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CDIE ASSESSMENT
OF
A.I.D. ENVIRONMENTAL PROGRAMS

PART 1:
ASSESSMENT FRAMEWORK
AND
SECTOR EVALUATION DESIGNS

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Center for Development Information and Evaluation
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CDIE ASSESSMENT OF A.I.D. ENVIRONMENTAL PROGRAMS

PART 1: ASSESSMENT FRAMEWORK AND SECTOR EVALUATION DESIGNS

1. Introduction

The Agency's Center for Development Information and Evaluation (CDIE) is undertaking an assessment of A.I.D. investments in the environment and in natural resources management (E/NRM) as part of the Agency's Evaluation Studies Agenda. The CDIE E/NRM assessment consists of a series of evaluations of environment and natural resources management programs assisted by the Agency in key development sectors. During the 1993-95 period CDIE will begin its evaluations of environmental programs in the forestry, agriculture and energy sectors.¹

Part I, "The Assessment Framework", describes the scope of the assessment, the operational hypotheses, and the analytic approach that CDIE will take in evaluating its environment and natural resources management programs. Part 2, "Sector Evaluation Designs", details the procedures for the evaluations of A.I.D. environmental programs in each of the sectors -- forestry, agriculture and energy -- that will make up the assessment during the two-year 1993-95 planning period of this document.

1.1 Purpose and Audience

The E/NRM assessment responds to the growing importance of the environment and natural resources management both as a development challenge and as a distinct focus area for the Agency's development assistance activities. Since the early 1980's, A.I.D. has significantly increased its funding for the design and implementation of projects and programs aimed at environmental and natural resources management problems in developing countries. As with earlier policy statements, the Agency's present Environmental Strategy encourages developing countries to manage their environments and natural resources in ways that conserve biological and physical resources for sustainable long-term economic growth.

¹ The forestry sector evaluation will also include examination of biological diversity conservation programs that are based in forestry habitats, e.g., forest parks and preserves. CDIE plans additional subsequent sector evaluations of environmental programs in the urban/industrial, water, health and other sectors. CDIE designs for these future sector evaluations will use this same assessment framework.

The purpose of the E/NRM assessment of A.I.D. environmental programs is to:

- provide an objective reading on the progress to date in meeting the Agency's environmental objectives, and
- derive lessons that will permit more effective design and implementation of ongoing and future programs and projects.

CDIE is conducting this assessment of A.I.D. environmental programs to gather evidence that will document the impact of selected A.I.D. projects and programs by establishing plausible linkages between funded activities and progress of developing countries toward their economic and environment and natural resources management goals. Assessment findings are also used to determine key factors affecting program performance and impact and to draw lessons for future E/NRM program design and implementation.

In documenting impact and performance, this CDIE assessment envisions two principal audiences: Senior Agency, Administration and Legislative leadership and Agency professional technical and administrative ranks. For these two audiences the E/NRM assessment will respond to the questions:

Has A.I.D. made a difference? To answer this question the sector evaluations of A.I.D. environmental programs will gather evidence of the impact of A.I.D. assistance on recipient countries' accomplishments at protecting and managing their environments and natural resources to attain sustainable economic growth. The sector evaluations will determine what types of environmental programs and projects have come closest to meeting their strategic objectives and which have fared less well.

How has A.I.D. made this difference? To answer this question the sector evaluations will examine what has worked well and less well and what hasn't worked at all to identify the principal determinants of performance across a range of commonly used development assistance strategies. It will, for example, address such questions as how A.I.D.-supported environmental programs have: a) institutionalized natural resource management in government agencies, in legal tenurial systems, and in the non-governmental organization or NGO community; b) fostered greater environmental awareness and education in the stewardship of natural resources; c) promoted the adoption of environmentally sound economic policies; d) developed and introduced new technologies.

1.3 Scope of the Assessment - The A.I.D. Environmental Strategy

The scope of the CDIE Assessment of Environmental programs is defined by the Agency's Environment Strategy² which focuses on five environmental problem areas:

Loss of forest cover and critical habitats for biodiversity -- degradation or destruction of old growth forests which act as watersheds and habitats for wildlife on private, public and communal lands;

Environmentally unsustainable agricultural production -- loss and decline in quality of agricultural and rangeland soils due to overuse and environmental degradation from excessive use of harmful agricultural chemicals;

Environmentally unsound energy production and use -- wastage in and harmful emissions from the generation, use and/or transmission of energy.

Degradation and deletion of water and coastal resources -- damage to inland water and coast marine systems from tourism, fisheries, mining, industrial, urban waste disposal activities.

Urban and industrial pollution -- untreated emissions of noxious and greenhouse gases and discharge of solid and liquid wastes.

The sector evaluations of this assessment will examine A.I.D. environmental program assistance of the recent past to serve as a guide for future Agency program implementation of the Agency's Environment Strategy in addressing these problems. Because past A.I.D. project and program assistance between and within these five problem areas has been uneven the assessment will begin its program evaluations in those sectors -- forestry, agriculture and energy -- where A.I.D. has the greatest experience. A.I.D. support for addressing the problems of water and coastal resources degradation and urban and industrial pollution, are too recent and too limited to warrant inclusion among the sector evaluations during this planning period of the assessment.

1.3 Historic Overview of A.I.D. Environmental Programs

CDIE has reviewed evaluation documentation prepared since 1980 for over 125 A.I.D. projects and programs with primary E/NRM objectives or with important E/NRM components. The documentation review findings help identify A.I.D. E/NRM program priorities in terms of funding and serve to point toward the central operating hypotheses that form the core of the assessment and its sectoral evaluations. The literature review results

² "Environment Strategy", Agency for International Development, Washington, D.C., June 1992

also help guide the selection of field sites for sector program evaluations.

The CDIE review of past evaluation literature revealed projects and programs that range in size from small research grant activities in areas such as agro-forestry in sub-Saharan Africa to large multi-million dollar capital projects with environmental dimensions such as waste water systems in Egypt. For ease of handling the immense volume of evaluation literature, the CDIE review groups this population of E/NRM projects and programs into the following three categories:

Green realm: Forestry, sustainable agriculture and biological diversity (Part 2, Annex II);

Brown realm: Energy production/use and urban/industrial pollution (Part 2, Annex III);

Blue realm: Coastal resources management, fisheries and water (Part 2, Annex IV).

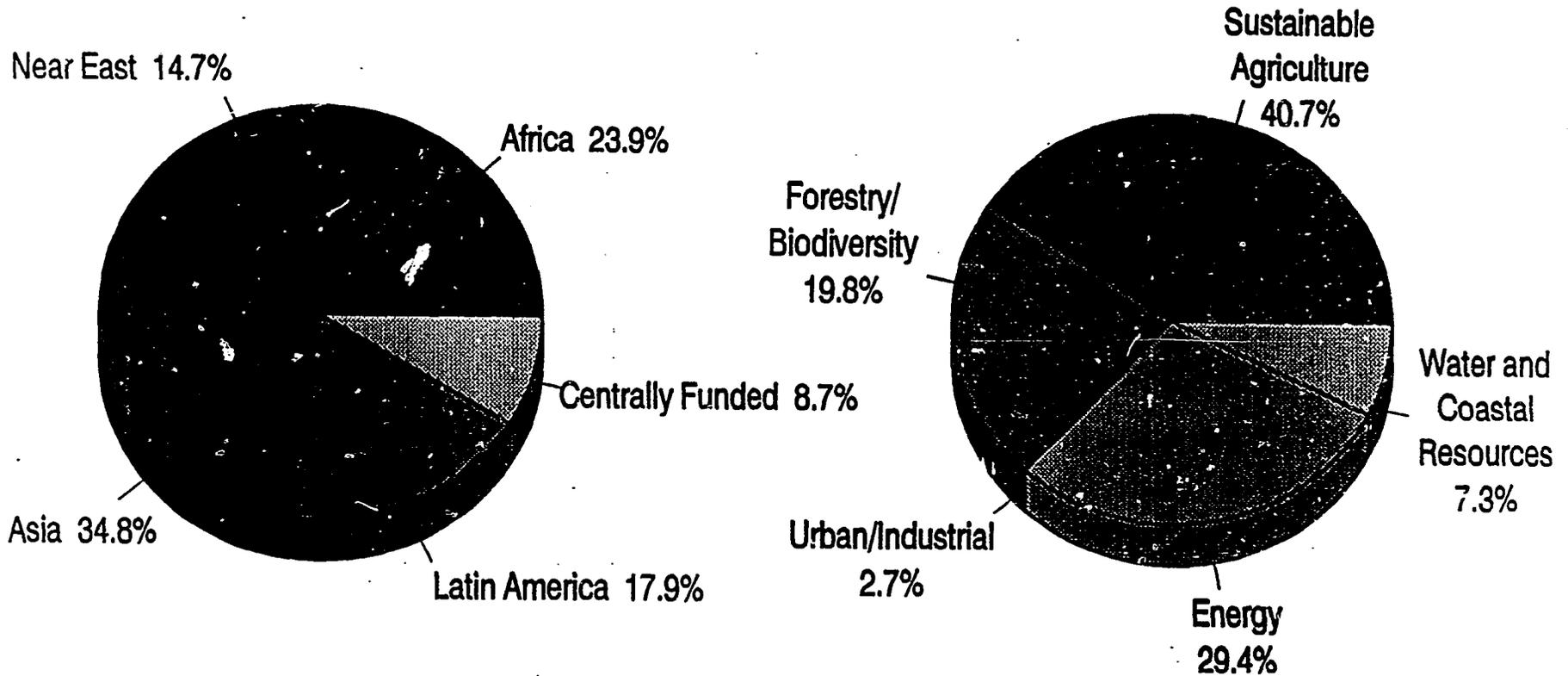
Figures 1 and 2 give a breakdown of projects reviewed by geographic region, major environmental problem area (sector), and funding allocations. With total anticipated authorizations for the projects exceeding \$3.3 billion between 1980 and 1991, the Agency's investment in environmental programs has been substantial and geographically broad. In a few instances where data revealed major discrepancies between authorization and obligation, the latter was substituted. Although not all funds were specifically authorized for environmental activity, clear patterns in the Agency's E/NRM support do emerge. Most notably, the balance of coverage across the four major regional bureaus and between the regional and central bureaus underscores the breadth and depth of the Agency's E/NRM portfolio.

Overall, the Agency's E/NRM portfolio has emphasized energy, sustainable agriculture, forestry and agro-forestry. A.I.D. supported range management, and fisheries programs more in the early 1980's than in recent years. Most initiatives to preserve biological diversity are recent.

With the notable exception of waste water management projects in the Near East and Horn of Africa, A.I.D. during the last decade has not provided significant funding for alleviation of urban and industrial pollution. In response to the trend toward greater urbanization in the developing world, A.I.D. has begun to give more attention to pollution abatement and urban environmental quality, but these initiatives, for the most part, had yet to be evaluated. Coastal resource management has been addressed largely through regional and global projects.

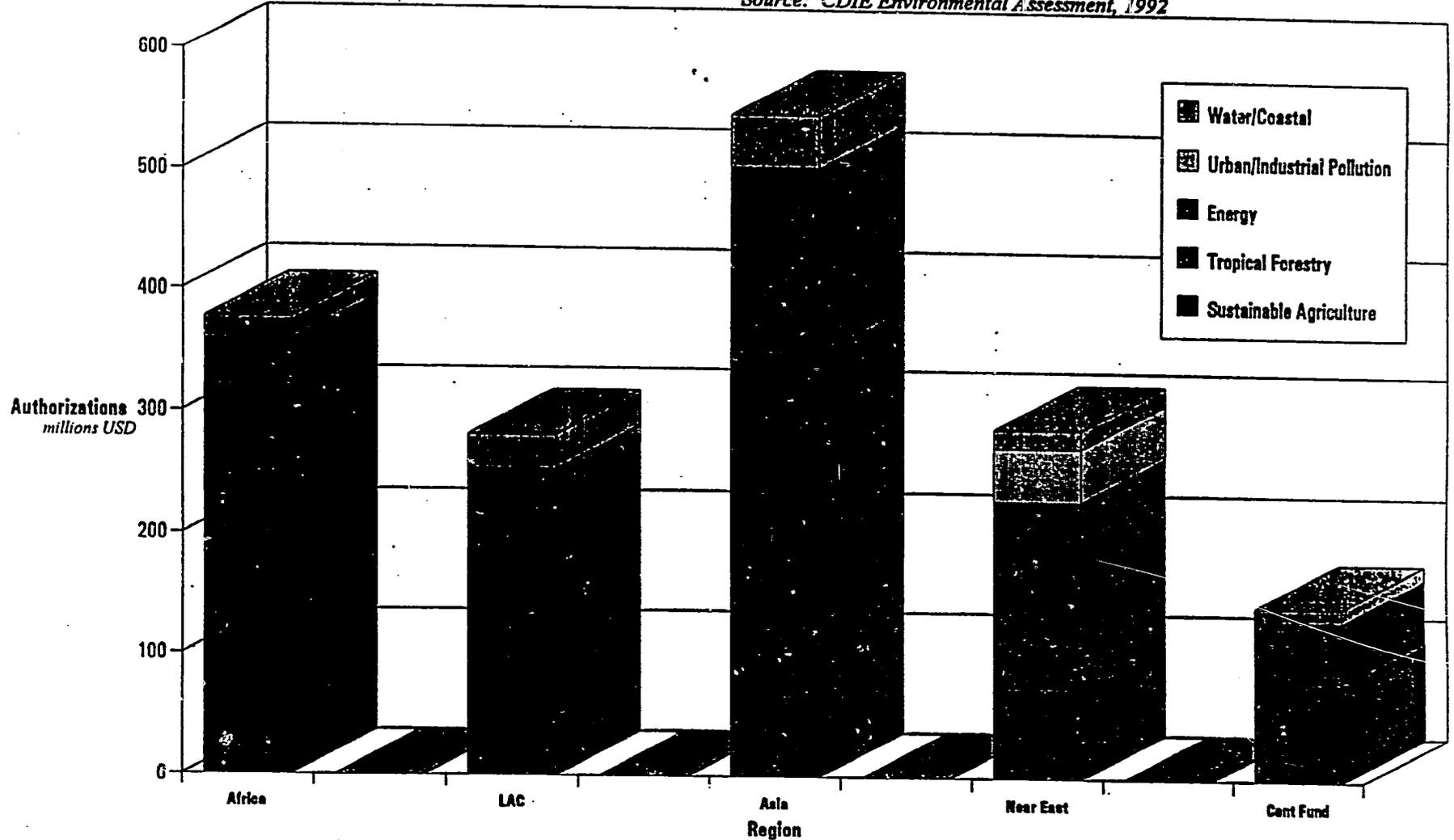
1980-1991

Regional and Sectoral Breakdown of Projects



Source: CDIE Environmental Assessment
(Egypt water treatment projects not included)

Source: CDIE Environmental Assessment, 1992



(Near East excludes wastewater projects in Egypt)

Regional differences, as evidenced in Figure 2, are also apparent. In the Africa region, sustainable agriculture has clearly been emphasized. Latin American, Asian and centrally funded programs show a more balanced allocation among sectors except for urban/industrial pollution which is notable by its absence. In contrast, the Near East region appears to have concentrated its activity on concerns of energy production/use and urban and industrial pollution. That balance shifts dramatically when the more than 1.5 billion dollars in authorizations for Egypt's water and waste water projects is added. While rational use of water resources is certainly a priority in the region, these atypical authorizations are left out of the figures in order not to overwhelm presentation of the authorizations among the other regions and E/NRM categories.

Numerous A.I.D. projects with no E/NRM objectives have also contributed to improving environmental conditions and promoting sustainable use of environmental and natural resources. For instance, agricultural research projects that boosted crop yields and family planning programs that reduced population growth have both contributed to reducing the pressures on fragile lands and natural resources in a number of developing countries. CDIE does not include A.I.D. programs with indirect environmental benefits among the sector evaluations selected as part of this assessment.

2.0 Analytic Framework

2.1 The Central-Operating Hypothesis of the Assessment

The CDIE review of A.I.D. evaluation documents suggests what makes up a good environment and natural resources management program. Specifically, A.I.D. supported environment and natural resources programs that have worked and worked well -- that is, that have made a difference -- in developing countries appear to be those that:

- Strengthen public and non-governmental environmental institutions and organizations;
- Foster environmental awareness, education and advocacy;
- Introduce environmentally sustainable technological change;
- Reform economic and other policies, such as those affecting resource access and use tenure, that inhibit sound environmental practices.

The assessment will test this hypothesis by closer field evaluation of a number of A.I.D. supported E/NRM programs in key development sectors, e.g., forestry, agriculture, energy. The assessment will collect evidence to document if indeed those E/NRM programs employing these strategies have performed best.

E/NRM programs that employ these strategies are expected to score well on the five performance scales used by CDIE for evaluating A.I.D. programs:

- **program impact** or the difference that A.I.D. support has made or can be expected to make and how this difference manifested;
- **program efficiency** or the capacity to generate benefits to society that exceed the value of the public -- A.I.D., other donor and host country -- resources invested in making the systems work;
- **program effectiveness** in relation to alternative approaches that A.I.D. and host countries might have achieved the same objectives;
- **program sustainability** after A.I.D. assistance is terminated;
- **program replicability** or spread of coverage beyond those initial direct participants in A.I.D. supported activities.

The text in Box 1 expands on the definitions of these terms as evaluation criteria to be used in the sector evaluation case studies. This assessment framework discusses later the means with which these performance scales will be measured. Separate designs for each of the evaluation sectors detail the variables and the indicators that will be used in the measurement and analysis process.

The CDIE E/NRM assessment will look at what the roles of these program strategies have been and will develop guidance on when and how they could be used to enhance overall program performance. The assessment will not evaluate each strategy component to determine its relative contributions or importance in E/NRM programs. Each E/NRM strategy component performs a unique role. Together they form a mutually supportive system that makes up the overall program. The assessment will contribute to better understanding of the contributions of each of these strategies to achieving program objectives in any particular country setting.

The assessment will utilize field studies, secondary data, other donor experience, and US-based research to assemble evidence germane to judging program impact. The field evaluation case studies that make up the sector evaluation are important, but not the exclusive sources of data. The aim of the sector evaluations is to examine plausible linkages between A.I.D. program strategies or activities and "net effects,"³ manifested as benefits to the human population, resulting from improved environmental quality or from better natural resource management.

³ "Net effects" means the difference between an *ex post* situation following the intervention and the hypothetical situation absent the intervention.

BOX 1: CDIE EVALUATION CRITERIA EMPLOYED IN THE E/NRM ASSESSMENT

CDIE has selected the following performance measures as E/NRM program evaluation criteria:

- **IMPACT** – *The assessment will gather "impact" information to determine whether the strategic development objectives of a project or program have been accomplished. Some of the specific objectives of E/NRM projects include: stabilized or improved habitats of an endangered species; reduced electric power wastage; restored forest cover; or amended agricultural soil conditions. Unintended, as well as intended, impacts of E/NRM projects and programs are important as are differential impacts among subgroups – e.g., women, the rural poor or landless cultivators. Examples of E/NRM impact indicators for A.I.D. environment and natural resources management activities include: changes in wildlife forest habitat areas; newly reforested lands; fragile land areas stabilized under agro-forestry schemes; reductions in electric power waste as a share of total consumption; and changes in fuelwood gathering practices among rural women.*
- **EFFICIENCY** – *E/NRM program efficiency is calculated from estimates of the internal and external rates of return to A.I.D. project and host government investments and compare these with the expected value of benefits to flow to target and non-target program beneficiaries. Because many E/NRM programs generate a flow of benefits that extend into the future, the evaluation must collect evidence that these flows are likely to continue and at what level. The object of the analysis is a determination of whether E/NRM programs are being conducted in a fashion that will generate the greatest returns in the form of public and private benefits.*
- **EFFECTIVENESS** – *To assess E/NRM program effectiveness, the assessment will examine whether A.I.D. sponsored techniques, services, or products are actually being used by intended target groups and whether there is equity or bias in access and participation by target groups as planned in the design. Examples of E/NRM effectiveness indicators include the overall percentage and relative endowments of: farmers practicing soil conservation measures; of fishermen using species-specific capture techniques; small and large industries using electric power conservation devices.*
- **SUSTAINABILITY** – *Environment and natural resources management activities involve both socio-economic and bio-physical sustainability issues. Among the socio-economic issues the assessment will examine whether E/NRM practices, activities or programs continue beyond the termination of A.I.D. technical and financial assistance either on their own "internal" momentum for with host government or other donor assistance. Examples of E/NRM sustainability indicators include socio-economic factors such as: estimated internal profitability of E/NRM practices for participating farmers, communities or agencies; the ratio for reforestation to deforestation rates. Where feasible the assessment will also seek evidence of bio-physical sustainability. Examples of bio-physical indicators include: sustained or increased numbers of endangered species populations; top-soil build-up levels.*
- **REPLICABILITY** – *The assessment will gather evidence to determine if E/NRM project activities have spread beyond the target areas and whether such spread is "spontaneous", occurring among participants by "word of mouth" or other means without further outside support, or "induced" by public or private agencies – with or without other donor support – picking up on an A.I.D. supported concepts and introducing them elsewhere. Examples of replicability indicators include number of similar E/NRM activities supported by local or international agencies outside the A.I.D. target area and population; number of E/NRM beneficiaries outside program target areas.*

* * * * *

2.2 Documenting Program Performance

CDIE will employ a five-level logical framework to analyze E/NRM program performance. The framework was pioneered by the Africa Bureau for use in its natural resource management programs.⁴ The five-level framework forms a progressive continuum that establishes the linkages between development interventions and progressively higher level development goals. (See Figure 3).

