount and distribution of economic benefits and costs, establishing clear links between social projects and the protected area, providing a well-trained, experienced, and knowledgeable staff, establishing a consistent monitoring and evaluation plan to determine the successes and failures of the plan, and establishing a clear working link between NGOs and project managers.

*Changes and transfers in behavior.* There is increased pressure to change the decision-making process from a top-down to a bottom-up approach. The idea is to let those who best understand the on-site resources have a significant role in the decision-making related to resources allocation. While one cannot argue with the need for involvement at the most fundamental level, one must also recognize that a local focus often ignores the externalities they create for others. There is no universal, preferred management scale given that resources and problems differ. Some projects will require a farm-level focus while others will require a watershed perspective. Otherwise, decisions that seem appropriate at the farm level may not resolve the problem but may simply

transfer the problem to another location. The optimal management scale will require an evaluation of the relative costs and benefits of the alternative choices.

*Sufficient versus necessary conditions.* The binding constraints in Madagascar need to be better understood. These include time, income, and information. Understanding the sufficient conditions of biodiversity protection will require justification of key assumptions, such as the costs of transition from the status quo, availability and adoption of new agricultural technology, the cost of new institutions to monitor and enforce policy initiatives, and the sufficient involvement of national government and international organizations that support the project.

*Risk and uncertainty.* Because of the high level of uncertainty involved in the Madagascar biodiversity projects, there is a need for a serious commitment to risk management. Risk management implies systematically accounting for the risks and uncertainties in project development and appraisal. For example, sensitivity analysis should be a basic part of every project proposal and evaluation.

*Lessons learned.* Projects will benefit from learning about the mistakes of earlier projects. The team members believe the major lesson learned is that ecotourism is not a guarantee of solving all the revenue problems associated with biodiversity loss. Ecotourism has failed to deliver in several locations in Africa. For example, the National Park Plan in the Amboseli area of southern Kenya required the financial returns from tourism to replace the central government funds. But tourism leveled off and required additional commitments from government and international organizations. Projects that rely on ecotourism may well suffer in the long run.

In addition, history suggests a major problem with using the funds of ecotourism to compensate local people. The fund allocation process does not always pinpoint the affected sectors of society. The allocation schemes are often at a level of aggregation such that there is little effect on the target population. This implies that the target groups do not play an active role in decision-making. They also may not enjoy the direct benefits, aesthetic or otherwise, associated with habitat preservation. For example, in Malawi, only 1% of fee-paying visitors are national residents, even though they comprise 99.75% of the resident population. The benefits must be real and immediate to obtain results.

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## **Case Study 2: Sustainable Agricultural Development in Africa, with particular reference to The Gambia**

This report is in three parts. The first gives a brief account of agricultural performance in Africa and of what appears to be the major factors accounting for performance. Special, but by no means exclusive, attention is given to NRM. The second part lays out ideas for more in-depth study of obstacles to agricultural sustainability, focusing on The Gambia as a starting point. The objective of the study would be to identify the critical obstacles and to suggest ways in which USAID programs, particularly NPA, could most effectively address them.

Unfortunately, there are no reliable, comprehensive data on the extent of natural resources depletion and environmental damage resulting from agricultural production in Africa or anywhere else (Crosson and Anderson 1992). Consequently, there is no persuasive evidence that the trend of agricultural performance would look worse (or better) if account were taken of natural resources depletion and environmental damage. However, the anecdotal evidence (e.g., with respect to soil erosion) is strong enough to suggest that NRM, at a minimum, does not favor agricultural performance and may have affected it negatively.

### **Reasons for Poor Agricultural Performance**

The literature reviewed on agricultural development indicates that farmer incentives to adopt more productive technologies and NRM practices have been weakened by policies and institutions that have resulted in inadequate investment in transport and communications infrastructure linking agriculture to national, African, and international markets; agricultural research to develop more productive technologies and patterns of NRM; education and training of farmers; and agricultural credit institutions.

For political reasons, price policies have been designed to hold down food prices for urban consumers such that farmers lack incentive to invest in new technologies or NRM. At the same time, foreign exchange rates have been maintained at artificially high rates, putting African farmers at a price disadvantage in foreign markets.

Institutions that determine property rights for land and other natural resources often create ambiguity, resulting in lack of tenure security needed to persuade farmers to make long-term investments in new technology and conserve natural resources. In Africa, a particularly important instance of conflicting claims of rights to land arises between crop farmers and herders. In many African countries, it is common for farmers to have rights to plant, cultivate, and harvest a piece of land during the growing season, with herders then having the right to graze their animals on the crop stubble. Although technologies and improved NRM practices might be available on attractive terms that would make more intensive, year-round use of land more profitable to crop farmers, the conflicting claim of herders to the land would be an obstacle to adoption of new practices.

Government institutions responsible for agriculture and natural resources too often reward bureaucratic behavior aimed at enforcement of rules and regulations concerning resources use rather than working in partnership with farmers to find and exploit new, more productive forms of resources management.

In terms of USAID's NRM organizing framework, (Figure 1),<sup>3</sup> these reasons for poor agricultural performance in Africa indicate that the major problems lie at Level I and, to a lesser extent, at Level II. The failure of governments to make or induce others to make the investments noted above can be viewed as a failure to take the actions needed (Level I) to establish conditions that would induce farmers to adopt practices yielding greater productivity and income (Level V). Similarly, government price and foreign exchange policies are a form of action (Level I) that subverts creating conditions needed for adoption of more productive practices.

The property rights reason for poor performance can be viewed as a Level II problem; i.e., poorly specified or unenforced property rights in natural resources violate a condition needed for farmer adoption of more productive technologies and NRM practices.

### NRM and New Technologies as Sources of Productivity Growth

Although the five-level structure of the NRM organizing framework was developed by USAID to organize thinking about how to improve NRM in agriculture, it also applies to non-NRM sources of agricultural productivity growth--namely, new technology. For example, if governments fail to invest adequately in research to develop higher yielding crop varieties, this is a Level I failure, as are failures to adopt policies to make fertilizer and other modern inputs available to farmers at competitive prices.

This flexibility of the USAID organizing framework is a distinct advantage because the literature reviewed and the literature on sustainable agriculture generally makes it clear that achieving a sustainable agricultural system in Africa or anywhere else requires sustained advances in productivity from both 1) improved NRM to enhance the quality of the natural resources base and to ensure that future depletion does not exceed sustainable limits; and 2) improvements in technology, e.g., higher yielding varieties of plants and animals, greater use of fertilizers, and other modern inputs.

From a policy standpoint, achieving agricultural sustainability can be viewed as finding the proper weights to give to the two sources of productivity growth and allocating policy resources accordingly. Accomplishing this will require understanding the potential contribution of each source to future agricultural productivity growth under alternative policy and institutional regimes. A major obstacle to achieving the necessary understanding is the limited knowledge, noted above, about present rates of agriculturally induced natural resources depletion in Africa. The literature in this area simultaneously indicates a deep concern that the rates are a serious threat to agricultural sustainability and that there is little hard evidence to support the concern.

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<sup>3</sup> See also Crosson (1994) and Gollin and Verdisco (1994).

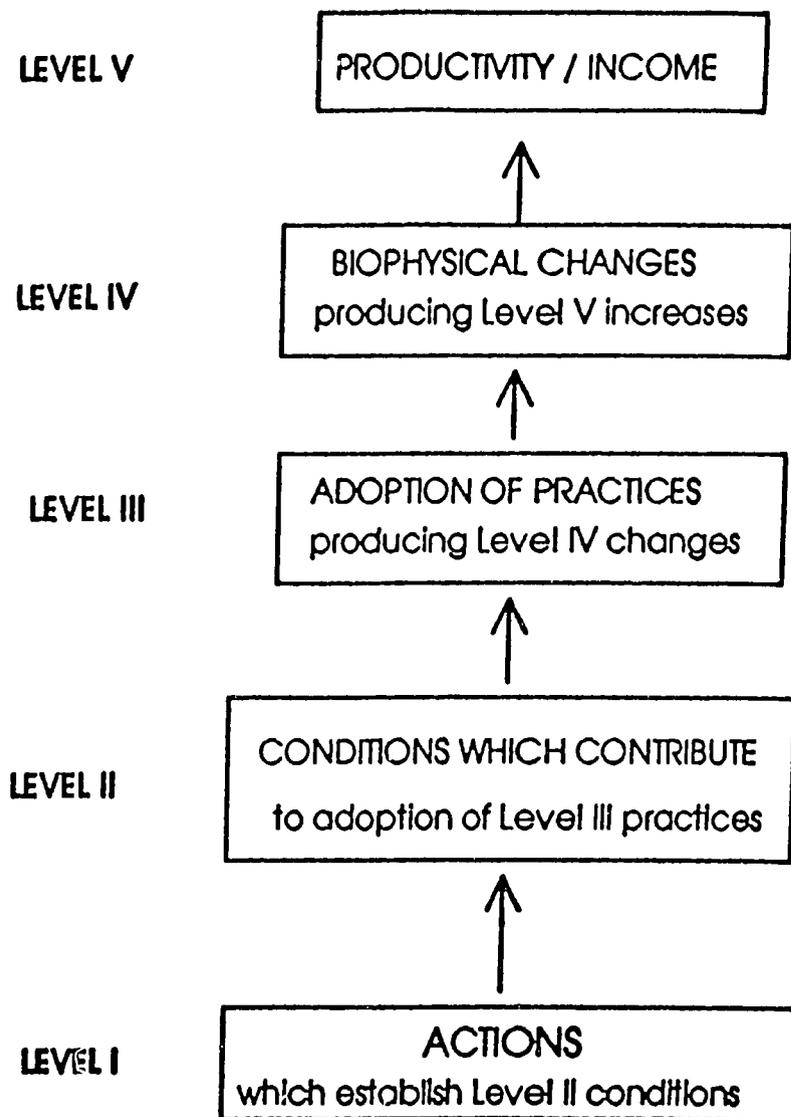


Figure 1. NRM organizing framework

## Problem of Uncertainty

Another advantage of USAID's organizing framework is that it makes clear the reality that there is ample room for things to go wrong between initiation of corrective actions (Level I) and achievement of intended increases in agricultural productivity and income (Level V).

Population growth and migration, changing demand conditions, technical change (albeit too slow), and political instability conspire to make agricultural development in Africa a dynamic, uncertain process. Consequently, even the best laid action plans initiated at Level I may be overtaken by events and thwarted at Levels II-IV, resulting in a shortfall or even failure at Level V.

Agricultural development in Africa and policies to promote it are attended by high uncertainty. Policies, programs, and projects that fail to recognize this and whose successes depend upon no change in the assumed underlying conditions almost surely will yield disappointing results. People responsible for policy, whether in USAID or in assisted African countries, cannot eliminate the uncertainties; however, there are steps they can take to help temper the consequences.

*Testing sensitivity.* One step is to test the sensitivity of policy, program, or project outcomes to variations in assumptions about key underlying conditions. If done carefully, this could suggest some restructuring of policies to make them less exposed to the more damaging sources of uncertainty. It also could provide a basis for qualitative adjustments to program or project benefit-cost ratios.

*Learning from mistakes.* The second step, closely linked to the first, is learning from mistakes. When programs or projects fail--not necessarily from inadequate attention to uncertainties, but including this--it is important to understand why. Indeed, learning about why programs or projects fail should be treated as a valuable output that can save time and money and reduce future risks of failure. Procedures for validating assumptions and developing and monitoring indicators of program and project success or failure, *as the programs and projects are under way*, should be an important part of all USAID initiatives to promote sustainable agriculture in Africa. To make the most use of the knowledge accumulated in this way, protocols should be established for accessing and using information about previous programs and projects. Adding such features and requiring staff to use them would require some cost. However, in high uncertainty ventures, learning from mistakes can yield significant long-term payoffs. The production of this type of knowledge should be an explicit objective of USAID initiatives in Africa and elsewhere. Proposers of such initiatives should be required to demonstrate they understand what has previously succeeded and failed and why.

## Next Steps

*Definition of sustainable agriculture.* The term *sustainable agriculture* is defined here as a management pattern of natural and human-made resources that indefinitely meets demands for agricultural output at costs and a distribution of costs judged by the society as acceptable and equitable both within and across generations. As stated, this definition could apply at any spatial scale; i.e., from the farm field to the world. However, in today's world, agriculture anywhere is linked through markets to agriculture everywhere. World trade in agricultural commodities is the major link, but there are global flows of inputs as well, especially knowledge of agricultural production practices and, on a smaller scale, of people. The existence of a global agricultural system means that countries everywhere may have the option, at the margin, of substituting imports of agricultural outputs (and inputs) for domestic production when the domestic economic and environmental costs of such production threaten to be unsustainably high.

This suggests that, in thinking about policies to achieve sustainable agriculture, countries should adopt a definition of sustainability that considers non-local input and output substitution insofar as it is desirable within the context of the country's overall development objectives. This, of course, does not say that policymakers should ignore sustainability issues that may arise within regions of a country. It means that, in addressing such issues, policymakers should keep clearly in mind that migration of people and regional trade within a country or with other countries may be an option for easing the pressure of mounting agricultural demand on the regional resources base.

Several desirable features of this global-scale definition of sustainable agriculture are noted here:

- It implicitly recognizes that achieving sustainability with existing levels of demand will not suffice if demand is rising, as it surely will be in Africa into the indefinite future.
- It permits costs to be defined quite broadly to include not only conventional economic costs to directly affected stakeholders (e.g., farmers), but any loss of environmental and other social assets as a consequence of agricultural production.
- By focusing on the social acceptability of costs as the criterion for sustainability, it permits the notion of trade-offs between components of natural and human-made capital used in agriculture. The existence of such trade-offs is important because it means that, in some circumstances, the lowest cost opportunity for achieving sustainability will be to invest in enhancement of natural resources as a substitute for investment in human-made capital. In other circumstances, substitution of human-made capital for natural capital may be the lowest cost path to sustainability.

The notion of trade-offs or substitution between natural and human-made capital is highly controversial in discussions of sustainable agriculture or of sustainable development generally. Indeed, it is fair to say that differences about the limits to such substitution are at the core of all differences about sustainability and how to achieve it. The history of world agriculture over the last 40 years demonstrates massive substitution of human-made for natural capital. In the study team's judgment, the critical question for the future of global and African agriculture is whether substitution opportunities will be available on the scale needed to achieve sustainability. The team members believe it imperative, therefore, to work with a definition of sustainable agriculture that incorporates the possibility of human-made/natural capital trade-offs.

### Study Focus

The purpose of the study was to show how natural resources and environmental management (NREM), in combination with management of human-made resources, affect achievement of sustainable agricultural development in Africa. The overriding goal was to support USAID program development, such that project and NPA yield results that support achievement of sustainable agricultural development.

This statement of purpose recognizes that natural resources are only one category of the resources used in agriculture. Consequently, improvement in NRM may not be sufficient to achieve sustainability if improvements in other resources (e.g., new fertilizer-responsive crop varieties, more potent but less environmentally threatening pesticides, or greater human skills) lag behind. Thus, the role of improved NRM is played out in the context of an interrelated bundle of resources--natural and human-made. To understand that role and to suggest policies for strengthening it requires understanding the complete resources context.

### Analytical Approach

In the above discussion about reasons for poor agricultural performance in Africa, factors were identified that adversely affect farmer incentives for adopting more productive technologies and NRM practices. All of these factors can be grouped into one of three broad categories: 1) policies of neglect, or even bias, against agriculture; 2) weakness in the institutional infrastructure (e.g., land tenure or rural credit systems); and 3) inadequate physical infrastructure (e.g., road network).

The three categories represent obstacles to achieving sustainable agriculture in Africa. All may, and often do, so distort the incentives of agriculturalists and of those in government and the private sector who serve them that patterns of resources management are inconsistent with sustainability as defined above. In this approach, the analytical problem is to identify the characteristics of the policies and of the institutional and physical infrastructures that have perverse incentive effects on agriculturalists and to devise corrective policies that will shape incentives to be consistent with sustainability.

## Application of the Approach in Africa

This study applies the approach described to analyze sustainable agriculture in The Gambia. Because The Gambia is so small, the problems of applying the approach should be easier than they would in a larger country. Also, The Gambia appears to have a number of the same types of NREM problems that other African countries have. What is learned in The Gambia, then, should apply, at least generally, to other countries.

USAID's ANR Program in The Gambia is another important reason for choosing this country for the proposed study because it indicates an interest on the part of USAID/The Gambia in the role of NRM in achieving agricultural sustainability.

The ANR Program is a US\$22.5 million effort designed to increase rural incomes from crop, livestock, and forestry production. On a per capita basis, the program is large by USAID standards. The ANR aims to increase rural production and income by promoting sustainable improvements in NRM. Another objective is to work with The Gambian government to establish a policy framework for encouraging development and adoption of improved NRM.

The ANR Program has two components: 1) NPA in the amount of US\$10 million to promote policy and institutional reform in the natural resources sector and 2) a US\$12.5 million support project. The NPA component will provide funds to the Government of The Gambia for debt repayment, conditional upon policy changes that will lead to improved NRM at both local and national levels. A key condition is that legislation concerning forestry, grazing, wildlife, and other resources will be reviewed and revised so as to enable local communities to assume management responsibility over local resources and to profit from this management subject to government supervision and technical assistance.

The theme of tapping local area knowledge and initiative to achieve improved NREM runs through much of the discussion in the PAAD for the ANR Program. The literature on agricultural development in less developed countries, and in Africa in particular, supports the argument for potentially high development payoff from these local sources. An example from Africa is briefly described here.

Mary Tiffin (1992) reports the results of several years of research on NRM issues in the Machakos District of Kenya. The study covers developments in the region from 1920 to 1990. A series of reports by visiting experts noted severe soil erosion and degradation of both cultivated and grazing land in the 1930s and 1940s. At least partly in response, the government from 1946 to 1962 had in place an expensive program to develop bush land in the highly populated area south of the District and, as Tiffin reports:

...to rehabilitate the older settled areas by closing grazing areas, compulsory communal work on terracing, and the building of dams...In 1990 there was much less soil erosion--almost none on cultivated land--and more animal and crop production on a District basis. Despite a five-fold

increase in population, wood fuel scarcity had not increased, and there were more trees. The difference was not due to better rainfall, which throughout the period from 1892 for which we have records has remained variable and erratic.