Level I summarizes the A.I.D. intervention "strategies or activities" that the assessment asserts are responsible for developing country E/NRM program performance. Level I activities might include: the establishment of legislation guaranteeing user rights in public forests, newly constructed, equipped and staffed field offices, new training curricula and research agendas. Often more than one strategy may be pursued to achieve a single E/NRM objective. Often one strategy will contribute to more than one E/NRM objective. For example, policy dialogue might be employed to encourage reform of market distorting forest product prices while awareness and education are used to raise public consciousness about conserving remaining forests.

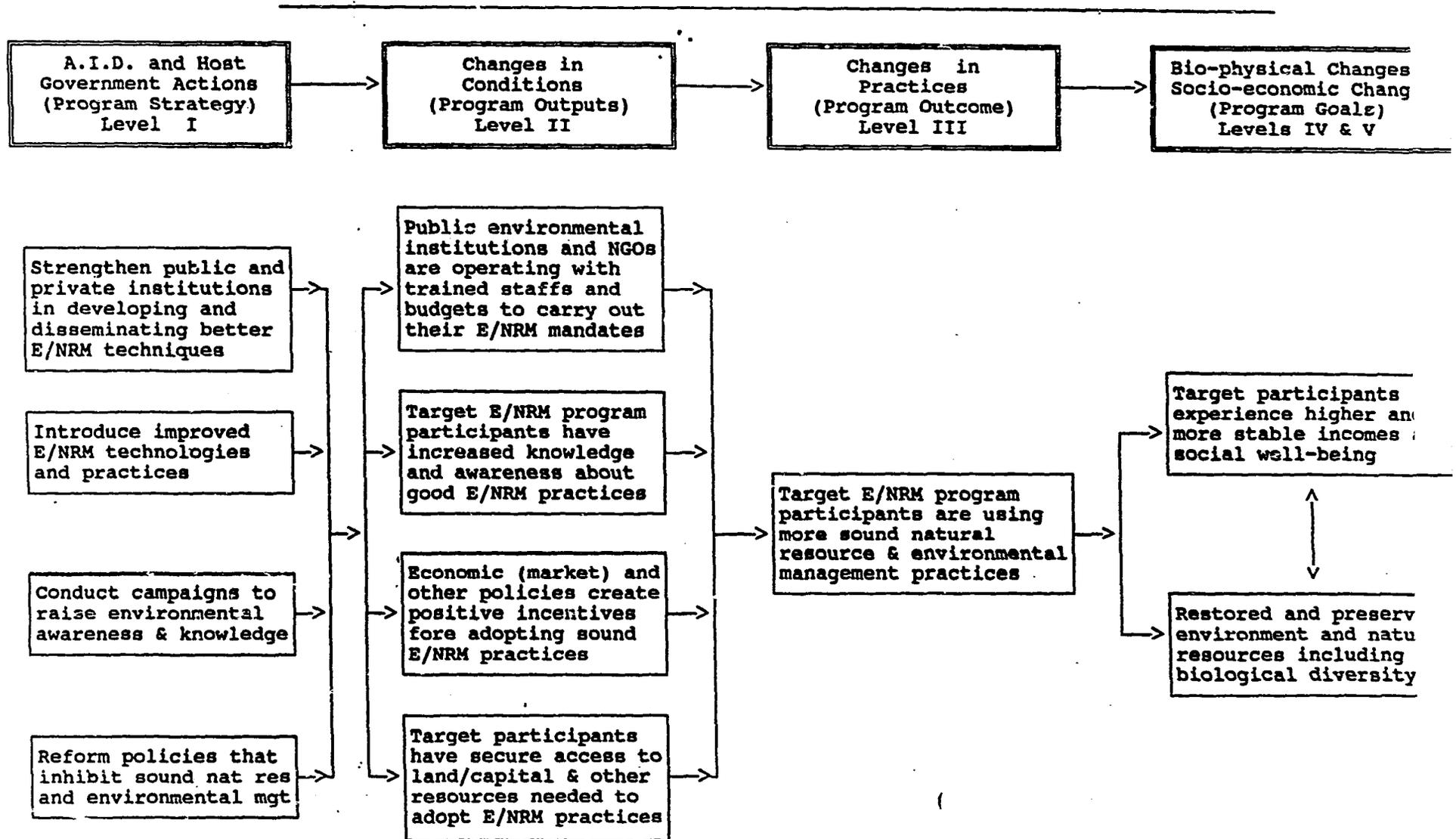
Indeed, identifying critical linkages--how well these strategies overlap and are blended--may be the most important determinant of program performance. Performance, of course, is subject to factors both within and beyond the Agency's control. In those cases where other factors, both program and non-program appear prominent, they will certainly be considered, but mainly to better understand the performance context of the core cross-cutting strategies.

Level II, "program outputs," are the conditions that have resulted from implementing these strategies. Level II conditions are manifested in more effective regulatory performance of government agencies, functioning and financially viable NGO's, unrestricted natural resource markets, new E/NRM technological packages generated by the research system. Making an impact at Level II entails the establishment of conditions that permit or lead to the adoption and diffusion of improved practices. It would be unlikely that changing a single level II condition would be sufficient to affect adoption rates significantly. More likely, changing multiple level II conditions will be necessary to achieve higher level impact.

Level III describes the "practices" that result from changes in Level II conditions. For the purposes of this assessment, Level III practices are perhaps the most important variables for analysis because they represent the highest level of changes to which A.I.D. program assistance and strategy intervention can be attributed. Indicators of the adoption of farm forestry practices and technologies include numbers of farmers, share of farm land and total area of farm land under project promoted farm forestry schemes.

⁴ Plan for Supporting Natural Resources Management in Sub-Saharan Africa, A.I.D. Bureau for Africa, May 1992.

Figure 3: Conceptual Framework for the Assessment of A.I.D. Environment
And Natural Resources Management (E/NRM) Programs



Level IV and V "program goals" constitute the biophysical and socio-economic changes expected to result from the adoption of Level III program outcomes or practices. Level IV and Level V goals can be viewed as mutually supportive, each contributing to the sustainability of the other and in many respects each flowing from the other.

Level IV constitutes the biophysical changes necessary and sufficient to attain the sustainable impacts at Level V. For the purposes of the E/NRM assessment, Level IV changes track the specific environmental objective being assessed: e.g., 1) increased forest vegetation cover, 2) improved agricultural and rangeland soils, 3) energy conserved, and 4) improved quality of coastal resources, 5) preserved biodiversity and critical habitats. CDIE's assessments of impact will usually focus on using Level III indicators as proxy measures for Levels IV and V impact.

Level V, the highest level, represents the "socio-economic" development goal. It may be normative, as would be the case for market oriented economic growth, or ontological, where the well-being of future generations is a fundamental concern -- ameliorating the adverse effects or environmental risks from global climate change, for example. Level V goals are generally associated with sustainable increases in income, profits, remunerative employment, overall well-being, or production. While access to income data is difficult, the continued involvement of beneficiaries in the program can be used as a "vote with their feet" proxy indicators of improved farm incomes and profits, at least at the time of the evaluation.

The five-level framework closely parallels the conventional A.I.D. logical framework. Level I corresponds with A.I.D. program strategies, activities and inputs; Level II with project outputs; Level III with the project outcomes or purpose and Levels IV and V with project or program goals. A major value of the analytical framework is the focus it places on local participation as the essential variable for measuring and verifying impact. Level III "practices" variables become both the dependent variables expected to result from changes in level II conditions and the independent variables assumed to bring about sustainable and widespread Levels IV and V bio-physical and socio-economic benefits. *Rates of adoption* of new practices -- in area of coverage or numbers of participants -- is an indicator of program performance common throughout the case study field work of the assessment.

The framework helps identify and classify indicators for each level. While Levels IV and V measure impact, Level III indicators establish development outcomes that mark progress towards sustainable environmental change and development impact. As proxy measures, they frequently mark the highest level that can be *directly* attributed to A.I.D. supported intervention. The accompanying text in Box 2 illustrates how the framework can be used to identify data needs and to link A.I.D. actions with higher level objectives. In addition to validating linkages, the framework provides a common structure and basis for synthesizing and reporting across case studies and across assessments.

BOX 2: APPLICATION OF THE CONCEPTUAL FRAMEWORK IN NEPAL

- *The Royal Nepalese Government (RNG) nationalized all forest lands in 1957. Because it has lacked the capacity to management these forest resources through public agencies alone, the RNG launched a "social forestry" program aimed at sustainable management of publicly owned forest land to private forest user groups. The user groups are primarily small farmers who have special uses for a variety of forest products found in Nepal (e.g., fodder, compost, medicinal/herbal, and fuelwood).*
- *A.I.D. has supported the Royal Nepalese government's "social forestry" program since 1975. A.I.D. support is based on several assumptions concerning the link between small farmer access to forest resources and the sustainable growth of their incomes and welfare. The A.I.D. field mission strategy fits well within the conceptual framework of the E/NRM assessment.*
- *Working from the left of the conceptual framework, Level I indicators measure intervention strategies or actions of the Nepal forestry program that have been supported by A.I.D.. In this case, USAID/Nepal has worked with other donors and the planning unit of the Ministry of Forestry to develop legislation to turn over state-owned forests to private user groups. The Mission has met its goal at this level.*
- *Level II indicators measure the conditions that lead to adoption of improved practices, indicators deal with the realization or implementation of changes in policies or institutions. In the case of Nepal, the Mission is working with the Ministry to promote implementation of the legislation, regulations, and guidelines turning over state-owned forest management to private user groups.*
- *Level III indicators measure the adoption of sustainable NRM practices that produce positive biophysical changes. Among these indicators are total area transferred to user groups and the number of people or groups engaged, the percentage of annual increase in the total number of hectares of forest land granted to user groups and the increase in hectares of park area under participatory management, the number of forest user groups formed and registered, and the degree of privatization of public forestry "parastatals".*
- *Level IV indicators measure environmental conditions and biophysical changes that contribute to producing the strategic objective: the quantity and quality of forest cover will be increased or maintained on a sustainable basis because of practices adopted by registered forest user groups. The A.I.D. Mission will probably have to undertake a special study sometime during the life of the project to confirm this assumption.*
- *Level V indicators measure achievement of the socio-economic goals of the program, in this case, rural household income increases. The A.I.D. mission has collected baseline data from a sample of rural households, some of which will be affected by project efforts to promote private forest user groups. Income data will be collected again in several years to measure changes in income.*

* * * * *

2.2.2. Measurement Issues

The five-level framework accommodates most measurement difficulties inherent in this type of program assessment. Where measurement is possible, the framework establishes the relative importance of what is being measured. Documenting the impact of A.I.D. environmental programs is costly and despite the efforts of many A.I.D. programs to elaborate performance indicators during the design process, A.I.D. experience in using these indicators for program monitoring and evaluation is very uneven. Moreover, new indicators of environmental impact are constantly needed as programs are implemented in new E/NRM areas.⁵ Reliable, comprehensive statistical data series on the environment and natural resources are still very limited. Few historical data series exist in developing countries on basic E/NRM problems (e.g. air and water contaminants, rates of reforestation or deforestation, fisheries resource depletion, etc.). For the following reasons, many E/NRM concepts are very difficult to measure and monitor:

Temporal dimensions. A program intervention strategy, such as reform of a forestry code, which establishes a Level II condition, may require a decade before measurable results manifest themselves either as ecological or socio-economic changes.

Multiplicity of actors. It is often difficult to attribute a given change, whether it be positive or negative, to A.I.D. support when there are several donors participating.

Paucity of baseline or time-series data. Only in recent years have there been systematic international efforts launched to collect comparable environmental data.

Lack of consensus on indicators. Unlike some other programs such as child survival or family planning, professional agreement on what constitute the most useful and effective E/NRM indicators has yet to be reached.

Logistical difficulties. Adequate sampling and measurement of both bio-physical and socio-economic changes is often beyond the time and resources of many evaluators.

The CDIE review of past A.I.D. E/NRM evaluation documents illustrates these limitations. Agency funded activities do not appear to be directed specifically at producing measurable environmental improvements, even though some make this claim. For example, a forestry project may have a goal of increased seedling production and planting, rather than one of reversing environmental degradation through reforestation. Consequently, evaluations examined project "outputs" or conditions (e.g., tree seedlings produced, buildings

⁵ The E/NRM Assessment has adopted the term "indicator" used by the Africa Bureau's Natural Resources Management (NRM) Indicator Catalogue: "key actions, functions, elements, or objects which, by virtue of their physical, biological, economic, or organizational attributes, are so closely associated with the system in which they are found as to be indicative of the state or trends of the system." (USAID, 1992, p. 1)

constructed, staff trained) more than environmental outcomes or practices (e.g., forest or agricultural areas where program participants have adopted better natural resources management practices).

Although many A.I.D. projects have apparently yielded Level IV E/NRM benefits, these benefits are not always directly measurable. For many A.I.D. supported E/NRM programs, appropriate baseline data were not collected, and monitoring of relevant E/NRM variables were not built into the design. Even less frequently have these evaluations collected evidence that Level IV biophysical changes have produced sustainable Level V improvements in the well-being of resource users. Consequently, E/NRM programs that purport to address problems of soil erosion by implementing appropriate conservation measures, by and large take no measurements of erosion rates prior to or during implementation nor at any intervals after project completion. The same is true for agro-forestry, forestry, and sustainable agriculture projects.

This assessment will focus, therefore, on E/NRM programs that present a high likelihood of offering reliably measured or measurable information on higher level indicators. Impact indicators will focus on program outcomes (not the outputs of projects) and fall at Levels III, IV and V. To assess association or causality, Level I and II indicators of A.I.D. and host government commitment will use Agency project and program funding data along with other secondary sources to establish linkages with the enabling conditions that can be identified during field evaluation case study work to bring about higher level changes.

Concurrent with this assessment, CDIE has begun the development of a series of impact indicators for its strategic objectives in the environment and natural resources management areas. These indicators are part of the Agency's new Program Performance Information System for Strategic Management (PRISM).⁶

The field studies will draw on and test the usefulness of these E/NRM indicators where appropriate in the course of the field work. For example, recently compiled data on totally and partially protected areas (national parks, wildlife preserves, marine gardens, animal sanctuaries, etc.) hold promise as useful indicators of the extent to which developing countries are conserving the diverse biological resources found in these areas. Other measures include: area covered in windbreaks to arrest desertification; increased wood stove use to slow deforestation; reforestation to preserve watersheds; more sedentary agriculture to reduce deforestation pressures from swidden (slash and burn) cultivation; and adoption of netting practices in capture fisheries.

⁶ PRISM environmental indicators are adapted from what missions report and fit to the five level framework originally developed by the Africa Bureau to support its natural resource management monitoring and impact reporting requirements. See for example, Fred Weber, The NRM Framework: What It Is, What It Does, and How It Works with an Example from the Field. World Resources Institute (1991) and NRM Indicator Catalogue, Annex II of the Plan for Supporting Natural Resources Management in Sub-Saharan Africa. A.I.D. Bureau for Africa (May 1992).

Because of these limiting parameters, CDIE will use a variety of field survey and interview techniques to reconstruct baselines and measure or describe change over time in environmental indicators at the highest feasible level. It is very difficult to identify and account for all factors and their interconnections that affect the environment and NRM improvements. The advantage of the E/NRM framework is that it organizes information pertinent to an admittedly complex sector and does so in a manner that goes beyond the immediacy of the project structure to situate the program in an overall development context. This blend of quantitative and qualitative as well as primary and secondary information will enable CDIE to integrate the field evaluation case study data across diverse cases and reach its judgements concerning performance.

2.3 Program Strategies

The following sections describe the major cross-cutting strategies that make up the E/NRM programs to be examined during the field evaluation case study investigations. Of course, A.I.D. and host country environmental priorities will change over time. Certain program features are more directly controlled as part of the A.I.D. project implementation process: project design which accounts for the parameters of local custom and culture; realistic goals and time frames; suitable technologies to a given problem; assignment of adequate and qualified staff. Other program features such as economic policy or tenure and property rights are more independent and can better be addressed through a program approach. The field evaluation case studies will collect information to describe the nature of these strategies and the roles they play as part of E/NRM programs supported by A.I.D.

2.3.1 Strengthening Public, Non-governmental and Private Sector Environmental Organizations.

A.I.D. is confronted by an extensive array of developing country institutions with which to work in conducting its E/NRM programs. For a given problem, determining the appropriate institutions and building their capacity appears to be a key determinant of E/NRM success. These institutions include central government ministries, local and international NGO's, for profit national and international private enterprises and local community resource user groups. A.I.D. evaluations point out the uniformly weak nature of public E/NRM agencies and underscore the need for greater involvement of NGOs, local community groups and private enterprises in E/NRM programs. Systematic approaches to involvement and integration of this broad range of environmental institutions have yet to be generalized. Recognizing the importance of contextual specificity, the sector evaluation field studies will seek out examples of innovative support to various institutional levels aimed at better linking central planning and decision-making with better local organization and implementation.

Some of the questions the field work will address include: What are the requirements for effective public sector environmental organizations? What measures have proven effective at fostering NGO, local beneficiary groups and private enterprises in E/NRM projects? How

can A.I.D. better focus the investment and technology capacity of private local and U.S. enterprises on E/NRM concerns? What support roles can international networking with local environmental groups play? How significant are gender distinctions in the impact and implementation of E/NRM programs?

Public Sector Institutions. The oversight of environmental conditions and the maintenance of natural resources in developing countries uniformly fall within the domain of public institutions. Nearly all A.I.D. supported E/NRM programs include activities to reinforce the operations and train the technical and administrative staffs of public or semi-private institutions working in environmental and natural resources management. However, the impact on environmental and natural resources of these A.I.D. institutional strengthening efforts has been mixed.

Most A.I.D. E/NRM projects work through public institutions that are characteristically plagued by manpower shortages, untrained staffs and insufficient operating budgets. But these conditions prevail for nearly all institutions in all sectors in all developing countries. E/NRM program impact appears to relate more closely to the extent to which public agencies have clearly defined mandates or jurisdictions and scope to exercise decentralized authority in their operations. Where environment and natural resources concerns cut across government agency lines the resulting confusion or even conflicts of responsibility appear to diminish the impact of programs. Because many environmental and natural resource management problems occur in disparate and often remote locations far from where national government apparatus is headquartered, the impact of programs also appears diminished where decentralized authority is not exercised.

Capacity for effective E/NRM program planning and implementation is critical for long term environmentally sustainable development. Many environmental and natural resource programs have been handicapped by narrow mandates of the implementing institutions or by poor collaboration between different and often competing government agencies, often further exacerbated by a parallel lack of coordination among donor driven planning exercises. A.I.D. and other donors are confronted along with host governments by diverse initiatives which include National Environmental Action Plans, Tropical Forestry Action Plans, National Conservation Strategies, National Anti-desertification Plans but with no comprehensive framework for their coordination. In the absence of unity of or compatibility between planning frameworks, A.I.D. support for E/NRM activities is more likely to remain isolated and not easily transferred or replicated.

Non-governmental organizations (NGOs) and private enterprises: While local non-government organizations (NGOs) face the same manpower shortage and skills problems as public agencies, they appear to have more frequent direct involvement with stakeholders, more clearly defined roles and more decentralized operations. As such, they exhibit potential in bridging the gap between governments and local communities. When beneficiaries not the environment *per se* are central to a project's orientation, the results have been impressive.

Natural Forest Management projects in Nepal, Niger, and elsewhere, demonstrate that when state control has been replaced by community based natural resource management and protection by local user groups, environmental degradation has been arrested and in some cases reversed. In contrast, "demonstration without participation", as was the case during the early phases of an environmental conservation demonstration project in Ecuador, reveals that sound technologies alone are inadequate to insure that improved resource management will become part of local culture and practice and sustained beyond the project cycle. The NGO premise is well-articulated in an Africa Bureau strategy statement:

Because of their involvement at the local level ... the PVO [Private Voluntary Organizations] are well-suited to helping broker the proper integration of natural resources activities, based on people's needs, into the ongoing extension and development programs. Farmer and community-based natural resources management schemes will often require new consensus and new social institutions in order to be successful. The PVO/NGO ... may be well-suited to stimulate and guide the process of formation of these new institutions.⁷

Others have argued that it is precisely the scaling up and collaboration with the state and international donor agencies that threaten the effectiveness of NGO's. Such interaction can, without careful attention to the dynamic of institutional change, "foster programmatic outcomes that are neither participatory nor sustainable."⁸ This assessment will examine Agency experience with the new organizational forms in an effort to determine what makes for an effective NGO dimension to an overall institutional strategy.

International networks of environmental NGO's appear to offer potentially powerful cost-effective ways of sharing experiences and environmental information. This assertion will be examined also in the area of environmental awareness and education where the transfer and adoption of training materials can reduce the costs of new course material development for each country and cultural setting.

Another dimension of institutional strengthening involves gender sensitive capacity building. Gender differences have been ignored or only marginally acknowledged in most E/NRM program design and implementation. The field evaluation studies will attempt to disaggregate people level impacts of E/NRM programs and relate this to the original conception and intent of the program.