The governmental expenditures of 1946-1962 can be given only limited credit for the improvement. Many of the compulsory terraces collapsed; the technology imposed, the narrow based terrace, did not stand up to heavy rainfall and did not conserve as much of the scarce and erratic rainfall as the alternative, more labor-demanding bench terrace, which farmers now almost universally prefer. Many more families settled themselves without expense to the government in new lands...Air photos show most of the land was terraced through private farmer investments between 1961 and 1978 when government expenditure on the District was at its minimum.

Experience of this sort in Africa, not limited to Kenya, suggests that USAID's ANR Program for The Gambia is on the right track in emphasizing the importance of government programs to harness the energies of local people acting in their own interest to achieve improved NRM.

It is anticipated in the PAAD that the ANR Program will permanently reverse the recent adverse trend in agricultural production. According to the PAAD, the Program has a positive benefit-cost ratio at 10% interest and that the IRR is 21%.

The adverse trend in agricultural productivity is inferred from a calculated decline in crop yields over the past 15 years. Although the PAAD states in one place that agriculture was negatively affected by "low producer prices, shortages of inputs, an overvalued exchange rate, disintegrating rural infrastructure, and predatory public enterprises" (USAID 1992), the conclusion, nevertheless, is that natural resources degradation was the principal cause for the apparent decline in agricultural productivity.

No data are given for soil erosion as a source of resources degradation. A decline in range quality is inferred from the disappearance of perennial pasture species and their replacement by less valuable annual species. Deforestation is said to have resulted in significant biodiversity loss, although little evidence is given. Wildlife meat is no longer significant in the diet of rural people, numbers of wild animals have declined, and a number of major animal species have become extinct.

As a partial explanation of the perceived degradation of the natural resources base, the PAAD notes that prevailing land tenure laws limit incentives of rural communities for sustainable management of farm and grazing and forest resources in their vicinity. Both forest and grazing resources have been treated as open access resources under customary law. As noted above, a condition of the NPA component of the ANR Program is government action to empower communities legally to manage their own natural resources. The PAAD states that one way to do this is to establish a legally binding Community Resource Use Agreement between the national government and some appropriate local institution. In addition, the PAAD discusses an educational program with respect to improved NRM for local people, especially about their rights under the

Agreement, and a program to make technical expertise about NRM available to local people.

An important feature of the ANR Program is providing for establishment of a monitoring, evaluation, and reporting system that will permit tracking of economic and social indicators of program performance. The account of this feature in the PAAD does not mention, however, whether provision would be made for an analytical capability that could use the data collected to answer questions about performance over time.

The economic analysis underlying the claims for the benefit-cost ratio and IRR of the ANR Program is difficult to follow and raises many questions about technique, use of data, and inferences drawn. This is not the place for detailed analysis of these issues. In any case, it is unclear what purpose, at this stage, such an analysis would serve.

The discussion in the PAAD of the ANR Program suggests that The Gambia has many of the same NREM problems found throughout Africa. The Gambian problems raise the same sorts of questions about the sustainability of the country's agriculture as can be asked about agriculture across the continent. Moreover, the PAAD makes it clear that USAID has collected a rich store of the types of data about agricultural production and institutional performance that would be needed to study sustainability issues in The Gambia's agriculture. What follows is a brief sketch of how the team members would propose to structure such a study.

The team would begin by emphasizing that the proposed work in The Gambia would take USAID's ANR Program as a given. The analysis in The Gambia would proceed by four fundamental steps:

1. A sketch of the trajectory of agricultural performance in The Gambia over time, emphasizing changes in quantities and types of output and patterns of use of human-made and natural resources. The PAAD for USAID's ANR Program in The Gambia indicates that some 15 years of agricultural production data are available. The supply of data for agricultural inputs (e.g., labor, energy, land, irrigation water, and agricultural chemicals) appears more problematic, but still adequate.
2. An assessment, within the limits of the data, of the sustainability of the trajectory, using the definition of sustainability presented above. The assessment would involve an analysis of the economic and environmental costs of the trajectory, past and prospective, and identification of the policies, institutions, and physical infrastructures that shaped the farm-level incentives implicit in the trajectory.
3. An analysis of the contribution of USAID's ANR Program to moving the trajectory to a more secure, sustainable level and an assessment of future program opportunities to achieve this objective. This exercise would have the potential of

establishing a model USAID could use elsewhere in Africa to support achievement of sustainable agricultural development.

4. A consideration of resources management issues beyond the scope of the ANR Program but consistent with and supportive of its objectives. Following are issues that would be considered in this part of the analysis:

- The analysis would focus on the relationship between improved NREM and human-made resources needed for sustainable agriculture in The Gambia. The ANR Program focuses exclusively on improvements in NREM. The PAAD supporting the ANR Program notes that fertilizer and pesticide use are low in The Gambian agriculture, but the Program is not designed to encourage greater use. Also, the Program does not discuss research to develop other aspects of new, more productive agricultural technologies, such as higher yielding crop varieties.

The PAAD for the ANR Program refers to the introduction and rapid adoption of higher yielding varieties of maize and millet, so use of these types of improved resources seems clearly a part of the experience of The Gambia's agriculture. The team believes that study of how the combination of improved NREM and other components of new technology might contribute to achievement of sustainable agriculture in The Gambia could enrich insights of the role of NREM and improve the likelihood that the ANR Program would achieve its objectives.

- In the discussion of reasons for poor agricultural performance in Africa, reference was made to poorly defined or enforced property rights in land as a deterrent to farmer adoption of new technology and improved NRM practices, particularly those for which the payoff is long-term (e.g., investments in soil conservation). An obvious implication of the property rights argument is that, where tenure rights in land or other natural resources are unclear or poorly enforced, reform to clarify and strengthen the rights should be undertaken.

The argument cannot be faulted in principle; but a substantial body of literature shows that, in fact, in Africa the relationship between formally established rights in land and farm-level performance with respect to investment and productivity is often fuzzy and sometimes not evident. The literature on this subject also cites instances, including Kenya, where programs to register property rights in land formally were used by the wealthy and politically well-placed to deprive less advantaged people of traditional, but never formally established, land rights.

The literature referred to (e.g., Feder and Onchau 1987; Barrows and Roth 1989; and Atwood 1990) makes it clear that the relationship between property rights and incentives to invest in improved technology and NRM practices is

more complex than was thought only a few years ago. One feature of the emerging perspective is that the property rights-investment relationship tends to change, sometimes rapidly, where fast population growth is associated with rapid technological change and increasing commercialization of agriculture.

The proposed work in The Gambia would investigate the land property rights-investment relationship, particularly as it may bear on the longer-term success of USAID's ANR Program. Focus would be on how population growth and technological change affect the land tenure system and other part of the institutional infrastructure affecting patterns of resources management in The Gambia's agriculture. The PAAD for the ANR Program gives a fair amount of attention to the land tenure system in The Gambia, particularly as it affects management of grazing land. The activity suggested here would start from the hypothesis that population growth and technological change, including improved NREM, create incentives to change the land tenure system to allow greater flexibility in shifting land from lower valued to higher valued uses.

The activity would add depth to the ANR Program perspective on land tenure issues. It should also provide insights into policies for making tenure systems better adapted to the dynamic technical, economic, and institutional conditions for achieving a sustainable agriculture in The Gambia.

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## 4. Related Issues

### Land and Resources Tenure

The following text summarizes the February 22, 1993 trip report of team member Mudiayi Ngandu, Agricultural Economist at Tuskegee University. The author traveled to Burkina Faso, Mali, and Côte d'Ivoire in January 1993 to participate in a workshop on and discuss major issues related to reforming forestry codes to empower local communities to participate in land and NRM. The ideas and findings of this report are preliminary.

Burkina Faso (Bobo Dioulasso, January 17-21, 1993), Sahel Forestry Code Workshop

The Sahel Forestry Code Workshop, organized jointly by the CILSS, University of Wisconsin at Madison's Land Tenure Center, and CILSS member states, aimed at taking stock of ongoing forestry code reforms in five Sahelian countries within the context of decentralized and participatory NRM by local village communities. Government delegations from the five countries (Burkina Faso, Chad, Mali, Niger, and Senegal) comprised more than two-thirds of the 80 workshop participants.

*Village-level partnerships.* Workshop committees analyzed the role of local village communities in making NRM decisions, the role of government in establishing rules in support of Village Level Partnership Agreements (VLPA), and the political and financial autonomy of village communities. The discrepancy between the tenor of workshop discussions and the draft proceedings was indicative of questions that persist among Sahelian government officials about the underlying rationale and empirical basis for the VLPA and the extent to which VLPAs can be implemented successfully to promote sustainable NRM that benefits local natural resources owners and users.