⁷ "Plan for Supporting Natural Resources Management in Sub-Saharan Africa", Bureau for Africa, A.I.D. (May 1992).

⁸ Michael Maniates, "A Marriage of Convenience or a Match Made in Heaven? Local Non-Governmental Organizations, State Actors and Openings for Sustainability". (n.d.)

2.3.2. Fostering Environmental Awareness and Education

Better knowledge and understanding of environmental and natural resource management issues appear to be among the most powerful determinants of successful E/NRM initiatives. Environmental education and awareness activities which include public environmental media campaigns, educational curriculum reform, and participant and policy maker seminars, study visits and other fora, are one of the most unevenly used components of Agency E/NRM programs. The country E/NRM program field work will test this preliminary finding.

Some of the questions this assessment will address include: What role have environmental education and awareness activities played in E/NRM performance? How effective have they been? What environmental awareness and education approaches have worked best? Do awareness and education efforts lead to greater host country or local level participation in and commitment to environmental aims and the donor funded activities that support them? Under what circumstances do they lead to increased participation of women as beneficiaries?

The Agency has had considerable experience with the impact of education and awareness programs on human behavior in developing health, family planning and agriculture programs. Only a few A.I.D. environmental programs have also had "awareness" components to reinforce the acceptance of new practices or technologies that were being introduced. This may be an unfortunate oversight. A.I.D. evaluation evidence from other sector programs -- e.g., health and population -- reveals the significant impact of awareness education in both disease prevention and contraceptive practices. The returns to investments in awareness efforts have been particularly high among women of childbearing age where education on contraceptive practices has been emphasized.

Environmental education may have unique advantages over similar efforts in the health and population fields where non-controversial messages on environmental practices have already proven highly effective when targeted at school-age children. Not only have children absorbed these messages in many instances but they have become messengers themselves carrying them back to communicate to their parents and other adults. There is little of an environmental nature that could not be included in educational curricula. A comparison of projects with and without awareness components will help determine its importance and impact. A.I.D. programs have addressed environmental awareness through such mechanisms as conservation education, pilot demonstrations, policy dialogue, and support to indigenous environmental advocacy groups and NGOs. Other donors have also applied these strategies.

2.3.3 Introducing Technological Change

Agency evaluations document the importance that many A.I.D. projects have given to the development and/adoption of technological changes aimed at better environment or natural resources management. Examples of technology change strategies employed in A.I.D.

E/NRM projects include: the introduction of new tree varieties and seedling production techniques in reforestation programs; intercropping of trees and grain crops (alley cropping) in agro-forestry programs; promotion of special anchor buoys to reduce coral reef damage in coastal resources management programs; funding for resistance capacitors and other industrial devices in electric power conservation programs.⁹

Some A.I.D. E/NRM projects were built around one or more technological changes while others simply included new technology adoption among several project activities. Both the choice of technology as well as the methods employed in its diffusion appear to have been important determinants of the performance of many E/NRM projects. The assessment will examine the role of technology adoption from three standpoints:

1. What are the benefits in terms of bio-physical changes and income and welfare? How are the benefits distributed from new E/NRM technology adoption? Are the E/NRM benefits from new E/NRM technologies experienced by the direct user alone or are there also external benefits that are shared with others? Does, for example, a farm family adopting alley cropping cultivation practices benefit solely on its own land or is there evidence of other (downstream) E/NRM benefits?
2. Have new E/NRM technologies produced user benefits sufficient to encourage their adoption and continued use without external incentives or support? Many new E/NRM practices may be technically sound, but adoption will depend on their appropriateness for the users' conditions. The assessment field work will examine A.I.D. projects where the adoption and continued use of new E/NRM technologies has "taken on a life of its own" that extends beyond either the project funding time period or project target area.
3. How extensive and rapid has the spread of new technology been among potential adopters within and outside target areas? A.I.D. projects have employed a range of methods to foster technology transfer, including demonstration plots, pilot projects, community action programs, input subsidies. The effectiveness of these technology transfer approaches at covering target groups will be examined during the assessment.

Among the indicators the assessment will use in determining what difference the introduction of technological change has made on environment or natural resources are: a) numbers of

⁹ Some related technologies fall outside the scope of this assessment. Examples are projects that introduce technologies aimed at reducing pressures on the natural resource base, e.g. food crop research activities aimed at more intensive use of agricultural lands as an alternative to land clearing; the introduction of pond aquaculture to supplement ocean fisheries in meeting demand for marine products; or development and diffusion of solar heaters to reduce deforestation pressures for fuelwood. The focus of this assessment is on techniques that improve resource management or resource use efficiency and not those that reduce pressures on resource consumption.

participants, rates of adoption within project target areas before and after A.I.D. project activities; b) share of adopters by socio-economic group; c) increased income earnings from new E/NRM technologies (reclaimed or improved croplands, new orchard tree crops, lower electric energy costs, d) number and coverage of other than target areas where the new technology may have been introduced spontaneously or otherwise.

The field case study work will combine key informant and individual and group surveys with secondary sources to gather data on these indicators. To measure impact, spread and sustainability the surveys will focus on project target areas and depend largely on memory recall to document the rate at which new technologies -- e.g., new tree varieties, different tree planting techniques -- were introduced and the degree to which the target area was covered during and after A.I.D. funded activities took place.

Field evaluations will also describe the methods used for introducing and transferring new technologies. The objective here will be to identify the determinants of rapid rates of technology adoption. To assess replicability, field teams will employ key informant surveys to compile data on the extent to which new practices in the target project areas are evident in other areas of case study countries and seek evidence to determine if this is attributable to the original A.I.D. funded intervention.

2.3.4 Promoting Environmentally Sound Economic & Other Policies

Economic policy. Only a few A.I.D. E/NRM projects evaluated before 1980 addressed the relevance and importance of economic and policies on the use and management of natural resources. Even fewer A.I.D. E/NRM projects included policy reform as an objective for improving environment or natural resources management. The policy setting was assumed to have a neutral influence or was ignored. The evidence is to the contrary. The contemporary development literature is documenting more and more cases where economic policy directly impacts on environmental and natural resource conditions.¹⁰ The World Resources Institute conducted two recent case studies on the Indonesian and Costa Rican economic growth 'success stories'. The studies reveal that a significant share of alleged income growth in those countries was actually the result of "mining" their forest and fisheries resources.

Some of the questions this study will examine include: What has been A.I.D. experience with reforming economic policies with adverse environmental impacts -- e.g., removal of subsidies on agro-chemicals, energy or natural resource based exports? How have A.I.D. programs strengthened host government capacity to examine the environmental impact of national economic policies? How have policy reforms been used to encourage more environmentally responsible behavior by private enterprises or to foster private sector E/NRM investments?

¹⁰ See for example the case studies described in T. Panayotou, "The Economics of Environmental Degradation: Problems, Causes, and Responses," A.I.D. CAER Contract.

The CDIE field assessment work will examine strategies aimed at reforming the following types of economic policies for their impacts on natural resource management:

Agricultural price and natural resource policies, particularly agricultural inputs subsidies that cause environmental degradation (from overuse of chemical fertilizers and pesticides) or natural resource depletion (from deforestation and/or over-cultivation of marginal and fragile lands).

Energy price policies that suppress fuel and electricity prices low to control domestic living costs but lead to inefficient use of energy and disincentives for investment in environmentally sound energy production and use.

Exchange rate and export incentive policies, such as export-led growth strategies, that encourage over-logging, or conversion of forests to pasture or failed to produce more export commodities?

Resource tenure, access and other policies. Land and resource tenure and use rights are important variables in determining how a resource is managed. As resource constraints become more acute, developing countries are combining modern legal and regulatory systems with customary rights and laws to resolve resource access problems. The central problem and determinant of program success is that of assuring security to investments in the land (or other resource). If users are uncertain of reaping the benefits to their investments, they will be unlikely to exercise responsible resource management in the long run.

Equity concerns are a also major consideration when changes to the tenure policies are proposed. There are almost always winners and losers because securing rights generally implies limiting access. For example, privatization may stimulate land markets, affect access to credit, alter gender based resource allocation and otherwise shift the distribution of benefits.

In some countries governments have demonstrated the willingness to intervene but not the capacity to regulate effectively. State policing especially of forests is often arbitrary, abusive and serves as a disincentive to invest. Again, this argues for new arenas in which to resolve disputes promptly and equitably. It is not only legislation and juridical institutions which agency programs have attempted to change, but the attitudes and mentality of government officials as well.

Managing common property (forest, rangeland and fisheries) resources is perhaps the most important area where A.I.D. programs have been concerned with promoting secure tenure and usufruct arrangements to achieve better stewardship of resources. Common property resource management regimes (and other shared access regimes) encompass a diversity of resources ranging from small-scale irrigation infrastructure to vast forest reserves and include rangelands, wildlife and nature tourism, fisheries, and watersheds. Project impact appears to have been greatest and most sustainable when communal ownership and management has

successfully limited access rights to user groups who accept, in return, responsibility for maintaining the resource.

Questions the sector evaluations will address include: What makes for environmentally sound management of common property (forest, rangeland and fisheries) resources? What has been A.I.D. experience with introducing environmentally sound management practices among common property resource users?

Experience indicates that sustainable change in the rules governing access to common property resources requires both time and authority to implement and that this is often best supported in a policy and program context rather than at the specific project level. For example, Range Management Areas in Lesotho are now expected to require 20 years of outside support before newly vested local groups will have gained the capacity for management and accountability. Elsewhere, it was considered necessary to suspend or terminate project activities pending reforms in the overall regulatory context governing tenure and usufruct rights.

The notion that communal tenure of land, water, forests and other resources produces an inevitable tragedy of the commons is founded on an assumption that private gain will be pursued to the detriment of public good and where natural resources are communally owned, access will be open and uncontrolled. From these assumptions derive arguments for privatizing resource ownership or for state intervention in granting exclusive large scale concession rights to the exploitation of communal resources.

A third, and until recently often overlooked option, for community property resource (CPR) management involves empowering the users of the resource to manage and resolve conflicts at the local level. This could be accomplished through strengthening user group organizational development and validating their authority through the establishment of a permissive legal and regulatory environment.

It has been argued that secure tenure and rights to resources are prerequisites to effective stewardship and sustainable management; however they do not alone guarantee effective management.¹¹ The field evaluations will focus data collection to test the hypothesis that A.I.D. strategies which promote policy reforms that provide for user based governance are effective approaches to bringing common property resources under sustainable management.

¹¹ Elinor Ostrom has convincingly put forth a matrix of enabling conditions most of which related to locally responsive governance that favor effective CPR management. She suggests a set of variables that might be used as a sort of checklist in evaluating specific CPR settings: clear definitions of users and of the resource; access and use rules permit local modification; monitoring carried out by users or their agents; enforcement based on a graduated system of sanctions; presence of institutions offering low-cost, equitable, objective dispute resolution services; recognize legitimacy of local regulation of the resource; forum for governance permits involvement of several interrelated levels of institutions. *Governing the Commons; The Evolution of Institutions for Collective Action*, Cambridge: Cambridge University Press (1991).

3.0 Methodology for Data Collection and Analysis

3.1 Steps in the Evaluation Process

To accommodate the complexity and diversity of programs that characterize the Agency's environmental programs, CDIE is implementing each of its E/NRM assessment in four phases which correspond to the steps followed in CDIE evaluations: Phase I -- Conceptualization and evaluation document review; Phase II -- Evaluation design and consultation; Phase III -- Evaluation field studies and data collection; Phase IV -- Analysis, synthesis, and diffusion of results.

Phase I. Conceptualization and Evaluation Document Review. The initial parameters for the assessment are set out in an approved concept paper. The CDIE evaluation literature review examined A.I.D. experiences in supporting environmental and natural resource activities in recipient countries. The review focussed on prior A.I.D. funded activities for which evaluation documents were catalogued in CDIE's development information database. The review, which was worldwide in scope, helped to define the E/NRM issues and problem areas upon which A.I.D. efforts have focussed over the past ten to fifteen years. The evaluation document review and issues synthesis is attached as Part 2 of this design proposal.

Phase II. Evaluation Design and Consultation. This phase captures the participation of Agency environmental coordinators and other stakeholders in the design of specific sector evaluations. Two main elements of this stage involve: 1) review of the sector evaluation designs with Agency stakeholders through its Environmental Forum (an unofficial grouping of Agency environmental specialists); and 2) consultations with regional environmental coordinators and field missions on the programs and projects for field study.

Phase III. Evaluation Field Case Studies and Data Collection. The field evaluation study work will examine, in A.I.D.-assisted countries, E/NRM programs supported by A.I.D. projects or series of inter-related projects, components of projects, host country components of regional and centrally funded activities, and, in some cases related activities of other donors -- going back as much as twenty years. CDIE will work with geographic bureau environmental offices to design procedures for each of the country case studies that will enable comparability among programs as well as include the unique E/NRM features of each specific setting. In addition the evaluation field studies will contribute to the preparation of a number of technical reports in areas of special emphasis (see below).

Phase IV. Analysis, Synthesis and Diffusion. The analysis and synthesis will integrate data and findings from the field evaluation studies and literature reviews within the assessment's five-level analytical framework. Each sector evaluation design discusses the methods of analysis that are employed for that sector. For dissemination the Assessment of A.I.D. environmental programs will compile its findings in technical evaluation reports for each field case study and a synthesis report for each sector evaluation. Summary "highlight" versions of

some of these papers will also be published. To accomplish this important final task, CDIE will tailor its analysis and findings to its two target audiences of decision-makers and practitioners.

3.2 Data Sources and Collection Procedures

The collection and analysis of data on major E/NRM assessment issues poses a major challenge partly because of the limited availability of reliable, quantitative information on the performance of environmental programs, and partly because of time and resource constraints which do not permit large-scale data collection in the field. Under these conditions, CDIE will employ primary and secondary sources of data and information to construct the chain of events linking project activities to the observed effects and impacts, to examine major assessment issues, and to identify major lessons learned.

The assessment will make extensive use of secondary data. It will identify, collect and analyze relevant secondary data and information that are available in Washington or in host countries from a range of sources including:

- **A.I.D.'s Project Records and Documents.** As part of the literature review, CDIE has already analyzed past evaluations conducted by A.I.D. of its environmental projects and interventions. In addition, before visiting a country for fieldwork, the assessment team will analyze projects' papers, reports, special studies commissioned for projects, mid-term and final evaluations, and other documents that are available with the Agency's own Development Information (DI) system.
- **Other National and International Organizations.** In many cases, host country organizations, PVOs, research institutions and international donor agencies have undertaken or commissioned studies, evaluations and papers on environmental problems. Even when such documents do not directly deal with A.I.D.'s efforts, they may contain useful data and information that can be used for the purposes of the assessment. Assessment teams will take steps to gather such documents and analyze them to answer evaluation issues.

When the acquisition of primary data is called for, the assessment will most frequently rely upon three rapid appraisal methods:

- **Mini-Surveys.** CDIE's literature review of A.I.D. environmental projects revealed that information on the impacts of environmental programs is scarce. Particularly, there is very little information on how the targeted population responded to interventions, to what extent did they benefit from them and under what conditions, and what, if any, are their suggestions and recommendations for the future. As a result, CDIE assessment teams may commission mini-surveys to generate the data on the impacts of programs on targeted beneficiaries. Mini-surveys follow the same methodology that

large sample surveys follow, however, they differ in three ways. First, the number of questions is deliberately kept small, ranging between 15 to 20 in most cases. Second, only a small sample is used that usually ranges between 25 to 70. Third, although the use of probability sampling is preferred, non-probability sampling procedures are also acceptable, when the former is not feasible because of the constraints of time and resources, as is often the case in field assessments.

- **Key Informant Interviews.** The assessment will extensively conduct key informant interviews to get information, ideas, inside stories, insights, explanations, interpretations of events and actions, suggestions and recommendations from knowledgeable persons. For example, it will interview key policy makers, managers of environmental programs, government officials in host countries, technical staff, specialists and officials of international donor agencies. Key informants will be carefully selected to obtain different viewpoints and perspectives on a topic.

The main advantage of key informant interviews is that they permit free flow of ideas between the interviewer and the respondent. While questions are based on an interview guide, they are framed in the course of the interview and in a very informal atmosphere. The interviewer subtly probes to elicit more information. Experience shows that respondents are willing to share in such interviews information and ideas which they might not divulge in a public setting. Assessment teams will keep records of key informant interviews to improve both the accuracy and credibility of interviews.

- **Focus Group Discussions.** On a number of issues, particularly those relating to the formulation and implementation of environmental policies, strategies and activities, the assessment team may use a focus group discussion methodology. In focus groups, participants explore a subject under the guidance of a moderator. Each participant is stimulated by the comments of others and in turn stimulates them. Usually, 7 to 9 persons participate in a focus group discussion. A short discussion guide is prepared in advance. Focus group discussions may be conducted with three categories of participants in this assessment; (a) the middle level managers to seek their understanding and views about implementation and effectiveness of environmental programs, (b) outside stakeholders such as PVOs, NGOs, village groups and contractors who are involved in relevant programs, and (c) technical experts in a host country.

3.3 Data Measurement and Analysis Methods

This framework document, along with the sector evaluation designs, will guide each phase of the assessment and each of the field evaluation case studies. Use of the E/NRM analytical framework to interpret field data underpins the major steps in data analysis and provides unity to a necessarily broad ranging investigation of program results.

CDIE has chosen to base its sector evaluations of environmental programs on a synthesis of non-quantitative case studies for several reasons.¹² First, measurement problems limit the extent to which the assessment can employ quantitative synthesis methods. Second, E/NRM programs are complex and varied. Their intended and unintended impacts vary across multiple levels of effect. Finally, in many instances, A.I.D. E/NRM assistance has been concerned with process, and impact must therefore be measured in terms of progress toward desired outcomes. While it is quite useful to compare and contrast the present and likely future performance and sustainability of differing approaches, the corresponding indicators of progress do not lend themselves to quantitative aggregation across programs. Rather in such circumstances, a variety of data both qualitative and quantitative will be more useful in determining performance and in distilling lessons learned.

Empirical realities vary from case to case, but CDIE is in the position of being able to structure the manner in which these realities are framed. As such, the first step toward meaningful synthesis in a team's analysis is undertaken while still in the field and is directed to achieving consensus among field team members concerning the findings for each field activity examined. This involves organizing and interpreting primary and secondary data gathered by individual team members. The initial effort to assess the significance of the information collected is the key objective of this exercise.

Field evaluation teams are expected to provide the host country mission with information on how the subject activities have performed, including preliminary recommendations relevant to mission project and program level decision-making. As the CDIE assessment process progresses, these field mission debriefings will increasingly incorporate lessons and insights from earlier case studies. It is important at this stage that team members agree on the general reading of what actually happened, on what constitutes the major evidence of impact, and on the key factors that affected performance. A structured exercise aimed at achieving consensus will enable the various field teams to follow a similar approach that in turn will help to organize and present evidence in the case study reports consistently and in a manner that supports higher level synthesis.¹³

The assessment methodology builds a convincing body of evidence to establish plausible linkages between A.I.D. funded actions and significant environmental results. The analytical framework will be used as a synthesis tool in to interpret the specifics of each case study or single component of a case study and to distill out what is relevant to the larger picture -- delimiting progress toward achieving the Agency environmental objective that is at issue.

¹² This does not preclude the importance and desirability of gathering quantitatively precise information concerning certain dimensions of the specific activities being examined over the course of the field studies.

¹³ CDIE has adapted a project field evaluation exercise described by Craig Olson, "Reaching Consensus in Evaluations," in Developing Alternatives. Washington, D.C., DAI (1991) to the analytical levels of the proposed framework.

4.0 Implementation Plan

The CDIE Assessment of A.I.D. Environmental Programs is made up of a series of sector evaluations. For the immediate planning period, CDIE is scheduling E/NRM program evaluations in the forestry (including forest bio-diversity habitats), agriculture and energy sectors. Each CDIE sector evaluation will examine the performance A.I.D. supported E/NRM programs employing one or more of its principle E/NRM strategies to achieve a particular Agency E/NRM objective. CDIE will summarize findings from the field evaluation work in a synthesis report for each of the sector evaluations.

While the first program evaluations are planned for the forestry, agriculture and energy sectors, CDIE's longer term schedule calls for subsequent evaluations in other sectors (e.g., urban-industrial, water, coast resources) or addressing other issues (e.g., global warming, environmental health). These have not yet been scheduled or budgeted. The same analytical framework, as described above, will be followed during each phase of the environmental assessment. CDIE will prepare separate design annexes for each sector evaluation. The program evaluation designs for the forestry and agriculture sector are annexed to this assessment framework. Other sector evaluation designs will be prepared and approved prior to commencing field evaluation work.

4.1 The Assessment Sample Frame

Annex 1 of Part 2: "Technical Annexes -- Review of A.I.D. Environmental Program Literature" discusses the criteria that CDIE uses for the inclusion of A.I.D. environment and natural resources projects and programs in this assessment. The entire population of A.I.D. programs and projects with E/NRM objectives numbers several hundred and covers a vast range of Agency development assistance activities. The assessment has narrowed this list to about 125 E/NRM projects. Of these a smaller set of about twenty projects have been selected for intensive case study evaluation to test the hypotheses formulated from the larger population of projects examined in the literature review

The principal criterion for inclusion of a project in this assessment was that the project must have a major focus on environmental or natural resource management or have a major component with such a focus. Projects that appeared to have such an E/NRM focus were candidates for review.

The time frame established for project reviews was set at 1980-1991. This decision was based largely on two considerations: (1) projects ending before 1980 were unlikely to have a specific major E/NRM component; and (2) the universe of projects needed to be limited to a size manageable with the time and resources available. Projects which began between 1980 and 1991, and those beginning earlier but still ongoing in 1980, were also included.

The A.I.D. E/NRM project and universe was further restricted to documentation available in

the A.I.D. Development Information Systems (DIS) database. The majority of projects reviewed had been evaluated at least once and evaluation documents were available. Project evaluations and related summaries were the principal sources of information utilized on project activities and outcomes.

A series of initial searches for evaluation documents in the DIS database were carried out using general key words in the hierarchy from *The A.I.D. Thesaurus* (September 1988) that were designed to identify potential projects for review. These initial searches identified several hundred documents. Document summaries were read to determine if projects had an E/NRM component, and those that did not were eliminated from further consideration. Additional searches using more specific key words (those at lower levels in the hierarchy) were conducted as a check to insure that the more general searches had in fact netted all potential projects.

For example, Range Management was considered to be inherently a form of natural resource management (as was watershed management). It was assumed that all projects and programs listing "range management" as a descriptor (keyword) and showing an evaluation for the 1980-1991 period in the CDIE/DIS database would meet the established review criteria. In practice, many range management projects did not show up in this initial search and many that did were not range management projects but more properly pasture management, forage production or land management. Some projects with a range management component were found by using such related descriptors as "livestock," "pastoralism," or "animal husbandry."

Summaries of documents flagged by the several searches were read to make an initial determination of whether the project conformed to the established review criteria. For those projects retained for review in the technical annexes, a data sheet was prepared which contained basic information about the project such as funding, beginning and ending dates, purposes, performance indicators, and evaluators' assessments.

4.2 Selection of Countries and Cases

The CDIE review of A.I.D. E/NRM evaluations has identified a number of countries and projects with relatively clearly defined objectives and performance indicators that lend themselves particularly well to direct field case study evaluation. In coordination with the regional and central bureau environmental offices, CDIE has begun to select among these projects for follow-up country field studies.

CDIE will seek to conduct a representative number of case studies in each of the sector evaluations that make up the assessment. Figure 4 presents a working matrix of these E/NRM sectors and principal and secondary program strategies in "primary" and "alternate" the countries where CDIE proposes to conduct the evaluation field studies. Numbers in each of the cells of the matrix refer to the country (four-digit) or regional (seven digit) projects that were implemented to achieve the specific E/NRM objectives in that country program. The

"X's" in the matrix refer to the cross-cutting strategies emphasized by a specific A.I.D. country program in those sectors.

As an example, the field work for the first country case study was undertaken in Pakistan to test this assessment framework and the evaluation designs in the forestry and energy sectors. That Pakistan field evaluations examined two A.I.D. supported programs: farm forestry and energy conservation.

The Pakistan farm forestry program had as its objective the restoration of forest cover (and stemming the further loss of old growth forests). The principle strategies employed to achieve that objective were: "institutional" - private farmer tree planting and the creation of a "social" (farm) forestry extension division in the Pakistan forest service; "technological" -- the introduction of new tree varieties (such as eucalyptus) and tree nursery stock production practices. The performance indicators are the number of participating farmers, the total area and share of farmland planted to new tree varieties, and projected income and value of fuelwood contributed from farm forestry enterprises. (An added unanticipated E/NRM performance "bonus" was found to be improvements in water-logged and saline soils achieved by temporarily rotating some farm-land back into tree crops.

The Pakistan energy conservation program had as its objective the reduced industrial wastage in electricity, petrol and natural gas energy use. The strategies employed were: "institutional" -- the creation of private energy auditing companies supported by a new energy conservation center; and "awareness" -- training and skills development courses and publications for energy control engineers major energy using firms; and "policy" -- price and tariff measures to encourage the adoption and use of energy saving and use monitoring devices. The performance indicators were the number of participating firms and the value of energy savings.

CDIE will conduct a sufficient number of additional evaluation case studies of similar A.I.D. supported forestry and energy programs in other countries and regions to permit synthesis of findings for the evaluations in these two E/NRM sectors. CDIE also will examine other program strategies employed to achieve similar E/NRM objectives. For example, strategies to stem the loss of forest cover in other A.I.D. countries include community forestry (in the Philippines and Nepal); and forest habitat preserves in Jamaica, Rwanda and Sri Lanka.

To attain an adequate sample, CDIE has planned fifteen case study field trips for the forestry, agriculture and energy sector program evaluations. Factors that will be important in making country case study selection include:

- **Geographic balance** -- Countries from each of the four "traditional" A.I.D. geographic regions: Asia, Latin America, Africa and the Near East. (Not included in this assessment are the Eastern Europe region and the Newly Independent States (NIS) of the former Soviet Union where A.I.D. has just begun development assistance programs.)

Figure 4. CDIE Assessment of A.I.D. Environmental Programs

Country Candidates	Program Sector				Cross-cutting Strategies			
	Forestry	Biodiversity	Sust. Agriculture	Energy	Public/Private	Technology	Policy Reform	Awareness
Country/Project								
Lesotho (p)			0215; 0221		X	x	X	
Senegal (a)	0283				X			
Gambia (p)			0203; 0202		X			
Burkina Faso (a)	0235; 0834	xx			X			X
Madagascar (p)		938-0268; 0103; 0104			X		x	X
Uganda (p)	0287				X			
Rwanda (a)	0128	xx			X	X	X	X
Nepal (p)	0128; 0032	0144	0148; 0032		X			
India (a)	0475; 0478; 0495			0474	X			
Pakistan (p)	0481			0478	X	x	X	x
Sri Lanka (p)	0055; 0075	0075					X	X
Thailand (a)		xx	0294		X		X	X
Philippines (p)	0444		0358; 0388		X	X	X	X
Indonesia (p)		0338	0311		X	X		
Costa Rica (p)	0243	0142; 0182	0148	0175			X	X
Honduras (a)			0188		X		X	
Guatemala (p)			0274		X			
Ecuador (p)	0023	0031		0029	X		X	X
Jamaica (p)		xx	0048; 0101	0085				
Dominican Republic (a)	0128			0144	X			X
Morocco (p)			0145		X			

(p) = Primary Candidate (a) = Alternate Candidate Numbers refer to mission/regional projects.

X = Principal strategy x = Secondary strategy

(This update: March, 1983)

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- **Program features -- A.I.D. bilateral or centrally funded E/NRM projects with sufficiently well-documented histories over a sufficiently long period of time to permit systematic assessment. A balance of successful and relatively less successful programs is sought.**
- **Logistical/security considerations -- Local mission program as well as broader political conditions suitable for the field teams to complete their work during the four to five weeks they are in country.**

The Technical Annexes in Part 2 of this Document profile the major environmental projects and programs proposed for this assessment. From its review of the A.I.D. E/NRM evaluation literature, CDIE compiled the Figure 5 matrix that identifies the primary and alternate countries and projects for the country case study field work. The Technical Annexes in Part 2 of the Assessment briefly sketch most of the projects that will be considered.¹⁴

Each of the country case studies will focus on the roles of the E/NRM strategies that make up the basic "analytical units" of the assessment. CDIE proposes that each E/NRM objective and strategy be covered in at least four country case studies.

4.2 Implementation Schedule and Resources

CDIE began its assessment of A.I.D. environmental programs early in FY 92 with a review of A.I.D. E/NRM project and program evaluation literature. The field work began at the end of FY 92 and ends in FY 94. Figure 5 presents a preliminary management tracking system for each assessment implementation "event" and its time frame and target completion date. This management tracking system will be periodically updated once field visits are confirmed with A.I.D. field missions.

Each evaluation case study will involve a 2-5 person team over a total of 2-6 weeks each in-country. Field studies may be conducted during one period or, where warranted, scheduled over two field visits to allow for advance planning and interim data collection (e.g., where beneficiary field surveys are required).

The Administrator's Evaluation Agenda calls for "objective independence" in all aspects of assessment work. Therefore, the field teams are expected to be largely self-contained and to work independently. However, CDIE would look to USAID missions for limited support by designating an officer to facilitate scheduling initial appointments with government agencies, arranging site visits and, to the extent available, use of a mission office space out of which to work. (Otherwise, teams will use hotel or contract facilities).

¹⁴ Additional detailed project information is contained in unpublished data sheets that were generated by the document review for all projects.

Each field team will be led by a CDIE evaluation officer and comprised of A.I.D. direct hire and contract evaluation specialists drawn from disciplines related to the features of each country E/NRM program. Team members will be selected in consultation with field missions and AID/W regional bureaus. The evaluation services contractors will support field teams with required in-country logistics and contracting, say, for the services of host country nationals for conducting any field survey work.

CDIE anticipates a range of technical professional skills will be required in conducting the field study activities. CDIE will specify the exact type of evaluation specialist services required during final selection of countries and programs for the sector evaluation case study work. All evaluation specialists should have developing country experience in their fields working in design, implementation or evaluation of projects supported by A.I.D. or other donors. Spanish and French fluency is highly desirable and in some cases required. Fluency in the language of a particular country selected for field work would be particularly useful, and in some cases required, where direct surveys of local beneficiaries is needed. Proven analysis and writing skills will be required of all specialists.

While the need for additional specialists may arise during the course of the field evaluation work, CDIE has compiled the following list of special skills known now to be required in the course of the assessments:

- **Evaluation Specialist** -- Experience in quantitative and qualitative techniques for measuring and valuing the costs and impacts of A.I.D. and other donor interventions in the E/NRM area.
- **Social Scientist** -- Experience with local community and NGO programs in the natural resources (forestry, fisheries) areas. Skilled in group and individual beneficiary interview/survey techniques to determine impact incidence at gender and other levels. Local language skills may be required in some cases.
- **Natural Resources/Agricultural Economist** -- Experience at assessing national and farm level impact of economic policy on natural resource management and sustainable agriculture production systems. Asia and Latin American experience essential.
- **Farming Systems Research Specialist** -- Experience in conducting on-farm research for the development and introduction of sustainable agriculture production practices such as agro-forestry, integrated pest management, soil and water conservation measures. Experience in Asia, Africa and Latin America is essential. Fluency in Spanish required for work in Latin America; local language fluency is highly desirable.

- **Environmental/Energy Engineer** -- Skilled in measuring the external environmental costs and benefits of energy, industrial waste and urban pollution control investments in developing countries. Asia, Near East and Latin America experience essential.
- **Park Management Specialist** -- Experience with the management of parks and preserves for the conservation of natural habitats and biological diversity. Experience with "nature tourism" projects and with integrating habitat conservation with economic activity in developing country settings would be valuable. Developing country experience, preferably in Asia and Latin America is essential.
- **Range Management Specialist** -- Experience working with pastoral and nomadic herder groups in developing countries, particularly Africa. French fluency essential.
- **Forest Management Specialist** -- Experience working with community forestry and with sustainable forest management industries. Spanish required for Latin America. Local language fluency highly desirable in some cases.

5.0 Assessment Products and Dissemination Plans

5.1 Assessment Products

CDIE anticipates that the assessment of A.I.D. environmental programs will provide three types of products for direct use to the Agency:

- **Sector Evaluation Reports (3)** which summarize major findings, conclusions and lessons learned from the field evaluation and literature reviews. These reports will be global in nature though regional distinctions in program impact and performance will be noted where appropriate. Outlines for these reports are annexed to each of the sector evaluation designs in this first phase of the assessment for forestry-biological diversity, sustainable agriculture and energy conservation.
- **Technical (case study) Reports** of the findings from field investigations into the impact and performance of A.I.D. supported E/NRM programs in the forestry-biodiversity (eight reports), agriculture (six reports) and energy (four reports) sectors. The case study reports follow the format and structure of the Sector Evaluation Reports to which they will contribute along with the literature review.
- **Highlights and Bulletins** for senior Agency management and practitioners of case study and synthesis report findings.

The Technical (case study) Reports will be prepared and distributed following each sector evaluation field study. Periodically, CDIE "Highlights" and "Bulletins" summarizing

important field studies will be issued as progress reports for each of the sector evaluations. The evaluation synthesis reports will be prepared after all sector field study work is completed. Synthesis reports will have their own Highlights and Bulletins prepared as well.

5.2 Dissemination Plans

The findings and information generated by the assessment of A.I.D. environment and natural resources management assessment will be shared within and outside the Agency following the CDIE dissemination plan. Specifically, CDIE will use the following vehicles to reach technical and administrative audiences inside and outside the Agency with the results of the assessments:

- The dissemination of Assessment and Sector Evaluation "Highlights" and "Bulletins" to Agency management and policy makers;
- The dissemination of Technical Case Study Reports to Agency technical specialists and project officers;
- The dissemination of sector assessment reports and guidelines for use in Agency technical training courses and in project design and implementation "manual order guidance";
- Periodic briefings of Agency and outside senior management and professional staffs and development community stakeholders.

6.0 Summary Budget

A summary budget for the Assessment of A.I.D. E/NRM Programs is outlined below. The budget figures cover funding for contractor (Development Alternatives, Inc. and Labat Anderson Inc.) Agency operating expense (OE) costs. Not included are the salaries of direct hire CDIE and other AID employees.

ENVIRONMENTAL PROGRAMS ASSESSMENT

(Summary Budget)

<u>Budget Item</u>	<u>Amount</u>
Desk Study - literature review	\$ 92,000
Field evaluation studies (fifteen @ \$ 70,000) Assessment field teams will average: 2 OE-funded direct hire staff @ \$ 7,000 ¹⁵ 2 contract specialists @ \$28,000	\$1,050,000
Seminars and briefings	\$ 12,000
Publication and distribution	\$ 28,000
Other	\$ 8,000
TOTAL ASSESSMENT COSTS	\$1,190,000

* * * * *

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¹⁵ OE-funded staff levels are lower because direct hire salaries are not included. Over the 30-month period of the assessment direct hire salaries would add another \$ 210,000 to the budget bringing the total costs of the assessments to \$1,400,000.

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**ANNEX 1: EVALUATION DESIGN FOR
A.I.D. ENVIRONMENTAL PROGRAMS IN THE FORESTRY SECTOR**

Objective

The CDIE evaluation of A.I.D. environmental programs in the forestry sector has two objectives:

- To assess the impact of A.I.D. assistance for stemming the loss of forest tree cover and protecting forested wildlife habitats in developing countries; and
- to identify approaches and conditions that influence the performance of A.I.D. programs that have supported environmentally sound forest management.

Rationale

Global concern over threats to the world's remaining forest cover -- particularly tropical forests and forested wildlife habitats in developing countries -- led Congress in 1989 to direct A.I.D. to implement a special program aimed at protecting tropical forests and biological diversity. Funding for forestry programs since FY 1989 has averaged about \$160 million annually, or about 25 percent of the Agency's \$650 million environmental programs portfolio.

Global statistics document that deforestation rates have accelerated by a factor of perhaps fifty percent over the last decade. Deforestation has been particularly acute in tropical forests, nearly all of which are in the developing world. In addition to providing harvestable timber and non-timber products, tropical forests protect soils and watersheds which insure current and future agricultural productivity for developing countries. Tropical forests also contribute to global climatic stability by harnessing free carbon. Finally, they serve as reservoirs for much of the world's biological diversity.

Stemming deforestation through improved environmentally sound management poses a critical development challenge to which A.I.D. environmental programs have responded. Forest management requires meeting the demands of global, national and local actors, whose interests may not always coincide. The evidence suggests that bringing local stakeholders, especially those whose interests are often neglected, into the process of both decision making and benefit sharing is critical to lasting effective change. Some countries and regions have fared better than others in forest protection and management suggesting that there are lessons to be learned about what works best and why.

Description

This evaluation of A.I.D. environmental programs in the forestry sector was launched in 1992 with a review of the evaluation literature on A.I.D.'s experience to date and on the state global forest and forest (biodiversity) habitat conditions. The evaluation in 1993 is entering the field evaluation phase when it will examine three models of environmental management in the forestry sector:

- **Farm forestry** -- the introduction of farm tree production -- particularly on marginal and erodible farm lands -- for household use and commercial sale;
- **Community "social" forestry** -- social forestry arrangements or contracts with local communities and NGO groups for the reforestation of degraded lands and the sustainable management of forested areas; and
- **Forest habitat preserves** -- formal protection of natural and old growth forests as preserves for sustainable management by forest dwellers, local groups or national park services.

The evaluation will examine the ways that the Agency has assisted developing countries in fostering these forest management systems and the impact that these systems have had on forest resources. The evaluation findings will contribute to more effective forestry program activities under the Agency's new Environmental Strategy.

Beginning in the spring of 1993 field evaluation teams will visit selected A.I.D. countries to collect data A.I.D. forestry programs in each of the above three forest management areas. Upon completion of the field evaluation work, CDIE will synthesize, in a final report on environmentally sound forestry management programs, the findings from its forestry sector field evaluations, from other A.I.D. forestry program evaluation literature and from other donor agency's experiences. (An outline of that report is appended to this forestry sector design.)

The Analytical Framework

The operating hypothesis of the evaluation is that **environmentally sound forestry management results from A.I.D. forestry programs that:**

- **Strengthen capacity of national and local public and private organizations in the planning, coordination and implementation forestry programs;**
- **Conduct education and outreach campaigns to raise awareness, transfer information and foster advocacy;**

- Transfer or develop sustainable forestry management technologies;
- Reform policies to remove input, product and land market distortions and other disincentives, e.g., secure tenure or use rights to insure that benefits accrue to those making the investments.

The evaluation will test this hypothesis by closer field evaluation of a number of A.I.D. supported environmental programs in the forestry sector. The field evaluation case study work will collect evidence to document if indeed those programs employing these strategies have performed best. The field evaluation work will focus on testing the linkages between the conditions these strategies have created and the benefits of environmentally sound forestry management programs. A.I.D. supported programs that employ these strategies are expected to score well on five performance scales used in CDIE evaluations:

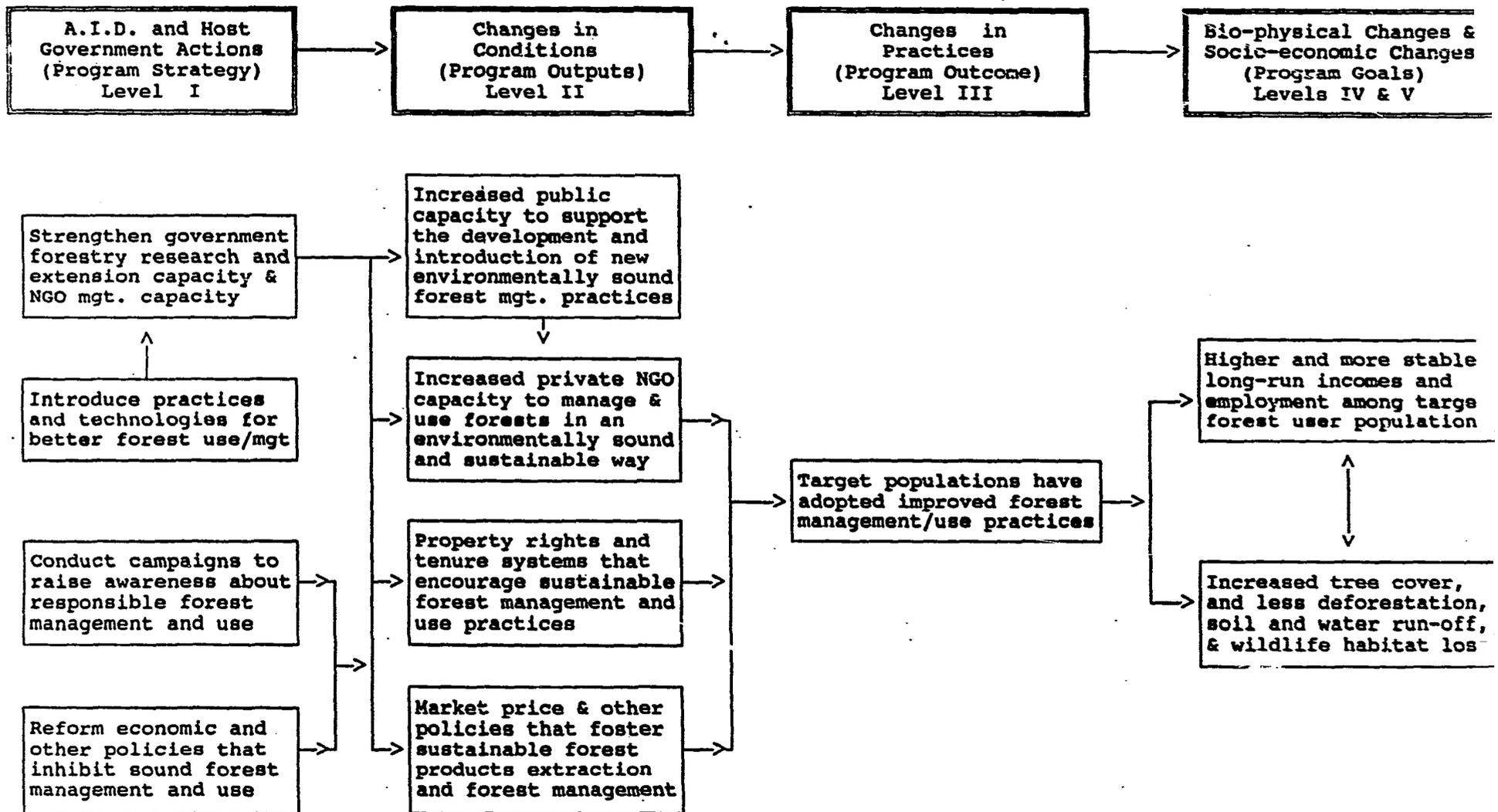
- program impact or the difference that A.I.D. support has made or can be expected to make and how this difference manifested;
- program efficiency or the capacity to generate benefits to society that exceed the value of the public -- A.I.D., other donor and host country -- resources invested in making the systems work;
- program effectiveness in relation to alternative approaches that A.I.D. and host countries might have achieved the same objectives;
- program sustainability after A.I.D. assistance is terminated;
- program replicability and spread of coverage beyond those initial direct participants in A.I.D. supported activities.