It was clear that a number of officials at the workshop understood the idea that enhancing security of natural resources tenure or ownership by local village communities would likely lead to a more rational NRM than under state-dominated property regime or resources tenure. Obviously, the countries represented at this workshop differed in opinion about the extent to which this idea is acceptable. Acceptability is the result of the accumulated NRM efforts of international NGOs and private voluntary organizations (PVOs) in the Sahel, the generally improved climate for economic liberalization of and support for private-sector initiatives, and increasing pressures for democratization and regional- and village-level political autonomy.

Specific studies financed by USAID and other donors on NRM and decentralization have contributed to this improved climate for a policy dialogue on NRM and property regimes. Examples include ASDGII (1990), Lassoie and Kyle (1989), Thomson and Tall (1991), Hesselting and Coulibaly (1991), and World Bank (1992).

What is still needed is not only wider support among Sahelian officials but developing a national constituency for the VLPA between an isolated village organization and an international NGO. (Care International in Mali, in its draft Agricultural and Natural Resources Sector Strategy [1993], envisaged a greater role for Malian NGOs and PVOs, as well as emerging environmental organizations.) It appears the driving force behind the VLPA has, to date, been the donor community, especially NGOs and PVOs. It is not surprising that only a few VLPAs have been signed and approved. Given the many reservations and objections expressed formally and privately, it is significant that the VLPA was discussed at all. The Sahel Forestry Code Workshop provided an important stepping stone in this regard and an entry point for discussing NRM policy issues related to land, tree, and water resources tenure and ownership.

*Role of government.* A commonly held view within the donor community is that a democratically elected organization of forest dwellers that represents the political and economic interests of a local village community should be allowed to sign an agreement with an international or national NGO. It may even choose to subcontract needed forest extension services to a private provider of services traditionally provided by the national, regional, or local department of the forest service. It has been reported that such arrangements exist in northern Burkina Faso, although it seems they have not been formally endorsed by the government. In other countries, it appears that key central agencies either ignore such arrangements or are beginning to accept them as one way of enhancing their cooperation with international NGOs and PVOs. These arrangements are consistent with the privatization and decentralization thrusts often integrated into the community-based approach to NRM. According to this version of the VLPA, the role of government is then reduced to advising on the legal framework for private stakeholders to manage resources sustainably.

This was the major point of contention between the delegations represented at the workshop. The official objections raised by the national forest service was that NRM investments by private resources owners or managers need to be coordinated with the national sectoral NRM strategy. This argument was couched in terms of national sovereignty, although the influence of the donor community in the Sahelian context narrows the degree of freedom for many countries in the NRM sector. Most officials readily admitted that the elaborate mechanisms set up to monitor the activities of international NGOs and PVOs at the village level, including reporting requirements, leave much to be desired on the side of national governments and the donor community; i.e., the intended coordination is ineffective.

Another related issue often raised was that a powerful, local headman (e.g., a traditional chief) may, in fact, exercise monopoly over the management of a key natural resource. Hence, it was argued that a private monopoly may have worse results than a public one. As Hesselting and Coulibaly (1991) correctly argue, "the choice was not necessarily between the state-dominated property regime and the traditional communal property systems, often idealized." The NRM strategy at the village level should focus on how successfully the traditional property regime has resolved increasing NRM conflicts

and how to incorporate these positive lessons into the ongoing forestry code reforms in each country. Ultimately, the VLPA appropriate for any given local community can only be determined empirically.

*Legacy of paternalism and repression.* The VLPA suggests a major restructuring of the relationship between NRM stakeholders at the local level, participation of local natural resources managers in decision-making, and assurance that they and users benefit from the results of improved and sustainable NRM practices. Interpreted as an attempt of redress the power imbalance between the forest service and forest dwellers' communities, the VLPA is anathema to the French legacy of paternalism, which excludes the forest dwellers' communities from any NRM decision-making. Workshop participants, already familiar with the legal and socioeconomic language of a decentralized NRM framework such as the VLPA, at times appeared as "hard-core converts." This was, however, far from true since the mentality and behavior of forestry service staff remain heavily influenced by paternalism and exclusion.

Exclusion means that local village communities are severely restricted from owning, using, and benefiting from natural resources, even those they may, in fact, control. The ubiquitous role of the state with regard to the forestry code and the extensive restrictions on the use of trees and other forestry products in the Mali Fifth Region were succinctly analyzed in McLain (1992). Paternalism means that the father, colonial power, or, subsequent post-independent state "best knows" how to manage the key natural resources. In addition, the ubiquitous state can "best watch out for" the interests of local communities. This implies that local village communities need to be protected against their own interests in NRM, which they may not even be aware of. Hence, knowledge to increase their awareness of their stake in NRM and management of key natural resources must be imparted to forest dwellers "from above." The two tenets of paternalism and exclusion have largely remained intact through the various amendments to the forestry codes of the Sahelian countries in the post-independence area.

The language used today by the Sahelian forester to describe the relationship between the national forest service and forest dwellers' communities still conveys a top-down, condescending view. The French word *paysan* is reminiscent of fourteenth and fifteenth century feudalism in rural France and is still not as respectable as *exploitant agricole*, which is used to describe the French, not the Sahelian, farmer. When juxtaposed with the verb *responsabiliser* to mean "transfer of responsibilities to local village communities," the connotation is that the forest dweller is irresponsible. Similarly, the words *encadreur* and *encadre*, meaning gatekeeper (the forester) and the one who must be safeguarded (the forest dweller) suggest that the forest dweller must be protected against his or her best self interest. Finally, the inertia and opposition voiced at the workshop by some foresters against the recommendation made by McLain and others to translate the forestry codes and related operational manuals into national languages evidences the entrenched powers of the French-trained foresters vis-à-vis the forest dweller and the length to which the forester would go to preserve this authority and power.

The repressive policy, and fine and tax collection of the Sahelian foresters predominate. Without meaningful technological packages to offer forest dwellers, the foresters continue to embrace these repressive roles. As a result, abuses abound. For example, to maximize collection of fines, forestry agents in Mali and other countries are known to set bush fires deliberately to village forests and then accuse the forest dwellers of setting them, which is a violation of the bush fire code. Not only have exorbitant fines been collected, but, in view of the prevailing low salaries and inadequate reimbursement for work-related expenses, reported fines are said to pale in comparison to those unreported. (In Mali and many other countries, uniformed forestry agents are not allowed in many local village communities. In fact, many agents elect not to wear a uniform. Resentment against the abuses of forestry agents was a catalyst in the democratization movement of 1990-1991.) Similar stories relate to illegal tree-cutting fines and land-clearing taxes.

*Changing the mentality of the Sahelian forester.* A genuine concern of the forester articulated at the workshop was that most foresters in the Sahel have been trained and have long engaged in these repressive roles for lack of alternative choices of behavior. The Committee on Institutional Reform Issues recommended 1) a separation of the repressive police, fine, and tax collector functions from the new and strengthened forestry extension services within the same forestry service or a transfer of the police functions to another law and order department; and 2) assumption of these police functions by local village communities or self-policing. The latter recommendation had the least support and did not appear in the draft workshop proceedings, although it is consistent with a decentralized VLPA in which local communities participate in key NRM decision-making.

The probable reason for this is that the Committee did not adequately address the critical issues of how the restructured forest service should be financed or which specific functions it should transfer to other departments and which ones it should keep, especially given the heavy reliance on fines. (Using provisional estimates of the Mali Forestry Service's 1990 annual report, the author calculated that fines and taxes accounted for about 45% of the department's total receipts.) Sahelian officials not only wanted the forestry fund to be as decentralized as possible at the smallest administrative unit in its operation, but also wanted continued financing of the forest fund from general revenue.

Understandably, most foresters prefer earmarking, meaning that funds collected from forestry activities are to be used to finance only forestry activities, preferably at the local level where they were collected. What was lacking in these discussions was the issue of whether the forestry service should be self-financing in exchange for accountability for its performance with regard to the provision of specific services to local village communities. Also missing from discussion was whether, within the decentralized VLPA, there was room for the forest service or should some of these functions be subcontracted to private providers? If the latter is the model adopted by some countries, the strategic roles to be played by the state in support of privately negotiated VLPAs need to be specified (e.g., assistance in negotiations, advisory role, and enforcement of the validity of the private contact.) Even in Mali, where these ideas appear the most advanced, many questions

remain. What is important is that these ideas are being considered for possible inclusion in the ongoing reforms of various forestry codes and are being discussed openly.

*Restructuring the forestry service.* On the subject of restructuring the national forestry service, much discussion was devoted to the training requirements of the new forester. Participants agreed that the extension role of the forester needed emphasis, including training in project planning and financial and economic analysis at all levels. Training in forest economics was considered highly desirable. What was lacking was a discussion of the training of the forester in environmental and natural resource economics. The thinking was that, with the emphasis on providing high-quality extension services, the forester would be stretched too thinly to take on added responsibilities. The French training of the agronomist/forester falls short of forest economics and includes virtually no curriculum in environmental and natural resource economics. (This was based on conversations between the author and several French-trained agronomists/foresters from Burkina Faso, Mali, and Côte d'Ivoire.)