The field evaluations will examine the impact and performance of A.I.D. forestry program strategies using the CDIE Environmental Programs Assessment Framework of "Strategy (action) ———> conditions ———> practices ———> impact (bio-physical and socio-economic)" linkages. (See the CDIE Environmental Programs Assessment Framework for more detailed discussion). Figure F-1 adapts the Assessment analytical framework for the forestry sector evaluation. Figures F-2, F-3 and F-4 are the analytical frameworks to be used for evaluating farm forestry, community forestry, and forest habitat preserves programs.

The variables to be measured, their indicators, data sources, methods of measurement and analysis are discussed below for each of the levels of impact and performance in the analytical framework. These same variables will be measured throughout the period of field evaluation work. To assure uniformity in analysis across case studies, during field team planning the CDIE staff directing the sector evaluation will use the list of variables in directing preparation of data collection instruments and guidelines to be used during field evaluation work.

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Figure F-1: Conceptual Framework for A.I.D. Forestry Programs



Some of the indicator data will be used to infer causal relationships between each level of impact; some indicator data will be used to measure program performance -- efficiency, effectiveness, sustainability and replicability.

Conditions Expected From Implementing A.I.D. Strategies (Level II)

Variables and indicators. The A.I.D. forestry program strategies or actions are expected to bring about conditions to encourage the adoption of improved environmental practices and technologies. Condition-level variables are the independent variables of the analysis. The degree to which they are present is assumed to determine the degree to which practices-level variables are registered.

The following condition-level variables will be used to measure the degree to which conditions have been changed by the forestry program strategies. These variables will be qualitative or scalar in nature and they will be expressed as composite scores of indicators of the degree to which conditions are present as a result of A.I.D. program strategy interventions. The following are a list of the variables that will be used to measure conditions through-out the field evaluations. With each variable are listed the primary indicators that will be used to develop composite scores against which higher level impacts (e.g., impacts on practices, and bio-physical and socio-economic conditions will be compared.

Variable #1: National institutional capacity. Indicators: Existence of a national forestry planning framework; evidence that framework is being used to plan forest development activities; the existence of systems for monitoring forest conditions and use of these systems for strategic planning; existence and status (e.g., budgets and staff levels) of organizations created to address perceived forestry needs; forestry personnel policies; degree to which monitoring and evaluation functions operative and affecting program implementation; levels of external donor funding and technical support; decentralized decision-making authority and implementation capacity; degree of communication with other government services affecting local resource users.

Variable #2: Private users and user groups. Indicators: Numbers of organizations and numbers participants; type of forestry management activities they carry out; associations with which they are affiliated; their levels of technical training and skills; financial viability of local NGOs; participation of local actors in planning meetings and decision-making; the "climate" for establishing NGOs; status of local groups' security and rights to traditionally used forested areas.

Variable #3: Education and outreach system. Indicators: Number and types of training courses; number and types of participants; per unit costs of training course delivery; number and type of information publications; frequency of media use; local language translation practices; awards and recognition activities; systems for handling information requests; system for periodic information distribution.

Variable #4: Technology introduction system. Indicators: The type and extent of research and development activities; budget and staff of research organizations; relevance of the research agenda; responsiveness to feedback from local forestry groups; linkage to extension and education programs; the type and nature of information collection and transfer activities; degree of access to international research literature and plant germ plasm; participation in international networks; pilot and demonstration activities; visit and exchange activities among target program participants.

Variable #5: Policy reform process. Indicators: Degree of price regulation and control; degree of import duties and subsidies on forest products; type and nature of trade regimes; capacity to levy taxes and use proceeds at local level; revenue sharing arrangements distributing benefits among stakeholders in process; valuation policies for standing timber (differential stumpage fees by species and by distance from population concentrations or from degraded areas); targeted credit (i.e. credit to replant degraded sites versus clearing virgin forest) and other reforestation incentives; existence of forestry extension as separate from forest policing; time and nature of forest concessions; forestry code with clear rules governing tree tenure (an enforceable code).

Data sources and methods of collection. Before and during field work, evaluation teams will compile data from secondary sources including host country and USAID mission project and program records, research studies and reports. To verify the validity of secondary data and to collect additional primary data where needed, evaluation teams will make site visits and conduct group and individual interviews with selected respondents that are among target program beneficiaries. Respondent information will be collected largely on the basis of historical recall or from review of their files and records, (e.g., samples of advertisements, extension bulletins that they had received or collected as evidence of ways they learned about programs and participated in them).

Methods of measurement and analysis. Field evaluation teams will consolidate data into qualitative scales based on weights given to the existence of or degree to which the above conditions are present. The universal variables to be used through-out the forestry sector evaluation will be compiled in composite scaler indexes during the field evaluation planning process preceding the first field team visit. Condition-level data will be presented in a descriptive logic model which identifies their linkage to A.I.D.-supported program activities. Causal relationships, defined by plausible linkages to adoption of improved practices will be drawn by examining the information gathered for each variable.

Practices expected from changed conditions (Level III)

Variables and indicators. Practices-level variables are the dependent variables of the evaluation and the principal sources of verification and measurement of program impact. The evaluation will collect quantitative data on the share of target population (or area) adopting environmental

practices as a result of the new conditions fostered by A.I.D. program strategies. Where clear linkages have been established in the international development and environmental literature between practices and environmental impact, the practices variables will be used as proxies for attributing environmental impact of A.I.D. support for forestry programs.

Variable #1: People adopting new practices. Indicators: Number of users adopting new practices as a share of potential beneficiaries; degree to which forestry management practices are followed; gender distinctions among practices.

Variable #2: Area covered. Indicators: Area (acres, hectares, or square kilometers), covered by new practices as a percent of total potential area where practices could be applied.

Data sources and methods of collection. Field evaluation teams will collect data from surveys of beneficiary groups and group members where feasible. When not feasible and secondary survey data sources are insufficient or lacking, information on adoption of practices will be collected from a series of individual and group interviews with the staffs of participating agencies, members of local user groups and forest products firms and other selected entities. To the extent possible all major program locations in a country will be represented in data collection.

Evaluation teams will randomly or purposely select individuals and groups to be interviewed from lists of participants maintained by host government agencies. To control for response bias, evaluation team members will contact, set up appointments and visit participating individuals and organizations without help or participation of A.I.D. or host government officials. Field teams will be instructed to collect data from program non-participants as a control group, when time, resources and field survey logistics permit.

Methods of measurement and analysis. Before going to the field, evaluation teams will develop qualitative scales based on rates and degrees of adoption among program target beneficiaries. These scales will be related to condition-level variables to assess the impact of forestry program strategies on fostering changes in practices which changed conditions are hypothesized to influence.

Bio-physical & socio-economic conditions from changed practices (Levels IV and V)

Variable #1: Bio-physical conditions. Indicators: Levels and changes in: a) area of vegetation cover (percent tree/shrub crown cover in open woodlands and agro-forestry systems, number of new tree plantations, their composition and planting density); b) rates of deforestation (trends in natural forest cover relative to total potential area); c) quality of vegetation cover (existence of key indicator species); d) fertility and productivity of surrounding soils.

Variable #2: Socio-economic conditions. Indicators: Levels and changes in: a) incomes of participating economic units (individuals, families, user groups); b) non-monetary welfare of economic units having use rights to the forest products resulting from improved management.

Data sources and methods collection. Because of time and resource limitations the evaluation will develop bio-physical and socio-economic indicators using information obtained from the monitoring files of the evaluated forestry programs themselves and from other secondary data sources. However, to assess the reliability of these data sources evaluation teams will examine the data collection instruments, discussing data collection procedures and verifying some of this data through spot checks of participant records during site visits.

Bio-physical impact: Forestry sector master plans, conservation strategies and other high level sectoral program documents; forest management plans implementation reports; natural resource inventories; environmental monitoring studies; proxy indicators from knowledgeable observers.

Socio-economic impact: Sample survey data from agency, host government and USAID records; original beneficiary surveys where secondary sources are lacking or inadequate; individual and group interviews.

Methods of measurement and analysis. To examine the impact of changes in practices on bio-physical conditions, the evaluation will conduct a longitudinal study comparing forest resource base before and after program activities. To examine socio-economic impact of new practices, the same longitudinal study will compare participants' fuelwood and timber expenses, incomes and profits before and after program participation. The evaluation will also draw on the international literature as an additional source of verification of linkages between practices and their impact on bio-physical and socio-economic conditions.

Team Make-up for Field Evaluation Case Studies

Each evaluation case study will involve a 2-5 person team over a total of 2-6 weeks each in-country. Field studies may be conducted during one period or, where warranted, scheduled over two field visits to allow for advance planning and interim data collection (e.g., where beneficiary field surveys are required).

The field teams are expected to be largely self-contained and to work independently. However, CDIE would look to USAID missions for limited support by designating an officer to facilitate scheduling initial appointments with government agencies, arranging site visits and, to the extent available, use of a mission office space out of which to work. (Otherwise, teams will use hotel or contract facilities).

Each field team will be led by a CDIE evaluation officer and comprise A.I.D. direct hire and contract evaluation specialists drawn from disciplines related to the features of each country E/NRM program. Team members will be selected in consultation with field missions and AID/W regional bureaus. The evaluation services contractors will support field teams with required in-country logistics and contracting, say, for the services of host country nationals who might be needed for conducting field surveys.

CDIE anticipates a range of technical professional skills will be required in conducting the field study activities. All field evaluation team members should have developing country experience in their fields working in design, implementation or evaluation of projects supported by A.I.D. or other donors. Spanish and French, and local language, fluency is highly desirable and in some cases required. Proven analysis and writing skills will be required of all specialists.

The following is a list of special skills known now to be required in the course of the field evaluation case study work in the forestry sector:

- **Evaluation Specialist** -- Experience in quantitative and qualitative techniques for measuring and valuing the costs and impacts of A.I.D. and other donor interventions in the E/NRM area. The evaluation specialist will not accompany all field teams but will be consulted regularly throughout the field study period on procedures and methods need to assure maximum comparability of the case study research.
- **Social Scientist** -- Experience with local community action programs in the natural resources. Skilled in group and individual beneficiary interview/survey techniques to determine impact incidence at gender and other levels. Local language skills may be required in some cases.
- **Natural Resources or Forestry Economist** -- Experience at assessing macro-level and farm level impact of economic policy on natural resource management and sustainable forest production systems. Asia and Latin American experience essential.
- **Farming Systems Research Specialist** -- Experience in conducting on-farm research for the development and introduction of farm forestry within traditional crop production systems. Experience in Asia, Africa and Latin America is essential. Fluency in Spanish required for work in Latin America; local language fluency is highly desirable.
- **Wildlife/Park Management Specialist** -- Experience with the management of parks and preserves for the conservation of natural habitats and biological diversity. Experience with "nature tourism" projects and with integrating habitat conservation with economic activity in developing country settings would be valuable. Developing country experience, preferably in Asia and Latin America is essential.

- **Forest Management Specialist** -- Experience working with community forestry and with sustainable forest management systems. Spanish required for Latin America. Local language fluency highly desirable in some cases.

Implementation schedule for field evaluations and reports

CDIE began its evaluation of environmental programs in the forestry sector with a review of the A.I.D. program and project literature in early 1992 and the first field case study -- of farm forestry -- in Pakistan in the fall of 1992. An additional five field evaluations are scheduled during 1993. CDIE is tentatively planning to include the following countries and programs in its field evaluation work.

<u>Program evaluation</u>	<u>Country locations</u>	<u>Status/timing</u>
Farm forestry	Pakistan	Completed
Farm forestry	Gambia	May '93
Community forestry	Nepal	May '93
Community forestry	Ecuador	July '93
Community forestry	Africa (TBD)	July '93
Community forestry	Philippines	September '93
Forest wildlife reserves	Sri Lanka/Thailand	May/Sept '93
Blackberry preserves	Oregon/Washington/Alaska	August '93
Forest wildlife reserves	Costa Rica/Jamaica	November '93
Forest wildlife reserves	Uganda/Madagascar	November '93
Synthesis Report	All field studies	January '94

Each program case study evaluation will be documented in a CDIE technical report issued after the completion of field study work. The forest preserves case study evaluations will be directed at the role of forestry programs in the protection of biological diversity.

Each of these forestry program evaluations will be the subject of an evaluation report and a "highlight" bulletin. Periodically, when there is sufficient information, CDIE will prepare senior management bulletins for more prompt information dissemination.

The following Figures F-2, F-3 and F-4 present the conceptual frameworks for the program evaluations in the farm forestry, community forestry and forest (biodiversity habitat) preserves areas, respectively. Attached also is an outline for the synthesis report to be compiled from the CDIE evaluation of environmental programs in the forestry sector.

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Figure F-2: Conceptual Framework for A.I.D. Farm Forestry Programs

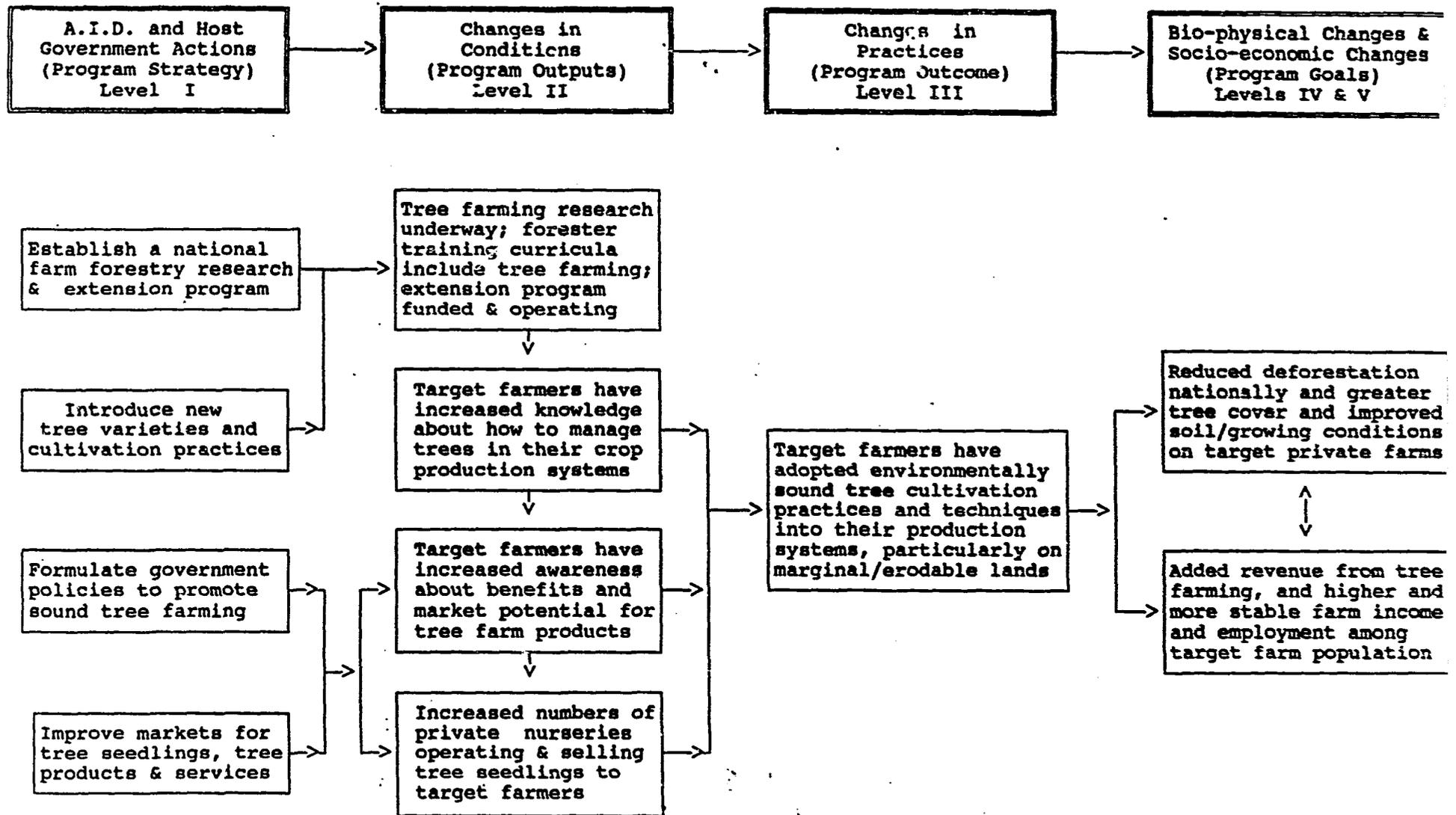
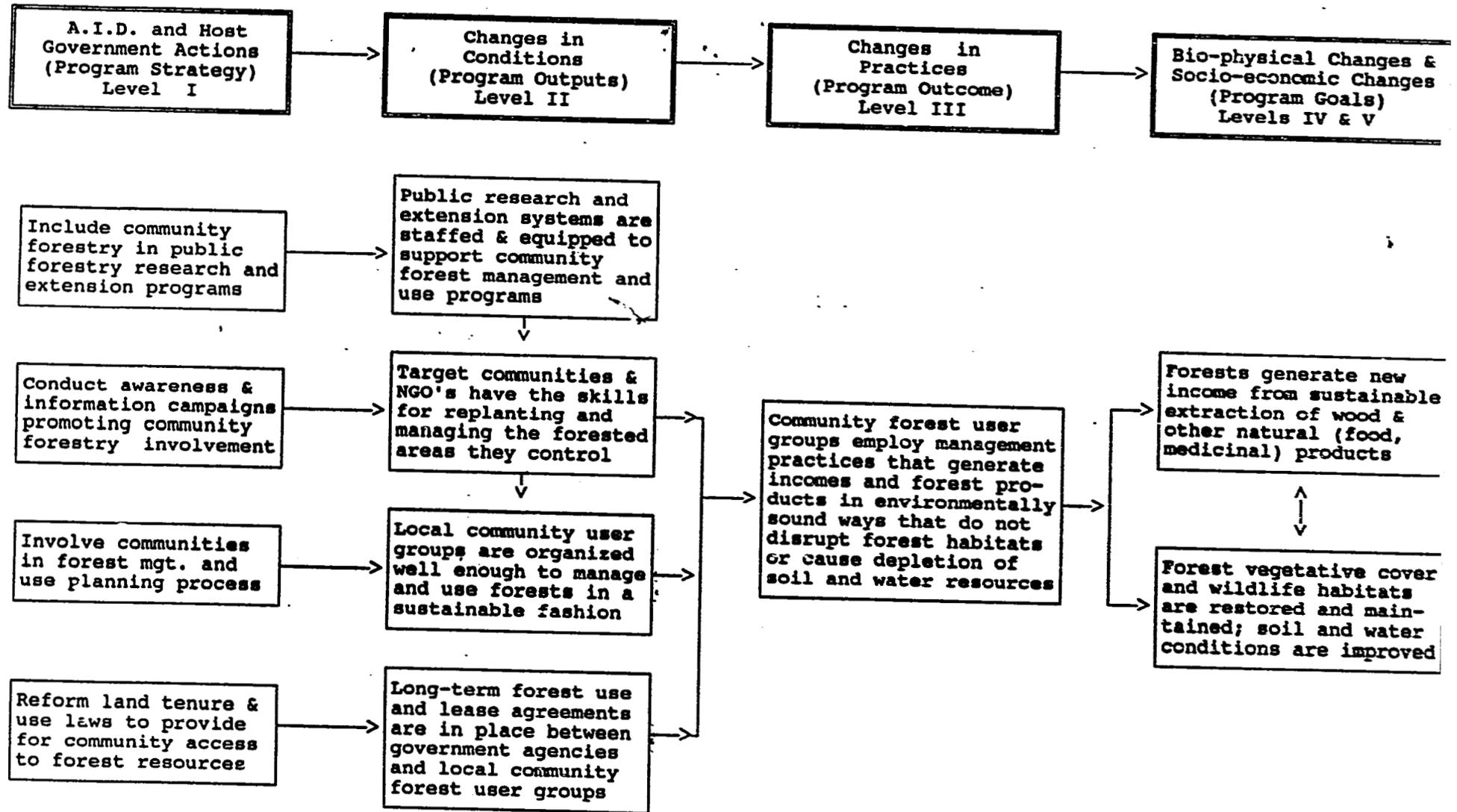
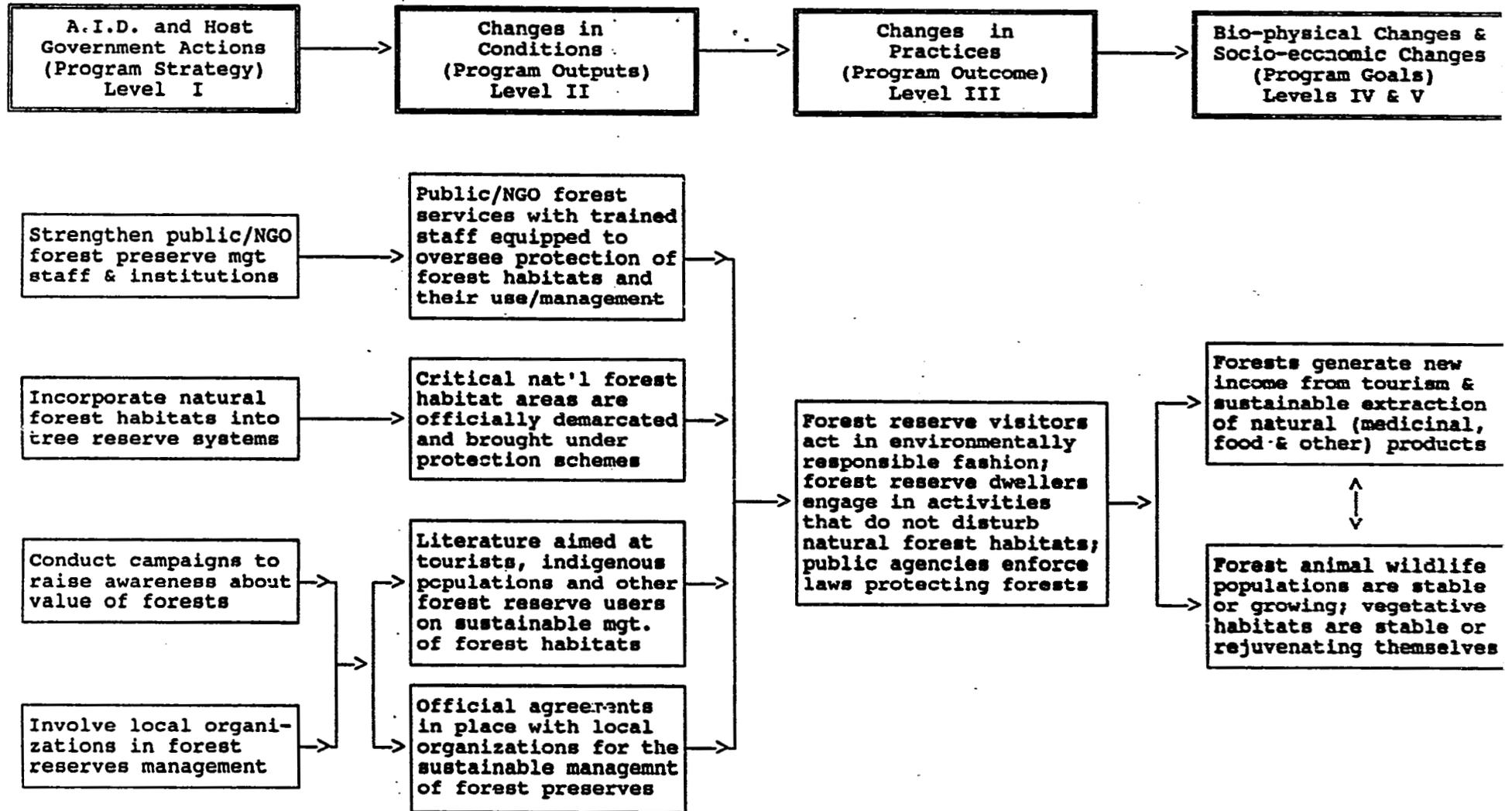


Figure F-3: Conceptual Framework for A.I.D. Community Forestry Programs



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Figure F-4: Conceptual Framework for A.I.D. Forest Preservation Programs



CDIE ASSESSMENT OF ENVIRONMENTAL PROGRAMS -- FORESTRY SECTOR
SYNTHESIS REPORT OUTLINE

1.0 Introduction

1.1 Objective and rationale of the evaluation

- 1.1 The problem -- loss of vegetative cover due to unsustainable forest management practices**

2.0 A.I.D. environmental programs in the forestry sector

2.1 Farm forestry

2.2 Community "social" forestry

2.3 Forest habitat preservation

3.0 Evaluation Findings

3.1 The role of A.I.D. program strategies

- 3.1.1 Institutional strengthening**
- 3.1.2 Education and outreach**
- 3.1.3 Technology introduction**
- 3.1.4 Policy and tenure reform**

3.2 Program impact

- 3.1.1 Impact on practices**
- 3.1.2 Biophysical impact**
- 3.1.3 Socio-economic impact**

3.3 Program Performance

- 2.2.1 Program efficiency**
- 2.2.2 Program effectiveness**
- 2.2.3 Program sustainability and replicability**

4.0 Lessons Learned and Management Implications

ANNEX #1: References

ANNEX #2: Analytical framework for the forestry sector evaluation

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**ANNEX 2: EVALUATION DESIGN FOR
A.I.D. ENVIRONMENTAL PROGRAMS IN THE AGRICULTURE SECTOR**

Objective

The CDIE evaluation of A.I.D. environmental programs in the agriculture sector has two objectives:

- To assess the impact of A.I.D. assistance to the adoption of sustainable agriculture production systems in developing countries; and
- to identify approaches and conditions that influence the performance of A.I.D. programs that have supported environmentally sound and sustainable agriculture production programs.

Rationale

In the on-going struggle to produce enough food for a growing global population, agricultural lands have come under increasing pressures. Green revolution technologies have helped alleviate some of this pressure by increasing farm yields. A growing challenge facing agriculture today is sustaining current rates of agricultural yield increases without destroying the land and water resource base on which crop and livestock production activity depends.

In Latin America and Asia, economic policies such as input subsidies to stimulate food crop production have led to both environmental degradation and natural resource depletion as farmers responded by clearing and cultivating marginal lands and dumping excessive amounts of chemical pesticides on their crops. Africa's agricultural soils have also deteriorated under the economic and demographic pressures that have driven farmers to continuously cultivate land previously left to "rest" and rejuvenate in traditional bush-fallow systems.

A.I.D. support to sustainable agriculture programs are designed to increase agricultural productivity while maintaining or enhancing the natural resource base. These programs include investments in integrated pest management and biological nitrogen fixation to reduce dependence on chemical fertilizers and pesticides, minimum tillage, green manure, terracing, agro-forestry and other cropland and rangeland management systems to improve soil conservation and increase soil nutrient and moisture content.

According to a 1992 desk study, A.I.D. authorizations to support sustainable agriculture programs during 1980-91 were about \$645 million, or about 40 percent of total authorizations to support A.I.D. projects with an environmental and natural resources focus during this period. These substantial investments warrant examination for what it can reveal about the impact and performance of sustainable agricultural programs that A.I.D. has supported.

Description

This evaluation of A.I.D. environmental programs in the agriculture sector was launched in 1992 with a review of the evaluation literature on A.I.D.'s experience to date. The evaluation in 1993 is entering the field evaluation phase when it will examine three models of environmental management in the agriculture sector:

- **Sustainable cropland management** -- the introduction of crop cultivation systems (e.g., agro-forestry, terracing, low tillage, rain water catchment) aimed at stabilizing fragile soils and restoring and maintaining their productive capacity;
- **Sustainable rangeland management** -- aimed at encouraging pastoral herders and herder groups to utilize common grazing lands in a sustainable fashion;
- **Integrated pest management** -- programs that reduce farmers' dependency on and incentives to overuse harmful and hazardous chemical pesticides when other natural pest control practices are feasible.

The evaluation will examine the ways that the Agency has assisted developing countries in fostering these sustainable agriculture production systems and the impact that these systems have had on agricultural soil and water resources and on the wildlife which has its habitat on or near agricultural lands. The evaluation findings will contribute to more effective sustainable agricultural production program activities under the Agency's new Environmental Strategy.

Beginning in the summer of 1993 field evaluation teams will visit selected A.I.D. countries to collect data on A.I.D.-supported sustainable agriculture programs. Upon completion of the field evaluation work in early 1994, CDIE will synthesize, in a final report on environmentally sound sustainable agriculture production programs, the findings from its agriculture sector field evaluations, from other A.I.D. agriculture program evaluation literature, from other donor agency's experiences. (An outline of that report is appended to this agriculture sector design.)

The Analytical Framework

The operating hypothesis of the evaluation is that the adoption of environmentally sound & sustainable agriculture production systems results from A.I.D. agricultural programs that:

- Strengthen institutional capacity of national and local organizations in the planning, coordination and implementation agriculture production programs;
- Conduct education and outreach campaigns to raise awareness, transfer information and foster advocacy;
- Transfer or developing sustainable agriculture production technologies;

- Reform policies to remove input, product and land market distortions and other disincentives (e.g., access to common property land resources);

The evaluation will test this hypothesis by field examination of selected A.I.D. supported environmental programs in the agriculture sector. The evaluation will collect evidence to document if programs employing these strategies have performed best. The field evaluation work will focus on testing the linkages between these strategies and the benefits of environmentally sound and sustainable agriculture production programs. A.I.D. supported programs that employ these strategies are expected to score well on five performance scales used in CDIE evaluations:

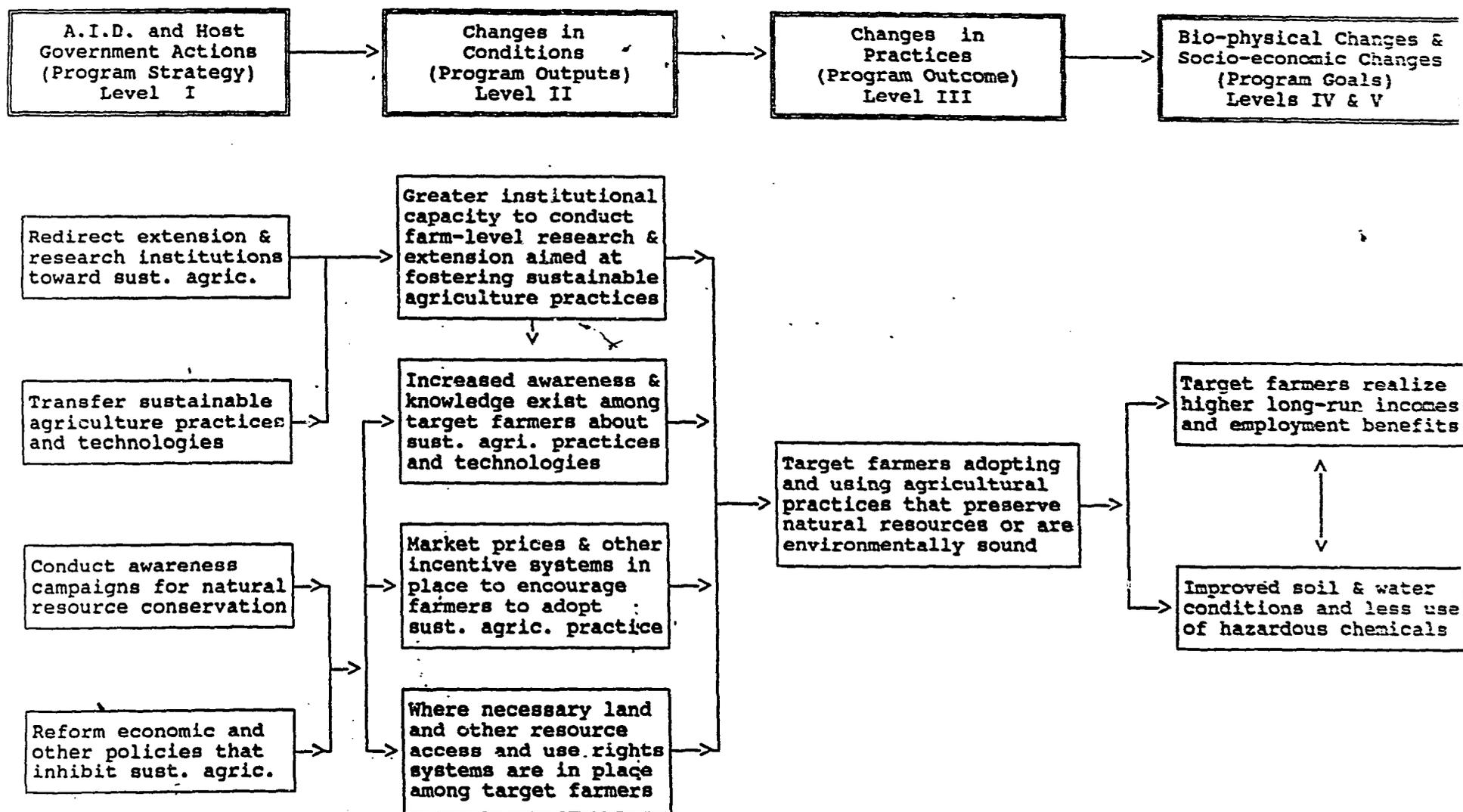
- program impact or the difference that A.I.D. support has made or can be expected to make and how this difference manifested;
- program efficiency or the capacity to generate benefits to society that exceed the value of the public -- A.I.D., other donor and host country -- resources invested in making the systems work;
- program effectiveness in relation to alternative approaches that A.I.D. and host countries might have achieved the same objectives;
- program sustainability after A.I.D. assistance is terminated;
- program replicability or spread in coverage beyond those initial direct participants in A.I.D. supported activities.

The field evaluations will examine the impact and performance of the five A.I.D. agriculture program strategies using the CDIE Environmental Programs Assessment Framework of "Strategy (action) —————> conditions —————> practices —————> impact (bio-physical and socio-economic)" linkages. (See the CDIE Environmental Programs Assessment Framework for more detailed discussion). Figure A-1 adapts the Assessment analytical framework for the agriculture sector evaluation. Figures A-2, A-3 and A-4 are the analytical frameworks to be used for evaluating cropland, rangeland, and integrated pest management programs, respectively.

The variables to be measured, their indicators, data sources, methods of measurement and analysis are discussed below for each of the levels of impact and performance in the analytical framework. These variables will be measured throughout the period of field evaluation work. To assure uniformity in analysis across case studies, the CDIE staff directing the sector evaluation will use the list of variables in directing preparation of data collection instruments and guidelines during field evaluation team planning.

Some of the indicator data will be used to infer causal relationships between each level of impact; some indicator data will be used to measure program performance -- efficiency, effectiveness, sustainability and replicability.

Figure A-1: Conceptual Framework for A.I.D. Sustainable Agriculture Programs



Conditions Expected From Implementing A.I.D. Strategies (Level II)

Variables and indicators. The A.I.D. sustainable agriculture program strategies or actions are expected to bring about conditions to encourage the adoption of improved environmental practices and technologies. Condition-level variables are the independent variables of the analysis. The degree to which they are present is assumed to determine the degree to which practices-level variables are registered.

The following condition-level variables will be used to measure the degree to which conditions have been changed by the agriculture program strategies. These variables will be qualitative or scaler in nature, they will be expressed as composite scores of indicators of the degree to which conditions are present as a result of A.I.D. program strategy interventions. The following are a list of the variables that will be used to measure conditions through-out the field evaluation case studies. With each variable are listed the primary indicators that will be used to develop composite "scores" for the variables against which higher level impacts (e.g., impacts on practices and bio-physical and socio-economic conditions) will be compared.

Variable #1: National institutional capacity. Indicators: Existence of a national agriculture planning framework; evidence that framework is being used; the existence of systems for monitoring agricultural conditions and use of these systems for strategic planning; existence and status (e.g., budgets and staff levels) of organizations created to address perceived sustainable agriculture needs; agriculture personnel policies; degree to which monitoring and evaluation functions operative and affecting program implementation; levels of external donor funding and technical support; decentralized decision-making authority and implementation capacity; degree of communication with other government services affecting local resource users.

Variable #2: Private producers and producer groups. Indicators: Numbers of organizations and numbers participants; type of sustainable agriculture management activities they carry out; associations with which they are affiliated; their levels of technical training and skills; financial viability of local farmer groups or NGOs; participation of local actors in planning meetings and decision-making; the "climate" for establishing NGOs; status of land tenure systems.

Variable #3: Education and outreach system. Indicators: Number and types of training courses; number and types of participants; per unit costs of training course delivery; number and type of information publications; frequency of media use; local language translation practices; awards and recognition activities; systems for handling information requests; system for periodic information distribution.

Variable #4: Technology introduction system. Indicators: The type and extent of research and development activities; budget and staff of research organizations; relevance of the research agenda; responsiveness to feedback from local farmer groups; linkage to

extension and education programs; the type and nature of information collection and transfer activities; degree of access to international research literature and plant germ plasm; participation in international networks; pilot and demonstration activities; visit and exchange activities among target program participants.

Variable #5: Policy setting. Indicators: Degree of price regulation and control on agricultural input and product markets; degree of import duties and subsidies on agricultural products and inputs; targeted credit (i.e. credit for sustainable agriculture systems).

Data sources and methods of collection. Before and during field work, evaluation teams will compile data from secondary sources including host country and USAID mission project and program records, research studies and reports. To verify the validity of secondary data and to collect additional primary data where needed, evaluation teams will make site visits and conduct group and individual interviews with selected respondents that are among target program beneficiaries. Respondent information will be collected largely on the basis of historical recall or from review of their files and records, (e.g., samples of advertisements, extension bulletins that they had received or collected as evidence of ways they learned about programs and participated in them).

Methods of measurement and analysis. Field evaluation teams will consolidate data into qualitative scales based on weights given to the existence of or degree to which the above conditions are present. The universal variables to be used through-out the forestry sector evaluation will be compiled in composite scaler indexes during the case study evaluation planning process and before going to the field. Condition-level data will be presented in a descriptive logic model which identifies their linkage to A.I.D.-supported program activities. Causal relationships, defined by plausible linkages to adoption of improved practices will be drawn by examining the information gathered for each variable.

Practices expected from changed conditions (Level III)

Variables and indicators. Practices-level variables are the dependent variables of the evaluation and the principle sources of verification and measurement of program impact. The evaluation will collect quantitative data on the share of target population (or area) adopting environment and natural resource management practices as a result of the new conditions fostered by A.I.D. program strategies. Where clear linkages have been established in the international development and environmental literature between practices and environmental impact, the practices variables will be used as proxies for attributing environmental impact of A.I.D. support for host country sustainable agriculture programs.

Variable #1: People adopting new practices. Indicators: Number of users adopting new practices as a share of potential beneficiaries; degree to which sustainable agriculture management practices are followed; gender distinctions among practices.

Variable #2: Area covered. Indicators: Area (acres, hectares, or square kilometers), covered by new practices as a percent of total potential area where practices could be applied.

Data sources and methods of collection. Field evaluation teams will collect data from surveys of beneficiary groups and group members where feasible. When not feasible and secondary survey data sources are insufficient or lacking, information on adoption of practices will be collected from a series of individual and group interviews with the staffs of participating agencies, members of local user groups and forest products firms and other selected entities. To the extent possible all major program locations in a country will be represented in data collection.

Evaluation teams will randomly or purposely select individuals and groups to be interviewed from lists of participants maintained by host government agencies. To control for response bias, evaluation team members will contact, set up appointments and visit participating individuals and organizations without help or participation of A.I.D. or host government officials. Field evaluation teams will be instructed to collect data from program non-participants as a control group when time, resources and survey logistics permit

Methods of measurement and analysis. Before going to the field, evaluation teams will develop qualitative scales based on rates and degrees of adoption among program target beneficiaries. These scales will be related to condition-level variables to assess the impact of sustainable agriculture program strategies on fostering changes in practices which changed conditions are hypothesized to influence.

Bio-physical & socio-economic conditions from changed practices (Levels IV and V)

Variable #1: Bio-physical conditions. Indicators: Levels and changes in: a) area of improved vegetation cover; b) rates of soil run-off and erosion; c) degree of chemical pesticide and fertilizer residues in soil and water; cover relative to total potential area); c) quality of neighboring wildlife habitats and diversity of wildlife species; d) fertility and productivity of surrounding soils.

Variable #2: Socio-economic conditions. Indicators: Levels and changes in: a) incomes of participating economic units (farmers, farm families, agricultural producer groups); b) non-monetary welfare of agricultural producers and their families in terms of health and quality of life and security of employment.

Data sources and methods collection. Because of time and resource limitation the evaluation will develop its bio-physical and socio-economic indicators using information obtained from the monitoring records of the evaluated agriculture programs themselves and from other secondary data sources. To assess the reliability of these data sources, evaluation teams will examine the data collection instruments, discussing data collection procedures and verifying some of this data

through spot checks of participant records during site visits.

Bio-physical impact: Agriculture sector master plans, conservation strategies and other high level sectoral program documents; agriculture program management plans implementation reports; natural resource inventories; environmental monitoring studies; proxy indicators from knowledgeable observers.

Socio-economic impact: Sample survey data from agency, host government and USAID records; original beneficiary surveys where secondary sources are lacking or inadequate; individual and group interviews.

Methods of measurement and analysis. To examine the impact of changes in practices on bio-physical conditions, the evaluation will conduct a longitudinal study to compare the quality of the agricultural resource base before and after program activities. To examine socio-economic impact of new practices, the evaluation will conduct a longitudinal study comparing participants' crop or livestock production, incomes and profits before and after program participation. The evaluation will also draw on the international literature as an additional source of verification of linkages between practices and their impact on bio-physical and socio-economic conditions.