Mali (Bamako, January 23-30, 1993)

*Political economy and NRM.* Mali is ahead of other Sahelian countries in that proposed reform legislation on the bush fire code (code du feu) and forestry code are in the final consensus-building and consultation stages. These are remarkable accomplishments given the little time since adoption of the new constitution and election of a democratic government in 1992. The following important features of the new constitution are relevant to NRM: empowerment of local populations; political decentralization; emphasis on private-sector development; and security for individual legal, human, and political rights.

These accomplishments stand in contrast to many other African countries, where national conferences are nonproductive in that they fail to meet the popular demands for democratization and decentralization. The political climate in Mali is now conducive to a meaningful policy dialogue on decentralized and community-based NRM. This climate has been enhanced by the Tuareg demand for a separate nation to which the central government has responded by creating an autonomous eighth region, Kidal. This has resulted in greater political autonomy for the remaining seven regions. Democratization, decentralization, and the promotion of private-sector initiatives seem to be the key points of entry for a policy dialogue on NRM issues.

At the same time, maintaining the democratization and decentralization momentum will require continued and effective participation by local communities. To nurture and support Mali's young democracy, adult literacy will need to increase much beyond the present estimated rates of 23% for men and 11% for women. Moreover, genuine political autonomy will need to be translated into financial autonomy (specifically, the strengthening of local capacities) so that resources owners or users can benefit from NRM investments. Therefore, development of the local human-resources base deserves close attention as a prerequisite for building local capacities. Equally important is raising local

incomes through NRM activities. In Mali, there is a risk that the practical necessity to democratize and decentralize may have outpaced the capacities of local institutions and the ability of local economies for self-financing. These constraints will likely dictate the pace at which decentralization is implemented. Another risk and cost involved is that of decentralizing too rapidly.

*Role of a restructured forest service.* It is clear that the Malian Forest Service needs restructuring to better serve the needs of local communities. It appears that the specific roles for the Service's reorganization are being negotiated as consultations on revisions to the bush fire code and the forestry code evolve and before parliamentary enactment. This perhaps explains the lack of input by the Forestry Service into preparing for and participating in the Mali National Conference on Rural Land Tenure, which was held in Bamako January 26-29, 1993. Participants at this conference were mainly political representatives of farmers' and forest dwellers' organizations and locally elected officials. The Malian Forest Service did, however, have significant input and representation in the National Technical Commission, which initiated revisions of the Malian Forestry Code. Integrating and harmonizing the principles and recommendations of these two entities is yet to happen. Some Malians suggest that the National Technical Commission has adopted a top-down approach to revising the forestry code and, hence, is less participatory. The 1992 national and subsequent conferences are said to have had a bottom-up approach, where a rising tide of anger was expressed against the Forest Service for abuses related to the bush fire code.

From the author's many interviews and conversations with Malian policymakers, it is clear that no one envisages a "slow death" for the Forest Service or believes that such an outcome would be desirable, even if some forest extension services could be provided by a private entity. The rationale is that certain local communities may choose to be serviced by the Forest Service either because they cannot afford privately provided services or because the Forest Service may be able to offer better services. In such a case, the Forest Service would enter a partnership agreement with a representative entity of such a village community. The partnership agreement may be tripartite, involving a third party such as an international or national NGO financed by one of Mali's traditional bilateral donors like USAID. In this regard, three issues arise: 1) as at the Sahel Forestry Code Workshop, it is unclear whether the present draft legislation on the forestry and bush fire codes would shed light on the validity of this type of VLPA and on the role envisaged for the Forestry Service; 2) this type of VLPA has implications for the technical training of Forestry Service personnel, as well as its forest extension approach vis-à-vis local communities; and 3) it is difficult to assess at this stage whether the VLPAs are vehicles conducive to a more rational and sustainable NRM than in the past because few have been signed and implemented.

Côte d'Ivoire (Abidjan, January 30-February 3, 1993)

*Background.* Côte d'Ivoire, along with Zaire and Cameroon, has one of the largest tropical rainforests in Africa in terms of square miles. The country's economy was buoyant as long as export prices for cocoa, coffee, logs, and wood products were favorable and external debt servicing was manageable. Massive French bilateral assistance and an overvalued CFA franc maintained the standard of living beyond the underlying productive capacity of the economy. Often, the need for foreign exchange earnings from the export of logs and wood products to shore up the country's balance of payments position dictated the exploitation rate of these key natural resources. Indications are that present rates are unsustainable, and the resources base is approaching critical limits, especially without adequate replanting. Strong emphasis on NRM issues is not envisaged until the ruling political regime runs its course. (President Houphouët Boigny's five-year term ends in 1995.) Initiating a serious policy dialogue on NRM issues has been difficult for the donor community because 1) the political muscle of influential commercial loggers on the ruling party; 2) the ambiguous response of the ruling elite to NRM issues and the resistance to change; 3) the traditional lock of French bilateral assistance in terms of financing, technical assistance, and policy advice on the country, which has barred other donors from participating; and 4) the country's abundance of natural resources, which made it difficult to conceive of limits but which has led to waste and mismanagement.

Two windows of opportunities include 1) an anticipated weakening in the leverage of French bilateral assistance because of the need to coordinate it with the development assistance of the European Economic Community in the future; and 2) the ongoing macroeconomic and agricultural sector adjustment operations, including a forestry sector loan by the World Bank. These favorable circumstances have led to the first attempt at aid coordination in initiating a policy dialogue on "green" issues.

With \$US 1 million from the Japanese and US\$100,000 from the French, The Cellule de Coordination du Plan Pour L'Environnement, a coordination unit, was established in the Ministry for Environment, Public Works, and Urban Affairs. The Ministry is responsible for "brown issues," including urban land-use planning, urban pollution, and hazardous and industrial waste. The U.S. fund and the coordination unit were managed by the World Bank, but the unit's coordinator, Mme. Emilienne Amikpo N'tame, was appointed by the minister to whom she reported. An important objective of the unit was to do preparatory work for a NEAP, related NRM investments, and policy options for the country.

The most important accomplishment of the unit [as of the writing of this trip report] was the May 18-20, 1992 Seminar To Initiate a NEAP. By all accounts, this seminar was a success. It was well attended by representatives of the major stakeholders in NRM in the country, national and regional officials, and donor representatives. Success of the

seminar was also attributed to the dynamism and technical competence of Mme. N'tame. USAID's Regional Economic Development Service Office (REDSO) financed the printing of the workshop proceedings and was, along with other donors, poised to participate in preparing a NEAP and related NRM investments. As of the writing of this report, preparatory work for the NEAP has progressed little. In early 1993, Mme. N'tame was fired from her position by the minister but was retained by the World Bank, which reassigned her to another country to do similar work. The minister has appointed a new coordinator who is less compatible with the donor community interested in NRM issues in Côte d'Ivoire. A stalemate has thus developed on this issue.

*Lessons learned.* In hindsight, it appears that Mme. N'tame was at a disadvantage from the start because there is no organized national constituency capable of effectively motivating a centralized political regime uninterested in environmental and NRM issues, especially with regard to "green" issues. Although Mme. N'tame was appointed by and reported to the minister, she had access to consultancy resources, facilities, and other forms of strategic and unquantifiable logistical support, which ensured considerable independence for the unit. Obviously, this was perceived as a direct challenge to the minister's authority. According to one official, the unit "was given too much independence and was a way of bypassing existing lines of authority."

Commercial loggers' interests far outweigh the effectiveness of a sole coordinator, perceived as exerting pressure on national policymakers with the support of outsiders to focus on NRM policies that may erode the basis of political support for the ruling regime. As one official put it, "the driving force for the NEAP was external and had not been sufficiently internalized, and ownership of the process was not by nationals." There may be some merit in rethinking the donors' strategy toward initiating a policy dialogue on NRM issues under consideration similar to those prevailing in Côte d'Ivoire.

In Côte d'Ivoire, such "green" issues as deforestation, decreased soil fertility, and increased soil erosion cut across many sectors and ministries, including agriculture and animal resources, industry, mining and energy, and economics and finance. The coordinator of the unit, because of her limited position in a ministry dealing with "brown issues," was dealing with issues that overreached her "turf." This did not endear her to the concerned ministries. It is a practice of the ruling regime to elevate departments responsible for managing difficult policy issues to a special ministerial status in the President's Cabinet. The fact that this was not done in the case of the coordination unit may indicate the government's lack of readiness to address "green issues" seriously. Interested donors may have also arrived at the same conclusion.

In preparing for the May 1992 Seminar, the coordination unit led by Mme. N'tame spent much economic and political capital to increase the society's awareness at regional and local levels about the need to focus on environmental and NRM issues. The payoff from these efforts may have backfired in the sense they were perceived as a threat to an entrenched, centralized regime whose inaction on NRM issues could be used against it politically during the transitional period (1993-1995) and beyond. The existing stalemate between the government and the donor community is probably symptomatic of a natural conflict between a highly centralized approach to environmental and NRM through a parent ministry and the decentralized approach attempted by the unit through grassroots farmer organizations at regional and local levels. It appears that resolution of this conflict and a significant change in the climate favorable to a NRM policy dialogue may not occur until the government's responsiveness to NRM issues improves markedly. Some argue this may not happen during the remaining three years of the present regime.

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## **Analytical Requirements for NPA Initiatives**

Because NPA strategies occur over such long periods of time and attempt to promote policy reforms within the context of a perplexing poverty-development-environment nexus, their assessment requires a special focus. For purposes of economic evaluation, this means giving detailed attention to the following factors, which become especially important as levels of uncertainty and program interdependence increase.

*Cause-and-effect relationships.* In the NRM organizing framework (Figure 1, Section 3, 35), the links between Level I actions and Level V results are sometimes tenuous. Where success requires that the behavior of resources managers change in some significant way, the evaluation of any policy initiative must concentrate on how it is expected to change the objectives, constraints, or incentives facing these managers. In most circumstances, it will be useful to take the objectives of a resources manager as given and operate on the premise that, unless the proposed initiative will change incentives or constraints, it will not succeed.

*Full range of alternatives.* For any given problem or set of problems there is usually a range of potential interventions associated with both project and NPA. Tightening constraints on resources managers (e.g., stronger enforcement of protected areas) or relaxing constraints on resources managers (e.g., improving land productivity in unprotected areas) or changing economic incentives directly through taxes or subsidies or conditional cash payments may all contribute to a solution. Funding agencies tend to search for new solutions to new problems and to screen out policy alternatives that do not appear to deal specifically with the problem of concern. However, because environment, development, and population problems in Africa are so intertwined, dealing with a problem directly (e.g., promoting ecotourism to protect biodiversity) may be more costly and risky than dealing with the problems indirectly (e.g., promoting regional agricultural development). It is important to consider a full range of policy alternatives.

*Changes versus shifts in behavior.* Program evaluation criteria need to be broad enough in scope to recognize when there will be overall improvements in NRM and higher level impacts and when there will only be localized improvements. Improvements in environmental quality in one area are frequently purchased at the expense of worsening environmental conditions elsewhere. Changes in behavior that result in less exploitation of one resource often result in more exploitation of another. Establishing and enforcing protected areas, for example, may protect biodiversity in the protected area by concentrating more environmentally damaging behavior in unprotected areas. Reducing deforestation by providing incentives to farmers who slash and burn to shift to more intensive farming practices may, for example, result in downstream damage to fish resources from increased agricultural runoff. The scope of the evaluation needs to distinguish *improvements* from *transfers* in behavior to make reasonable trade-offs.

*Sufficient versus necessary conditions.* Forecasting Level V payoffs from Level I actions usually requires many implicit and explicit assumptions about the state of the

world and how it will change. NPA initiatives cannot be designed to control all conditions necessary for success or to ensure that all initial assumptions will be validated. However, it is possible, in most cases, for the underlying assumptions upon which the success of the initiative depends to be fully understood. Procedures for identifying, characterizing, and monitoring key assumptions and testing their validity as the program proceeds should be an essential part of every NPA initiative. Managers should be encouraged to recommend making mid-course corrections or even abandoning an initiative where there is evidence that the conditions needed for its success either did not materialize or no longer exist.

*Risk and uncertainty.* Because of the high level of uncertainty involved in NPA initiatives, they have been referred to only half-jokingly as "long-term exercises in hypothesis testing." A similar interpretation that may be more useful is that they are exercises in the art of integrated risk management where risk, in practical terms, can be taken to mean the volatility of potential outcomes. In designing and managing NRM initiatives in Africa, which entail an enormous amount of unavoidable risk, this art is important to each factor that can affect the volatility of potential outcomes. Designers and managers of NPA initiatives cannot be held responsible for failures. However, they can be held responsible for understanding and monitoring the critical factors that can cause the initiative to fail and for taking timely action to control or respond to them whenever possible. NPA initiatives that are designed and managed to be risk-sensitive--to deal explicitly with the volatility of potential outcomes--will, on average, outperform and be less costly than those that are not.

*Lessons learned.* NPA initiatives are bound to have an unavoidably high rate of failure; many will not result in Level V outcomes. However, all NPA initiatives can be designed to produce useful knowledge about cause-and-effect relationships and the reasons for failure. This should be treated as valuable project output that can save time and money and reduce risks in subsequent initiatives. Procedures for validating assumptions and developing and monitoring leading indicators of program failure should be an important part of all NPA initiatives. To maximize use of the wisdom accumulated in this way, protocols should be established for accessing and using information about previous programs. Adding such features and requiring busy USAID staff to use them will entail cost. However, in high-risk ventures, learning from mistakes yields significant long-term payoffs. Producing information should be an explicit objective of each NPA initiative. Those who propose such initiatives should be required to illustrate they understand what has previously succeeded and failed and why.

*Expanding the NRM organizing framework.* To evaluate the economic aspects of any particular NRM initiative, the central question is whether a Level I action will lead to changes in Level II conditions that will suffice to result in Level III changes and so on. It is a fundamental premise of applied economic analysis that the conditions that would need to change for decision makers to change behavior must be associated with changes in either the incentives or constraints they face. From this perspective, the search for the causes of NRM problems is the search for those incentives or constraints that cause natural resources users to make certain decisions; the solutions to NRM problems require

changes in conditions that affect these incentives and constraints. With this in mind, the study team for NRM Activity 1 elaborated on Level II conditions to make it explicit that changes in incentives or constraints are necessary to achieve Level III changes in behavior. This stipulation helps emphasize an essential link between policy initiatives and people-level impacts.

For purposes of economic analysis, it may be necessary to consider whether Level III changes in behavior, if they can be achieved, will be sufficient to result in Level IV changes in biophysical conditions. Even with adequate changes in incentives, changes in behavior of some natural resources managers may occur too slowly to stop or reverse environmentally damaging or unsustainable patterns of resources use. There may be targeted changes in Level III behavior that cannot, by themselves, result in Level IV improvements in biophysical conditions or cannot occur fast enough to have a significant effect. For purposes of evaluating the potential of any particular NRM initiative, it is important to know 1) which changes in behavior are most difficult to achieve and 2) which changes will contribute the most toward solving the NRM problem. For this reason, the study team distinguished between Level III changes in behavior that are of minor importance and those that are significant enough to offset resources degradation from other sources and result in Level IV improvements.

Finally, the study team decided to expand the definition of people-level impacts at Level V to include improved public health and more sustainable forms of economic development. This reflects the team's belief that many of the costly public health problems and long-term environmental problems that are the focus of current NRM initiatives are the result of previous development strategies that concentrated exclusively on short-term increases in income and productivity.

*Changing NRM behavior.* Natural resources managers range from subsistence farmers to corporate managers and agency bureaucrats. Individuals within each group have certain objectives and constraints and therefore tend to respond similarly to policy interventions. It is important to tailor policy interventions to the groups causing the problem. The objectives of corporate managers, for example, involve maximizing profits or sales, so interventions to affect the behavior of commercial timber or agricultural interests that do not significantly affect corporate costs or revenues will not be effective. Because they may wish to maximize power or advance their careers, agency bureaucrats may respond quickly to institutional initiatives promoted from above, but not at all to market-based initiatives. Subsistence resources users are the most difficult because they are often inaccessible through institutional or market-based instruments. Once a natural resource problem has been identified, it is important to identify the responsible user of that resource and characterize how he or she makes decisions before deciding on where and how to intervene.

## **Appendices**

## Appendix A: Statement of Work

### BACKGROUND

On May 14, 1992, the Acting Assistant Administrator, Bureau for Africa authorized the Policy, Analysis, Research and Technical Support (PARTS) project. The Project Authorization permits obligations not to exceed \$46,100,000 in grant funds over a 4 year period. All funding is to come from the Development Fund for Africa appropriation.

The purpose of the project is

to increase the utilization and influence of A.I.D. sponsored information and analysis for agriculture and natural resources policies, programs, and projects in Sub-Saharan Africa. The project will respond to the needs of policy makers and program managers in African countries, as well as A.I.D. and other development agencies, for improved technical information to address critical constraints that inhibit sustainable increases in African agricultural productivity. The project purpose will be achieved through the implementation of syntheses, analyses, and field-based research on priority issues and through the proactive dissemination of information to decision makers.<sup>1</sup>

The Africa Bureau intends that PARTS sponsored research activities will be carried out in the main through buy-ins to R&D Bureau managed contracts. In that regard, the budget for Phase I of the project, i.e. for the period ending September 30, 1996, allocates \$17.9 million for such buy-ins. The funding contained in this PIO/T is a part of that total. These funds were transferred from AFR to the R&D Bureau for the purpose of initiating a series of activities (described below) to be undertaken by the Winrock International Environmental Alliance under R&D/ENR's Environmental and Natural Resources Policy and Training (EPAT) project. The purpose of this PIO/T is to transfer the funds to the Winrock requirements contract (no. DHR-5555-Q-00-1085-00).

AID missions in Africa interested in a strategic focus on environmental and natural resources management policy issues are faced with the difficult task of sorting out priorities. The efficacy of alternative selection criteria and tools to apply the criteria are subjects of considerable debate. Missions are often

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<sup>1</sup>Quoted from the Action Memorandum for the Acting Assistant Administrator for Africa requesting authorization of the PARTS project.

not well placed to evaluate different approaches, and therefore, are overly dependent on the advice of contractors and other collaborators. The latter sometimes approach issues by defining tasks in terms which can be readily carried out using analytic tools with which they are comfortable, rather than starting from the perspective of issues and then selecting tools appropriate for the analysis of those issues.