Team Make-up for Field Evaluation Case Studies

Each field evaluation case study will involve a 2-5 person team over a total of 2-6 weeks each in-country. Field studies may be conducted during one period or, where warranted, scheduled over two field visits to allow for advance planning and interim data collection (e.g., where beneficiary field surveys are required).

The field teams are expected to be largely self-contained and to work independently. However, CDIE would look to USAID missions for limited support by designating an officer to facilitate scheduling initial appointments with government agencies, arranging site visits and, to the extent available, use of a mission office space out of which to work. (Otherwise, teams will use hotel or contract facilities).

Each field team will be led by a CDIE evaluation officer and comprise A.I.D. direct hire and contract evaluation specialists drawn from disciplines related to the features of each country E/NRM program. Team members will be selected in consultation with field missions and AID/W regional bureaus. The evaluation services contractors will support field teams with required in-country logistics and contracting, say, for the services of host country nationals who might be needed for conducting field surveys.

CDIE anticipates a range of technical professional skills will be required in conducting the field study activities. All field team participants should have developing country experience in their fields working in design, implementation or evaluation of projects supported by A.I.D. or other donors. Spanish and French, and local language, fluency is highly desirable and in some cases

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required. Proven analysis and writing skills will be required of all specialists.

The following are the special skills required in the evaluation of A.I.D. environmental programs in the agriculture sector:

- **Evaluation Specialist** -- Experience in quantitative and qualitative techniques for measuring and valuing the costs and impacts of A.I.D. and other donor interventions in the E/NRM area. The evaluation specialist will not necessarily accompany all field teams but will be consulted on evaluation procedures and methods to assure continuity of the case study research.
- **Social Scientists** -- Experience in the fields of: (a) local community and NGO programs in the natural resources use and management areas, including local group financing, conflict resolution, advocacy; and (b) rural household dynamics with skills in measuring and analyzing farm household organization and labor allocation agriculture. Skilled in group and individual beneficiary interview/survey techniques to determine impact incidence at gender and other levels. Local language skills may be required in some cases.
- **Natural Resources or Agricultural Economist** -- Experience at assessing macro-level and farm level impact of economic policy on natural resource management and sustainable agriculture production systems. Asia and Latin American experience essential.
- **Farming Systems Research Specialist** -- Experience in conducting on-farm research for the development and introduction of sustainable agriculture production practices such as agro-forestry, integrated pest management, soil and water conservation measures. Experience in Asia, Africa and Latin America is essential. Fluency in Spanish required for work in Latin America; local language fluency is highly desirable.
- **Range Management Specialist** -- Experience working with pastoral and nomadic herder groups in developing countries, particularly Africa. French fluency essential.

Implementation schedule for field evaluations and reports

CDIE began its evaluation of environmental programs in the agriculture sector with a review of the A.I.D. program and project literature in early 1992. Five field evaluations are scheduled during 1993 and early 1994. CDIE is tentatively planning to include the following countries and programs in its field evaluation work.

<u>Program evaluation</u>	<u>Country location(s)</u>	<u>Status/timing</u>
Cropland management	Nepal	May '93
Cropland management	Gambia	May '93
Cropland management	Philippines	Sep '93
Cropland management	Guatemala	Jan '93
Rangeland management	Lesotho/Morocco	Jan '94
Int. Pest Mgt.	Indonesia	Mar '94
Synthesis Report	All field studies	May '94

Each program case study evaluation will be documented in a CDIE technical report issued after the completion of field study work. Each of these sustainable agriculture program evaluations also will be the subject of an evaluation report and a "highlight" bulletin. Periodically, when there is sufficient information, CDIE will prepare senior management bulletins for more prompt information dissemination.

The following Figures A-2, A-3 and A-4 present the conceptual frameworks for the program evaluations in the sustainable cropland management, sustainable range management and integrated pest management areas, respectively. Attached also is an outline for the synthesis report to be compiled from the CDIE evaluation of environmental programs in the sustainable agriculture sector.

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Figure A-2: Conceptual Framework for A.I.D. Cropland Management Programs

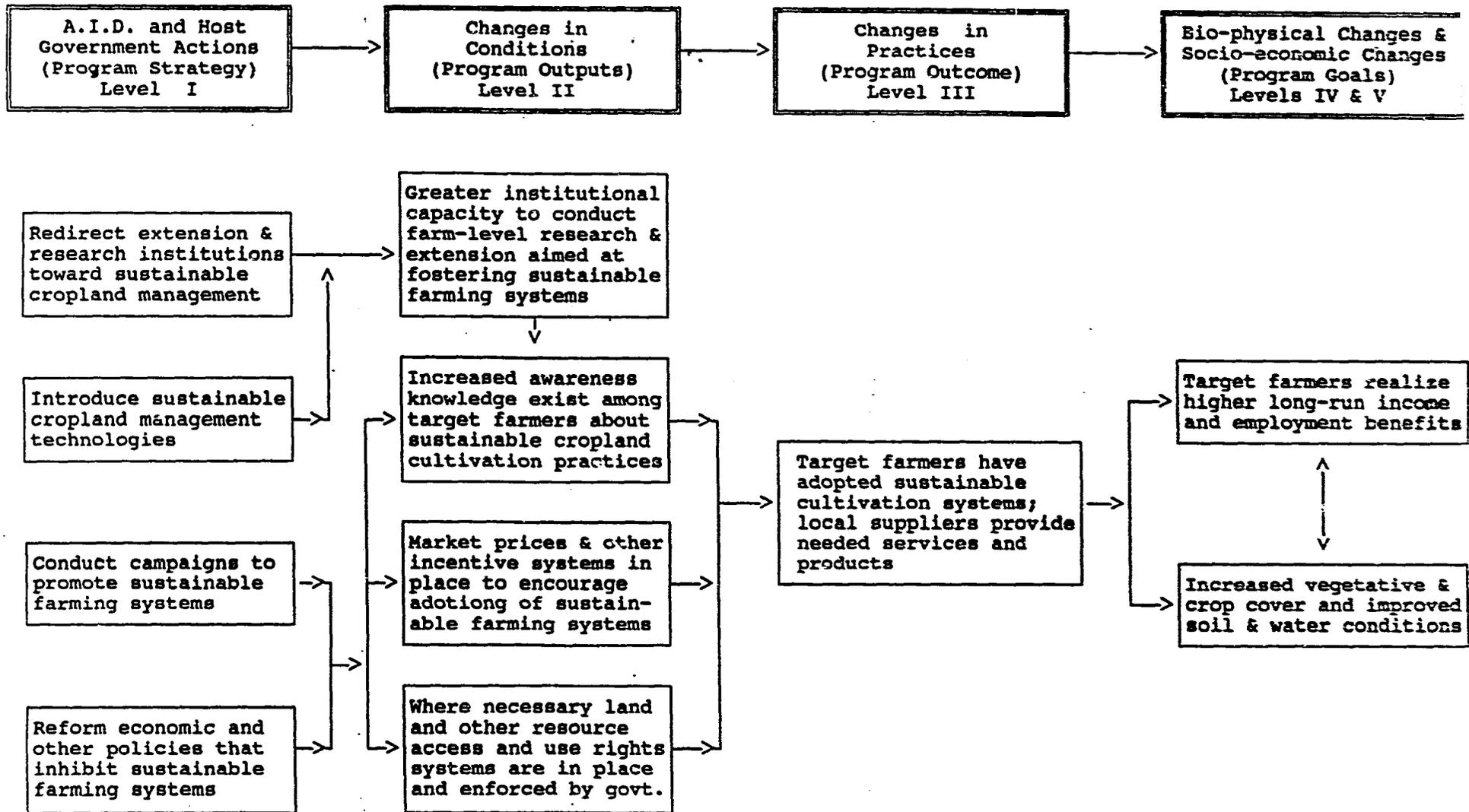


Figure A-3: Conceptual Framework for A.I.D. Rangeland Management Programs

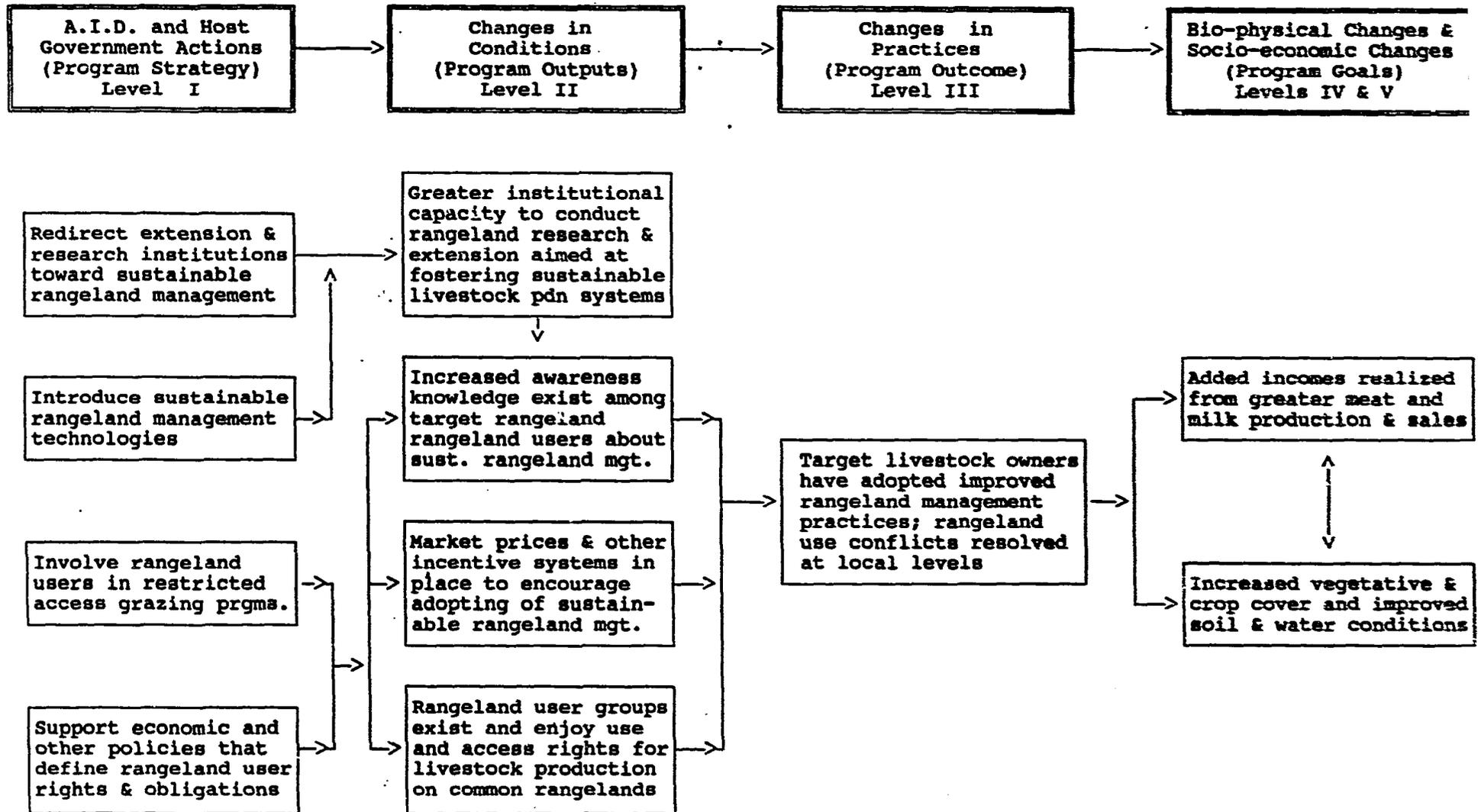
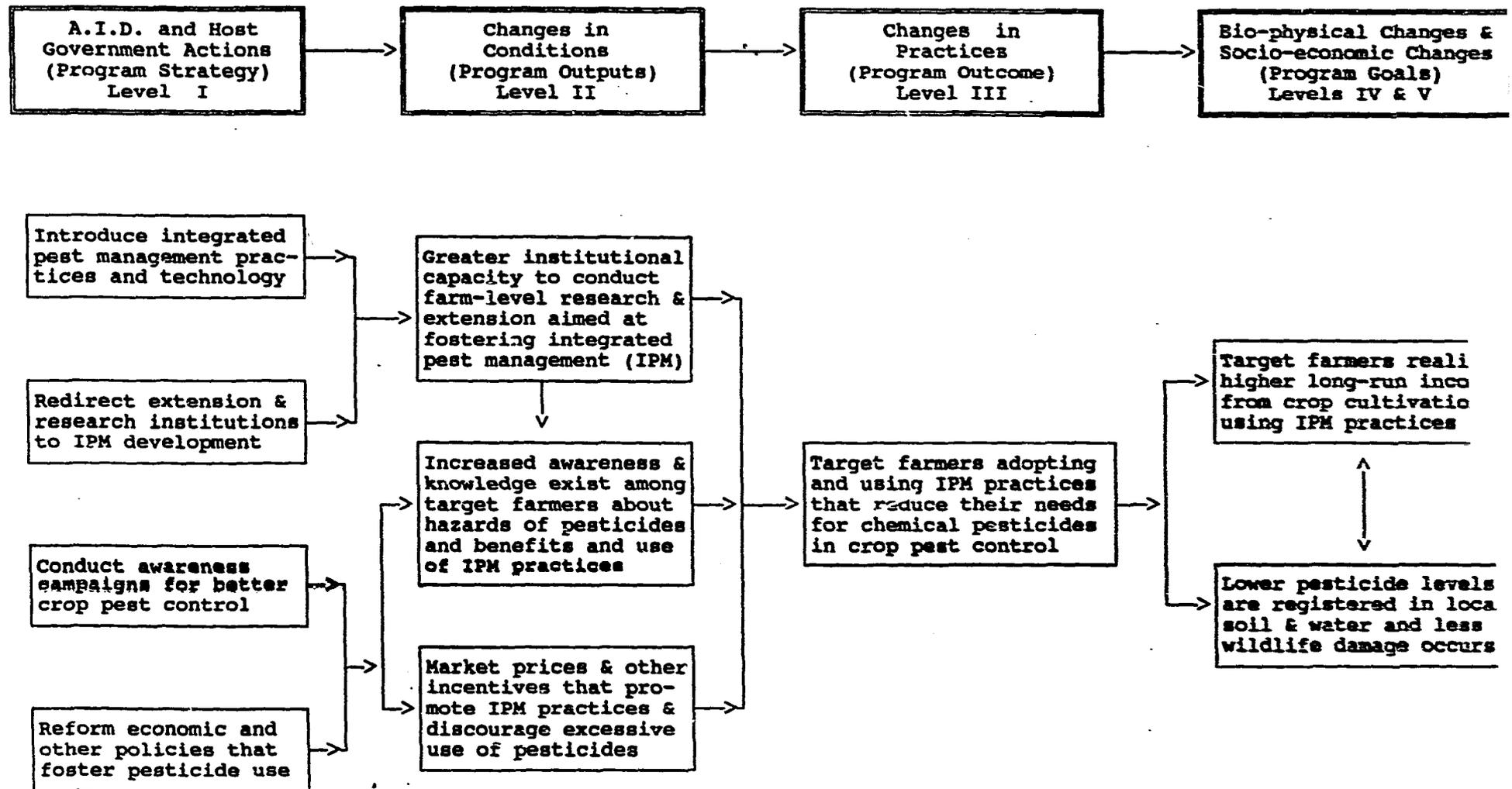


Figure A-4: Conceptual Framework for A.I.D. Integrated Pest Management (IPM) Programs



**CDIE ASSESSMENT OF ENVIRONMENTAL PROGRAMS -- AGRICULTURE SECTOR
SYNTHESIS REPORT OUTLINE**

1.0 Introduction

1.1 Objective and rationale of the evaluation

1.1 The problem -- degradation of land and water resources due to over farming and to harmful use of agricultural chemicals

2.0 A.I.D. environmental programs in the agriculture sector

2.1 Sustainable croplands management

2.2 Sustainable rangeland management

2.3 Integrated pest management

3.0 Evaluation Findings

3.1 The role of A.I.D. program strategies

3.1.1 Institutional strengthening

3.1.2 Education and outreach

3.1.3 Technology introduction

3.1.4 Policy and tenure reform

3.2 Program impact

3.1.1 Impact on practices

3.1.2 Biophysical impact

3.1.3 Socio-economic impact

3.3 Program Performance

2.2.1 Program efficiency

2.2.2 Program effectiveness

2.2.3 Program sustainability and replicability

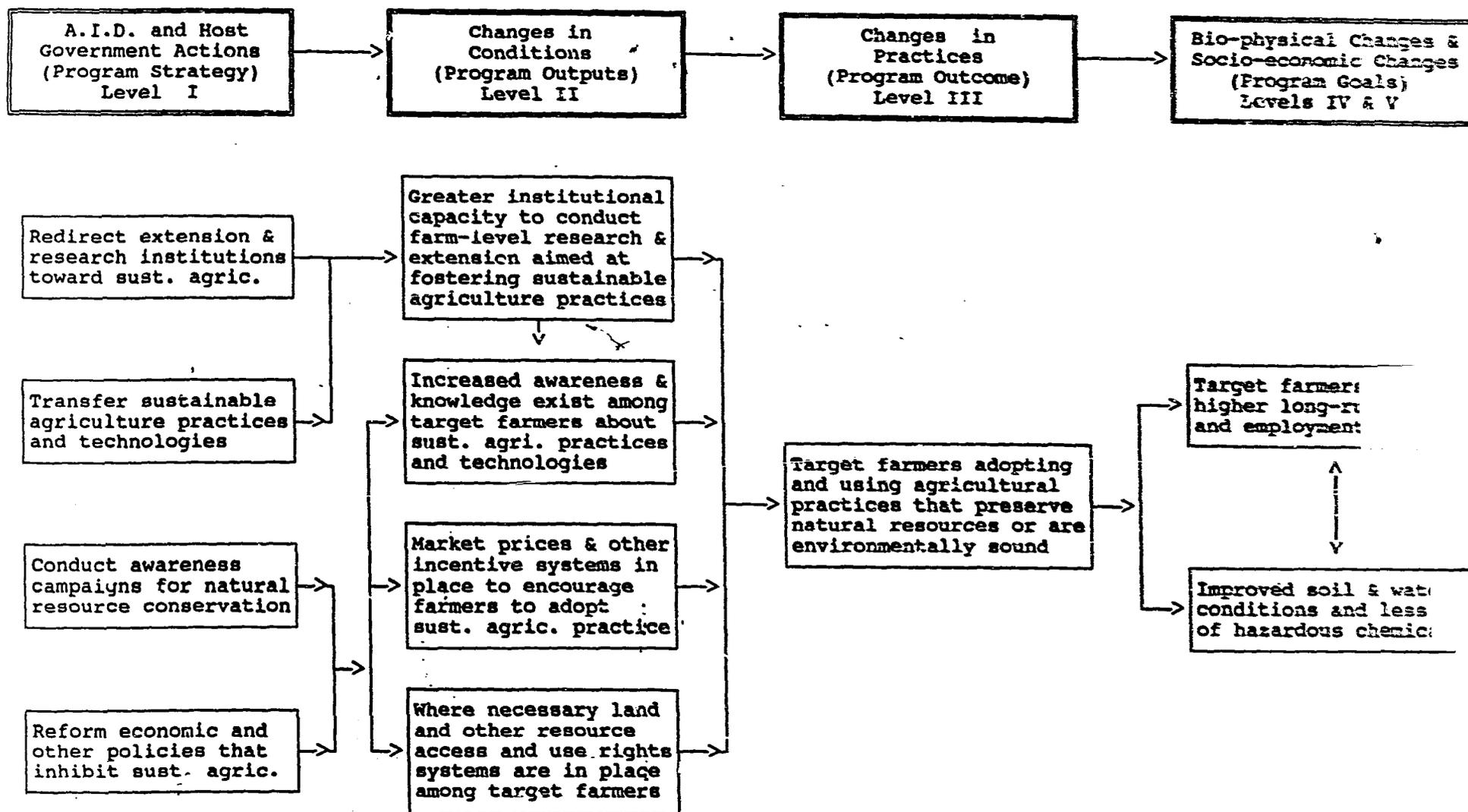
4.0 Lessons Learned and Management Implications

ANNEX #1: References

ANNEX #2: Evaluation analytical framework

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Figure A-1: Conceptual Framework for A.I.D. Sustainable Agriculture Programs



PA-ABQ-288

CDIE ASSESSMENT OF A.I.D. ENVIRONMENTAL PROGRAMS

PART II: TECHNICAL ANNEXES TO THE DESIGN PROPOSAL

September 1992

TECHNICAL ANNEXES

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ANNEX I

INTRODUCTION TO THE TECHNICAL ANNEXES

1. INTRODUCTION

1.1 The Content of the Technical Annexes

The project reviews in Annexes II, III, and IV are based on library research conducted at the request of A.I.D.'s Center for Development Information and Evaluation (POL/CDIE). The reviews focus on those A.I.D. efforts — both projects and programs — that had as their sole objective, or as an important objective, the improvement, stabilization, or sustainable use of the environment and natural resources. For the purposes of this literature review, projects and programs reviewed have been grouped into three categories, which we have labeled the **green realm**, the **brown realm**, and the **blue realm**. The green realm includes rural, land-based activities; the brown realm, urban/industrial and energy activities; and the blue realm fisheries and coastal resources activities.