The analytic activities to be undertaken by the contractor are designed to deal with these issues. According, they are important elements of the Africa Bureau's effort to improve the design and management, and to increase the impact of natural resource policy initiatives and programs. They are designed to shed light on the relative strengths and weaknesses of different analytical approaches for determining the appropriateness of alternative policy interventions and implementation mechanisms for promoting broad-based, environmentally sustainable development. Additionally, they will assess how well AFR Missions have been able to shape, and evaluate the impact of, policy agendas (including the use of analytical tools for those purposes) in conjunction with their natural resources management projects and programs.

#### I. TITLE

Project: Environmental and Natural Resources Policy and Training (EPAT)

Project Number: 936-5555

#### II. OBJECTIVE

To provide teams (as described in Section VII) which will undertake activities described in Section III 1 and 2 below, and members of a team who will participate in an undertaking described in Section III 3. These activities directly support the purpose of the Africa Bureau's PARTS project as described in the BACKGROUND section of this document.

#### III. STATEMENT OF WORK

The contractor shall undertake the following activities:

1. An analysis of how economic theory and various analytic approaches may be used to improve the design and impact of natural resources policy initiatives and programs.

The contractor shall begin this assessment with an examination of existing documents -- primarily, but not exclusively, Non-Project Assistance (NPA) and National Environmental Action Plan (NEAP) documents -- and discussions with AFR Bureau staff and contractors and grantees working on relevant Bureau sponsored

projects. The focus of this review shall be on the analytic tools used, and assessment of the environmental economic theory underlying the policy reforms undertaken. It will attempt to answer the following questions:

a. What was the analytic process by which the designers of the NPAs and other interventions identified and prioritized problems or issues?

b. How were the problems and issues linked analytically and empirically to policy, market and institutional failures?

c. What remedial policy options were considered? and what was the basis (economic, political, other) for selecting the options chosen for the NPA or other intervention?

d. Beyond the issue of the potential economic efficacy of policy reforms considered, how was implementability determined? That is, did the process include appropriate consideration of political, cultural and institutional considerations; analysis of stakeholders and resource tenure; implications for institutional reform and required institutional investments; and articulation of conflicts and consideration of the possible need for negotiation or conflict resolution mechanisms during implementation?

Following completion of these initial steps, the contractor shall prepare a preliminary report which will identify issues for further analytic work. The report shall be subject to peer review in the United States and to appraisal by resource and environmental economists and NPA specialists in the Africa Bureau and the Bureau's missions. As part of the peer review and appraisal process, and for the purpose of further defining needs for further analytic work, the contractor shall organize, conduct and provide all logistical support for a seminar for AFR staff, personnel of institutions which collaborate with AFR in carrying out its natural resources analytic agenda, and others as identified by the Project Manager and the contractor in close consultation with AFR staff. The contractor shall prepare a report of conference proceedings.

As the next step in the process, the contractor shall prepare a preliminary draft of guidelines on the use of analytical tools and the relevance to Africa of environmental economic theory. The intended audience for these guidelines will be the Africa Bureau and AFR missions, but following completion and verification through applied field research, they may also be made available to other interested donors, counterparts in host countries, research institutions, etc. While the precise content and format for the guidelines will be determined by the Project Officer in close consultation with AFR officers, in general it will cover the material in the preliminary report.

BEST AVAILABLE DOCUMENT

To verify findings in the preliminary report and the draft guidelines, and to assist AFR field missions with appropriate application of analytical tools to particular issues, applied research may be initiated in several countries. Given the wide range of impacts and NRM issues in Africa as well as the desirability of undertaking comparative studies, field research may be conducted in three or four countries, primarily funded by mission buy-ins. However, with the approval of the Project Officer, in close consultation with AFR staff, one or more initial field visits may be approved as a part of this program to discuss preliminary findings and the draft guidelines, to initiate discussions of follow-on field work, and to help prepare a long-term analytic agenda in the area of use of analytical tools and environmental economics theory and practice to inform planning and investment decisions in the natural resource management area.

2. An analysis of the role of natural resource accounting as a means to monitor NRM change, prioritize issues and determine the efficacy of alternative policy interventions in African contexts.

National income accounts do not normally take into consideration changes in environmental quality and the natural resource base, even though such changes may have significant impacts on the sustainability of economic growth as traditionally measured.

While considerable efforts have been undertaken to incorporate such information into the national accounts of developed and industrializing countries, the fundamental weakness of data in most of AFR's countries has limited the perceived usefulness of the approach. However, if trends of change are of interest, rather than more precise quantitative analysis, then the resource accounting approach may have great power. This approach may be of considerable importance both at the macro-economic level, and for evaluating the impacts of the types of NRM practices of interest to the Bureau. In other words, it is possible that adapting resource accounting to the constraints posed by the paucity of the data in Africa could lead to the development of a significant new analytic tool which could span the gap between macro-economic resource management decisions and the impacts of improved NRM practices at the local level.

To help adapt the tools of natural resource accounting, and to determine whether or not such tools (suitably adapted) are useful for policy making and strategic planning in the African context, the contractor shall undertake an activity which will have the following components (listed in time sequential order):

a. Literature review and synthesis: The contractor shall prepare a preliminary report that briefly, but informatively assesses existing and potential applications of natural resource accounting in developing countries with special reference to

African countries and conditions. The report shall cover (i) technical perspectives, (ii) appropriate methods, (iii) data requirements and availability from the point of view of measurability, comprehensiveness, and appropriateness in Africa, (iv) institutional and manpower strengths and constraints, (v) potential uses and applications of natural resource accounting for sustainable development and strategic planning, (vi) experience to date with natural resource accounting in Africa, (vii) how current measures of economic development can be adapted to better reflect the contributions of environmental assets, and (viii) recommendations for next steps.

b. Workshop: The contractor shall organize and conduct a workshop in the Washington, D.C. area, to present the findings, conclusions and recommendations of the initial survey and to discuss with AFR staff, members of other EPAT teams, and other Natural Resource Management Analytical Agenda collaborators the close linkages between patterns of natural resource use and sustained economic growth.

c. Case studies: Following the workshop, the contractor shall initiate one or two case studies in countries to be determined by the Project Officer in close consultation with AFR staff. These studies will examine:

- methods for assessing the economic value of selected natural resources, including wildlife and biological diversity;

- the significance, feasibility and methodology of including such values in strategic economic and environmental planning; and

- the relevance, value and shortcomings of natural resource accounting.

d. Advisory note: The contractor shall conclude this effort by preparing an advisory note whose audience shall be both the Africa Bureau and AID missions in Africa. The note will summarize realistically the potential use and value of natural resource accounting; the institutional, human resources and data requirements for an in-depth development of resource accounts, and guidelines on prerequisite institutional and policy conditions and steps to promote both.

3. Review of economic reforms in the context of the National Environmental Action Plans (NEAPs).

The NEAP is the primary multi-donor mechanism developed to structure and manage environmental programs in selected African countries. In order to improve the NEAP design and implementation process, the contractor shall provide team members to undertake an

assessment of the NEAPs from an economic perspective. This assessment is part of a multi-disciplinary review which, in addition to activities supported with funding provided herein, includes inputs from AID's Environmental Planning and Management (EPM) and Implementing Policy Change (IPC) projects.

The first step in this assessment will be a desk review of relevant documents, supplemented by interviews with knowledgeable and readily accessible people. On the basis of this review, the contractor shall contribute to a report of interim findings together with suggestions for more in-depth follow-on work for discussion at a meeting with AFR management in month five. The review shall:

a. inventory and assess economic methods, data and assumptions used in conjunction with NEAP preparation to identify and rank problems and issues;

b. characterize casual sequences and impact of the problems/issues

causes - policy/market/institutional failures;

sequences - dynamics, linkages; and

impact - magnitude and distribution, both primary and secondary;

c. assess the range of actions explored to select NEAP components, the selection process, and the underlying economic rationale; and

d. project outcomes of NEAP interventions, discussing, among other things, magnitude and distribution of benefits expected, anticipated conflicts and conflict resolution mechanisms, incentive structures, and transactions costs.

At the conclusion of the desk study, the contractor (in conjunction with EPM and IPC collaborators) shall undertake a field study in Madagascar to determine how the NEAP is being implemented, and to make recommendations that can help improve NEAP implementation in Madagascar and the design and implementation of NEAPs elsewhere.

The team members provided by the contractor shall contribute to the body of the desk study and to a report of the Madagascar experience, and shall prepare detailed economic annexes of both. The material to be covered, both in the desk and the field studies, is described in subparagraphs a through d above.

#### IV. TIME SCHEDULE AND DELIVERABLES

The contractor shall submit 25 copies of all reports as indicated below to the Project Officer and 25 copies to the AFR liason officer on or before the last working day of the month specified. However, the Project Officer may request a reasonable number of additional copies. The Project Officer shall be responsible for AID's review of reports, comments to the contractor, and approval of final reports.

##### ACTIVITY 1

This activity will span one calendar year. The schedule is as follows:

Months 1 to 6: Desk study - review and synthesis; preparation of preliminary report.

Month 6: Seminar to review preliminary report and recommend next steps.

Month 7: Submission of seminar report.

Month 7 to 10: Preparation of preliminary draft guidelines.

Month 10: Mission visit(s)

Month 11: Preliminary draft, long-term agenda

Month 12: Final report with annotated bibliography

Month 12: Two mission level policy analyses initiated

##### ACTIVITY 2

Months 1 to 5: Desk study: literature review and synthesis

Month 6: Workshop

Months 6 to 10: Case studies, with visit to Africa

Months 11: Preliminary Advisory Note, with recommendations

Month 12: Final Report

##### ACTIVITY 3

Month 1: Launch study with team planning exercise

Month 4: Preliminary draft of NEAP assessment

## Appendix B: Work Plan

			<u>Approx. man-days</u>
<b>TASK 1</b>	<b>Review NPA materials</b>	<b>Months 1-3 (Oct.-Dec., 92)</b>	<b>5</b>
1.1	Review and evaluate NPA documents		
1.2	Prepare draft discussion paper		
1.3	Discuss draft with AID staff (around Dec. 15)		<b>2</b>
1.4	Finalize discussion paper		
<b>TASK 2</b>	<b>Evaluate Analytical and Policy Issues</b>	<b>Months 4-6 (Jan.-Mar., 93)</b>	<b>20</b> (10 desk, 10 travel)
2.1	Collection information		
2.2	Review issues and documents		
2.3	Prepare draft 1 of guidance document		
2.4	Meet with AID staff (around Feb. 15)		
2.5	Prepare draft 2 of guidance document		
2.6	Field visits and review with AID missions (one 10-day trip each during mid-Jan. to mid-Mar.)		
2.7	Prepare final draft of guidance document		
<b>TASK 3</b>	<b>Organize and attend Washington work- shop (late Mar. or early April)</b>	<b>Month 7 or so</b>	<b>3</b>
3.1	Prepare materials		
3.2	Organize workshop (You all remember, Jay volunteered)		
3.3	Participate in workshop		
<b>TASK 4</b>	<b>Prepare final guidance document</b>	<b>Month 8 (sometime in May)</b>	<b>2</b>
		<b>Total</b>	<b><u>32</u></b>

## **Appendix C: USAID Documents**

### **List of Documents for AID-Africa (Proj. 92-152)**

#### **General**

- 1 Buffer Zone Management in Africa, Workshop, Oct 5-11, 1990
- 2 A Conceptual Approach to the Conservation & Management of Natural Forests in Sub-Saharan Africa (Arid and Semi-Arid Forests and Woodlands), Associates in Rural Development, USAID, March 1991.
- 3 An Economic Approach to Arid Forest Project Design: Experience from Sahelian Countries, Kjell A. Christophersen, Energy Development International, USAID, Univ. of Idaho, Nov. 1988.
- 4 Ecotourism: A Viable Alternative for Sustainable Management of Natural Resources in Africa, USAID, June 1992.
- 5 Ensuring Accountability: Monitoring and Evaluating the Preparation of National Environmental Action Plans in Africa, Kirk Talbott, World Resources Institute and Michael Furst, June 1991.
- 6 Fresh Start in Africa: A.I.D. and Structural Adjustment in Africa, Jerome M. Wolgin, March 1990.
- 7 Plan for Supporting Natural Resources Management in Sub-Saharan Africa, USAID, May 1992.
- 8 The Population, Agriculture and Environment Nexus in Sub-Saharan Africa, Kevin Cleaver and Gotz Schreiber, World Bank, May 1992.
- 26 Opportunities for Sustained Development, Vols. 1-4, Asif Shalkh et.al., USAID, Oct. 1988.
- 27 Implementing Natural Resources Management Policy in Africa: A Document and Literature Review, Derick Brinkerhoff, James Gage and Jo Anne Yeager, March 1992 (Discussion Draft).
- 28 Implementing Natural Resources Management Policy in Africa: An Annotated Bibliography, Derrick Brinkerhoff, James Gage and Jo Anne Yeager, Sept. 1992.
- 29 Use of Economic Instruments for Environmental Protection in Developing Nations, EPAT, Sept. 1992 (Workshop).
- 31 Indigenous Land Rights Systems in Sub-Saharan Africa: A Constraint on Productivity? Shem Migot-Adholla, Peter Hazell, Benoit Blarel and Frank Place, World Bank Economic Review, Vol 5, No 1: 155-175 (1991).
- 32 Land Registration in Africa: The Impact on Agricultural Production, David Atwood, World Development, Vol 18, No 5, pp. 659-671, 1990.
- 33 Land Rights Systems and Agricultural Development in Sub-Saharan Africa, Gershon Feder, Raymond Noronha, Research Observer 2, No 2 (July 1987).
- 34 Africa Bureau Non-Project Sector Assistance Guidance.

## **Gambia**

- 9 Review of Economic Analysis of Gambia PAAD, Aug. 19, 1992.
- 10 Untitled (Proposed Agriculture and Natural Resource Program), Feb 10, 1992.
- 30 Agriculture and Natural Resources (ANR) Program and ANR Support Project, Prog. Assistance Approval Doc., USAID, Banjul, Gambia, 11/2/92 (Draft).

## **Ghana**

- 11 Environmental Impacts of Agro-Export Policies: Ghana Initiative.
- 12 Trade and Investment Program (Project Assistance Approval Document).
- 13 Trade and Investment Program, Initial Environmental Examination or Categorical Exclusion, May 26, 1992.
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PROJECT PROFILE

PA/ NPA	PHASE (prospective, interim, retrospective)	PURPOSE	AMOUNT/ DURATION	TYPE OF DOC
{ 9 both	Prospective	Examine method used to calculate proj viability	\$10 million NPA; \$10 million PA	Review of economic analysis
{ 10 both	Prospective	Increase value of production through policies	\$10 million NPA; \$10 million PA; 5 yrs	Economic analysis
{ 30 both	Prospective	Increase rural incomes from crop, livestock & forest products	\$10 million NPA; \$10 million PA; 5 yrs	Project approval document
11 n/a	n/a	Examination of NTAE policy impacts		Review of policy
{ 12 NPA	Prospective	Increase capacity of non-traditional export sector	\$80 million	Project approval document
{ 13 n/a	Prospective	Examine long-term environmental impacts of #12		Environmental impact review
14 n/a	n/a	Increase awareness of environmental issues		Non-technical description of problems in Madagascar
15 n/a	Interim	Assess effectiveness of Env. Action Plan		Mission report
{ 16 NPA	Prospective	Sustainable proj; biodiversity mgmt &	\$33 million NPA	Initial proposal
{ 17 PA	Prospective	protection (forests/watershed/tourism)	\$9 million PA	Project approval
18 NPA	Interim	Facilitate NRM policy reforms; site study		Case studies
19 both	Retrospective	biodiversity & envr. policy development	\$85 million total/3 countries	General history of Env. Action Plan in Madagascar
20 n/a	Interim	prelim analysis of Nat Env Act Plan		Trip report
{ 21 both	Prospective	Increase production/income; technical	\$30 million; 5yrs	Program approval
{ 22 both	Prospective	assistance, training; promote policy and		Program approval: Technical Annex
{ 23 both	Prospective	institutional reforms		Program approval: Technical Annex
24 both	Prospective	Improve NRM, forest protection/biodiv.; imp. standard of living	\$10 million NPA; \$20 million PA	Project plan
25 n/a	Interim/Retrospective	Terracing for improved land use		Review of long-term project initiated during colonial era

Note: Each set of bracketed numbers represents a single project.

BEST AVAILABLE DOCUMENT

**BENEFITS ANALYSIS**

	<b>EVALUATION APPROACH</b>	<b>EXPECTED BENEFITS</b>	<b>RECOMMENDATIONS</b>
9	Economic/financial analysis	Positive NPV and Internal ROR of 21% in 5 years	
10	Improved forestry & agric. mgmt.	Opportunity cost \$2million, expected ben \$3.1mill/yr	
30	Econ/financial analysis; improved productivity	Positive NPV and Internal ROR of 21% in 5	
11	Sustain devel; sound NRM policies		
12	Cost/ben & improved ROR	ROR estimated 25.9% & 31.9% for 2 representative products	Env. impact assessment needed to gauge long-term effects
13	No negative effects on environment		
14	Reduce poverty; sustain development		Improve agric. yield; health prog; tree plantation
15			Improve coord of agencies; local intervention needed
16	Institutional effectiveness/sustainability	\$47 million from ecotourism & \$400K-\$2million in stumpage	
17	Sustain. revenue increase to finance env.	fees	Review stumpage fees & increase fees from tourists
18			
19	Sustainability; biodiversity; conservation		
20	Effective management		Better training, more staff
21	Increased production & incomes; progress	Institutional reforms leading to wider adoption of	
22	in implementation of NRM policy	productivity practices may lead to economies of 50%	
23			
24	Econ/fin feasibility; biodiversity; agric prod	ROR of up to 29% for projects targeted to increase tourism	Increase forest related and tourist fees
25	Wider use of terracing		

Note: Each set of bracketed numbers represents a single project.

**BEST AVAILABLE DOCUMENT**