In practice, there are no sharp distinctions among the green, blue, and brown realms. Conditions in one component of an ecosystem often affect others. This is especially true in such cases as watershed management, where manipulation of forest and agricultural cover can increase or decrease downstream turbidity, soil erosion, and ultimately affect coastal zone resources as well as increase or decrease the use of agrochemicals in rural food production areas, which may have an effect on the quality of urban water supplies. The division of A.I.D. projects into these different realms is intended only to simplify the analysis, rather than for the purposes of strictly defining ecosystems in biophysical terms. A few projects were reviewed in more than one of the following annexes when major project components warranted it.

Most of the projects examined did not appear to be directed specifically at producing measurable environmental improvements, even though this claim was made for some. For example, a project's goals may have been to increase seedling production and planting, rather than to reverse environmental degradation through reforestation. The evaluations would then usually tell how many seedlings were planted, and occasionally even list the survival rates, with little or no mention of the effect such efforts had on improving indicators of environmental quality. This is true even in the case of those projects that did have such specific environmental objectives as soil conservation or reversal of environmental degradation. Consequently, most of the evaluations were done with no specific guidance on E/NRM components and merely evaluate project results on the basis of non-environmental outputs specified in the project papers. Using such data, it is impossible to make definitive judgments on the efficacy of A.I.D. projects in bringing about positive E/NRM changes.

Social and political factors profoundly affect how natural resources used. Many projects addressed the environment indirectly through a focus on issues of policy, planning, institutional development, education, and human resources development. These approaches and the diverse cultural

traditions and values in which they are set cut across the green, blue, and brown realms and are discussed, where relevant, in the following three annexes.

The technical annexes focus on three principal questions:

- What E/NRM issues have been addressed in A.I.D.'s environmental programs and projects over the 1980 to 1991 period?
- How have these issues been addressed? and
- What have been the results?

A review of A.I.D. projects with an E/NRM focus or component for the period from 1980 to 1991 revealed that the major areas of endeavor in the green realm have been Agroforestry, Biodiversity, Forestry, Integrated Pest Management (IPM), Range/Livestock Management, Sustainable Agriculture, Soils (most often a component of one of the others), and Watershed Management. These areas are addressed in Annex II. Annex III addresses A.I.D.'s environmental efforts in the Urban/Industrial and Energy sectors — the brown realm. Annex IV, the blue realm, reviews projects with an E/NRM component in the Fisheries, Aquaculture, and Coastal Resources Management sectors. A few water quality/wastewater management projects, an area of overlap between the blue and the brown realms, are also assessed in Annex IV.

Figures 1 and 2 show the breakdown of projects reviewed by geographic region, major environmental problem area (sector), and funding allocations. With total anticipated authorizations for the projects exceeding \$3.3 billion, the investment has been substantial and geographically broad. Although not all funds were specifically authorized for environmental activity, clear patterns to the Agency's E/NRM support do emerge. Most notably, the balance of coverage across the four major regional bureaus and between the regional and central bureaus underscores the breadth and depth of the Agency's E/NRM portfolio.

Regional differences are apparent. Africa Bureau has clearly emphasized "green" environmental activity — sustainable agriculture and tropical forestry. Latin American and Asian and Centrally Funded programs and projects show a more balanced allocation between sectors except for urban/industrial, which is notable by its absence. In contrast, the Near East region appears to have concentrated its activity on energy and urban/industrial concerns with more than 1.5 billion dollars in authorizations for Egypt's water and wastewater projects, which is not shown in the figures. When added, the Near East region's unique urban/industrial focus becomes even more pronounced.

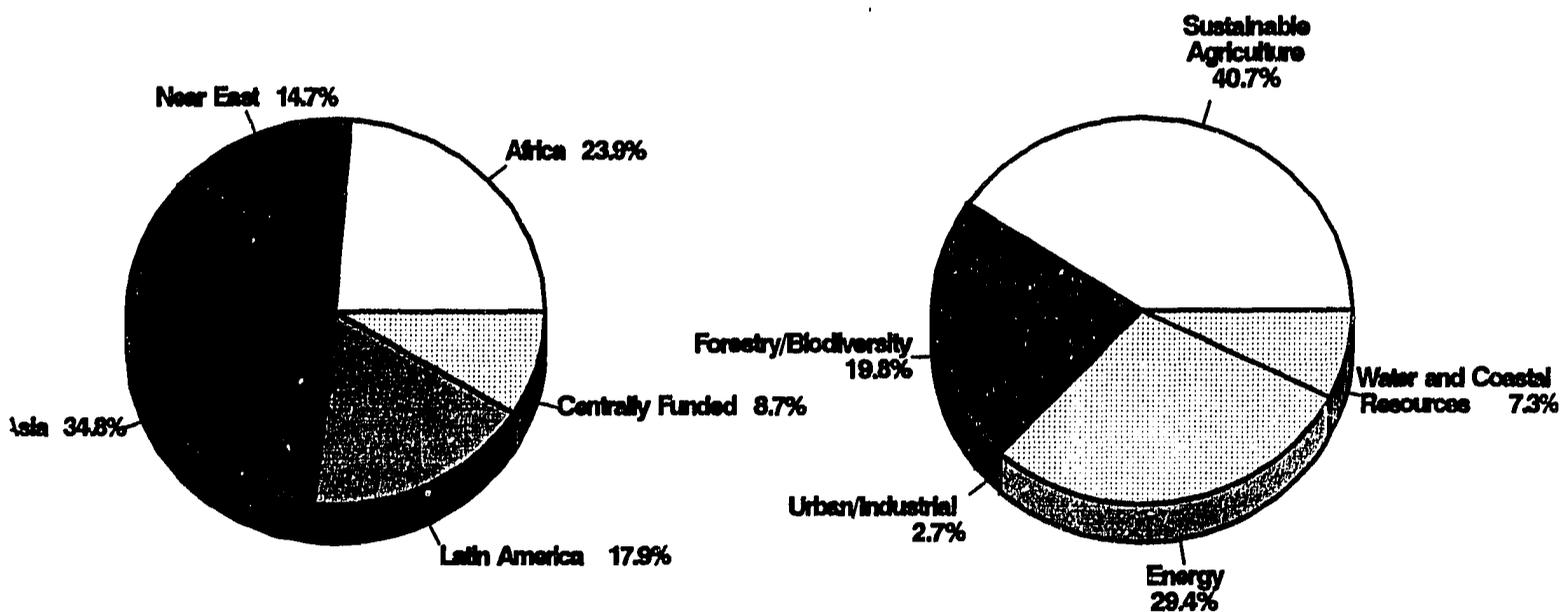
Overall, the Agency's E/NRM portfolio has given emphasis to energy and environmentally sound agriculture as well as forestry and agroforestry. Support for certain activities such as range management, fisheries and energy programs was more evident in the early 1980s but dropped off in recent years. Urban and industrial pollution and coastal resource management, with the notable exception of projects in the Near East and Horn of Africa, did not attract significant investment. As more programs focus on improving environmental quality, there is evidence that the relative underweighting of urban-directed assistance may be changing.

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FIGURE 1

A.I.D. ENVIRONMENTAL PORTFOLIO REVIEW, 1980-1991

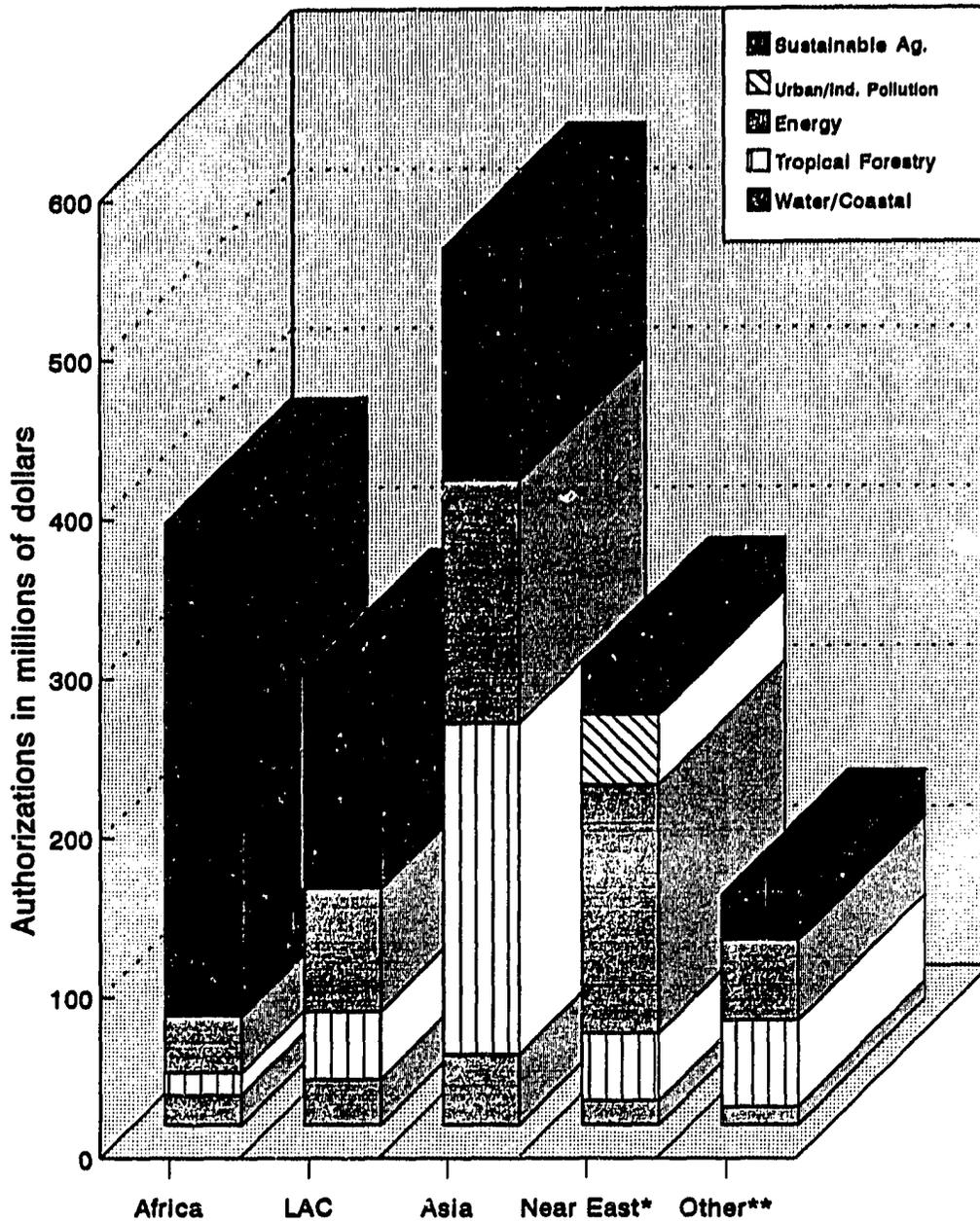
Regional and Sectoral Breakdown of Projects



Source: CDIE Environmental Assessment

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FIGURE 2
A.I.D. ENVIRONMENTAL AND NATURAL RESOURCE AUTHORIZATIONS, 1980-1991



*Near East figures exclude Egyptian wastewater projects.

**Refers to centrally funded projects.

Source: CDIE Environmental Assessment, 1992

We believe that the projects reviewed here, based on the methodology described below, constitute the bulk of A.I.D.'s major efforts to confront E/NRM issues and problems during the past decade. However, we are well aware that numerous other A.I.D. projects with non-E/NRM purposes have also contributed to efforts to improve environmental conditions and promote sustainable use of environmental and natural resources. We are also aware that some projects have, in their zeal to achieve other purposes (notably economic growth), damaged the environment and contributed to the depletion of natural resources. This study represents a fairly comprehensive review of projects meeting the E/NRM criteria. To capture all such projects that may have an E/NRM component would require a more exhaustive review of existing documents. It is doubtful that the benefits of increased scope and detail from such an undertaking would justify the financial and human resources required.

1.2 General Results

The review of available documentation for all projects produced two significant results that will simultaneously guide and challenge the field data collection phase of the environment and natural resources management (E/NRM) assessment.

(1) Although many A.I.D. projects have apparently yielded benefits related to E/NRM, only in rare instances are these benefits directly measurable. For most projects, appropriate E/NRM baseline data were not collected, and monitoring of relevant E/NRM variables was not built into the design. Consequently, projects that, for example, purported to address problems of soil erosion by implementing appropriate conservation measures took no measurements of erosion rates prior to or during implementation nor at any intervals after project completion. The same is true for agroforestry, forestry, and sustainable agriculture projects. With few exceptions, the findings concerning the extent to which A.I.D. projects have yielded environmental benefits appear from a review of available documentation to be based on evaluators' judgments and on generally accepted but poorly documented assumptions such as that agroforestry is a beneficial soil and water conservation technology.

What this means is that during the data collection phase of this assessment, it will be necessary to utilize a variety of innovative data collection techniques either to reconstruct baselines or in other ways to measure change over time in environmental indicators. Evidence that biophysical changes have produced sustainable improvements in the well-being of rural resource users is even less directly obtainable.

(2) Notwithstanding this basic shortcoming of the design and monitoring process, the documents reviewed contained a wealth of findings and conclusions that can, at the very least, serve as hypotheses to be tested in the data collection and analysis phase of the assessment. For the purpose of this assessment, these findings have been framed as issues that need to be studied in the field. The categorization of these issues in the annexes will help focus the data collection phase of this assessment.

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2. METHODOLOGY

2.1 Criteria for Inclusion of Projects in the Study

The principal criterion for inclusion of a project in this study was that the project must have a major focus on environmental or natural resource management or have a major component with such a focus. Projects that appeared to have such an E/NRM focus were candidates for review.

The time frame established for project reviews was set at 1980-1991. This decision was based largely on two considerations: (1) Projects ending before 1980 were unlikely to have a specific major E/NRM component; and (2) The universe of projects needed to be limited to a size manageable with the time and resources available. Projects that began between 1980 and 1991 and those beginning earlier than and still ongoing in 1980 were considered candidates for review.

After discussion, the consensus among CDIE and DAI researchers was that only projects for which an evaluation document existed in the DIS database would be reviewed. This requirement further restricted the project universe. However, this criterion was sometimes honored in the breach.¹ The majority of projects reviewed had been evaluated at least once, and evaluation documents were available. Project evaluations and related summaries were the principal sources of information used on project activities, problems, and outcomes. The issues summarized in the technical annexes are derived largely from these documents.

2.2 Search Procedures

A series of initial searches for evaluation documents in the DIS database was carried out using general keywords in the hierarchy from *The A.I.D. Thesaurus* (September 1988) that were designed to identify potential projects for review. These initial searches identified several hundred documents. Document summaries were read to determine if projects had an E/NRM component, and those that did not were eliminated from further consideration. Additional searches using more specific keywords (those at lower levels in the hierarchy) were conducted as a check to ensure that the more general searches had in fact netted all potential projects. (Projects for which evaluations did not exist in the DIS database were, of course, not netted by this procedure.) This was the case in all but a few instances.

For example, Range Management was considered to be inherently a form of natural resource management (as was watershed management). It was assumed that all projects and programs listing "range management" as a descriptor (keyword) and showing an evaluation for the 1980-1991 period in the CDIE/DIS database would meet the established review criteria. In practice, many range management projects did not show up in this initial search, and many that did were not range management projects

¹ Evaluation documents for some projects that the researchers, through personal experience, knew were clearly important with respect to E/NRM issues could not be located. These projects were included in the review if a project final report or other project summary document was available.

but more properly pasture management, forage production, or land management. Some projects with a range management component were found by using related descriptors such as "livestock," "pastoralism," or "animal husbandry."

Summaries of documents flagged by the several searches were read to make an initial determination about whether the project conformed to the established review criteria. Some of the documents for projects that appeared to be relevant were ordered and subsequently examined. However, waiting for the documents proved time consuming, and printed copies of the documents were expensive (often because a brief evaluation document could not be obtained without voluminous accompanying annexes). Consequently, the majority of project documents were examined on microfiche in the CDIE library. For those projects retained for review in the technical annexes, a data sheet was prepared that contained basic information about the project, such as funding, beginning and ending dates, purposes, performance indicators, and evaluators' assessments.

Several factors limited the quantity and relevance of information available. Significant problems encountered were (1) uneven quality of the project evaluations and evaluation summaries; (2) lack of uniformity in types of information reported; (3) lack of adherence to a consistent format for reporting, including lack of reference to project logical frameworks, despite the fact that A.I.D. Evaluation Guidelines require a standard format for executive summaries, which is to include a copy of the project logical framework; (4) frequently no listing of expected project outputs either as originally stated in the Project Paper or as later amended, making it necessary to search for these in other documents — a very time-consuming task; and (5) the absence of certain documents for some projects, either because they were never written or because they were missing from the CDIE/DIS files. In the time frame available for this survey, with a few exceptions, it was not possible to explore other possible avenues to obtain appropriate evaluation documents.

* * * * *

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ANNEX II -- GREEN REALM

A.I.D. SUSTAINABLE AGRICULTURE, FORESTRY, AND BIODIVERSITY PROJECTS

1. PROJECTS REVIEWED

1.1 Introduction: Defining the Green Realm

The green realm consists of projects in the agricultural sector that have a specific E/NRM focus, objective, or component. To ascertain whether a particular project met this criterion, the researchers examined project purposes and project goals from Project Papers, when available. Occasionally, a Project Paper did not contain a specific reference to E/NRM objectives, but when examiners reviewed its project activities, it was found to have components directly related to E/NRM. This is true of many watershed management projects. Such projects were included in the review if their potential for significant impact on the environment or on natural resources was clear from project evaluations or other project documents. The realm was further circumscribed by excluding projects focused on coastal and marine resources (designated the blue realm), pollution, waste management, and energy use and conservation (the brown realm). Rural water supply and environmental health projects were also excluded from the analysis.

1.2 Project Identification Procedures

An initial bibliography, the result of a CDIE database search in 1991, was scanned as an initial step in locating relevant projects and documents. Subsequent searches were conducted using descriptors (keywords) available in the DI database that promised to yield appropriate projects in the green realm with an E/NRM focus or objective. Seven independent searches were conducted using the following descriptors: Agroforestry, Biodiversity, Forestry, Integrated Pest Management, Range/Livestock Management, Sustainable Agriculture, and Watershed Management. These searches were restricted to the period 1980-1991 and to projects for which any evaluation document existed (or audit report). The 1980-1991 dates refer to Agency-funded activities for which evaluations took place during the period and thus include projects begun in the 1970s as well as many that are still ongoing. The number of documents and the number of projects represented in each of these searches are shown in Table 1.

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TABLE 1

RESULTS FROM SEVEN INITIAL BIBLIOGRAPHIC SEARCHES

SEARCH DESCRIPTOR	NO. OF DOCS.	NO. OF PROJS.
Agroforestry	32	25
Biodiversity*	4	3
Forestry	48	32
Integrated Pest Management	25	15
Range/Livestock Management	126	26
Sustainable Agriculture	12	10
Watershed Management	63	32

* An additional search was done for biodiversity planning documents, which yielded 29 documents.

The resulting lists were compared to determine which projects (not documents) appeared on more than one list. If a project appeared on more than one list, it was presumed that it had major components in each of the categories in which it appeared. (As it turned out, projects appearing in only one category based upon the keyword search also frequently had components in other categories.) The results of this comparison are shown in Table 2.

TABLE 2

PROJECTS ON THE INITIAL SEVEN SEARCH LISTS
BY CATEGORY AND COMBINED CATEGORIES

AGROFORESTRY	19
AGROFORESTRY AND FORESTRY	4
AGROFORESTRY AND WATERSHED MANAGEMENT	2
BIODIVERSITY	3
FORESTRY	22
FORESTRY AND WATERSHED MANAGEMENT	6
INTEGRATED PEST MANAGEMENT	15
SUSTAINABLE AGRICULTURE	8
SUSTAINABLE AGRICULTURE AND WATERSHED MANAGEMENT	1
WATERSHED MANAGEMENT	26
RANGE MANAGEMENT	26

12

In order to further refine the searches and ensure that the greatest number of relevant projects possible was identified, additional searches were made using more specific descriptors for the categories of Agroforestry, Forestry, and Sustainable Agriculture. This was done as a check to determine if the broad initial searches had captured most if not all of the relevant projects. All new projects that showed up from the subsequent searches were included in the list to be reviewed.

From all projects yielded by the searches, 100 projects have been included in this review. The projects were categorized following the fivefold classification of areas of focus contained in the *USAID Environmental Program: A Narrative Summary (September 1991)*. We have labeled these areas of focus sectors. Up to three E/NRM categories of activity were identified for each project, based on identification of major project components with an environmental objective or focus.

Figure 1 displays the total dollar authorization of all projects reviewed in this annex, by sector. Figure 2 presents the percentage of total dollar authorizations of projects reviewed, by region and sector. Figure 3 shows the A.I.D. authorizations for Sustainable Agriculture, by region; figures 4, 5, and 6 provide the same information for Tropical Forest/Biodiversity, Water Resources/Coastal Zones, and Global Climate/Energy Development projects respectively.

2. PROJECT SUMMARIES

2.1 Agroforestry Projects

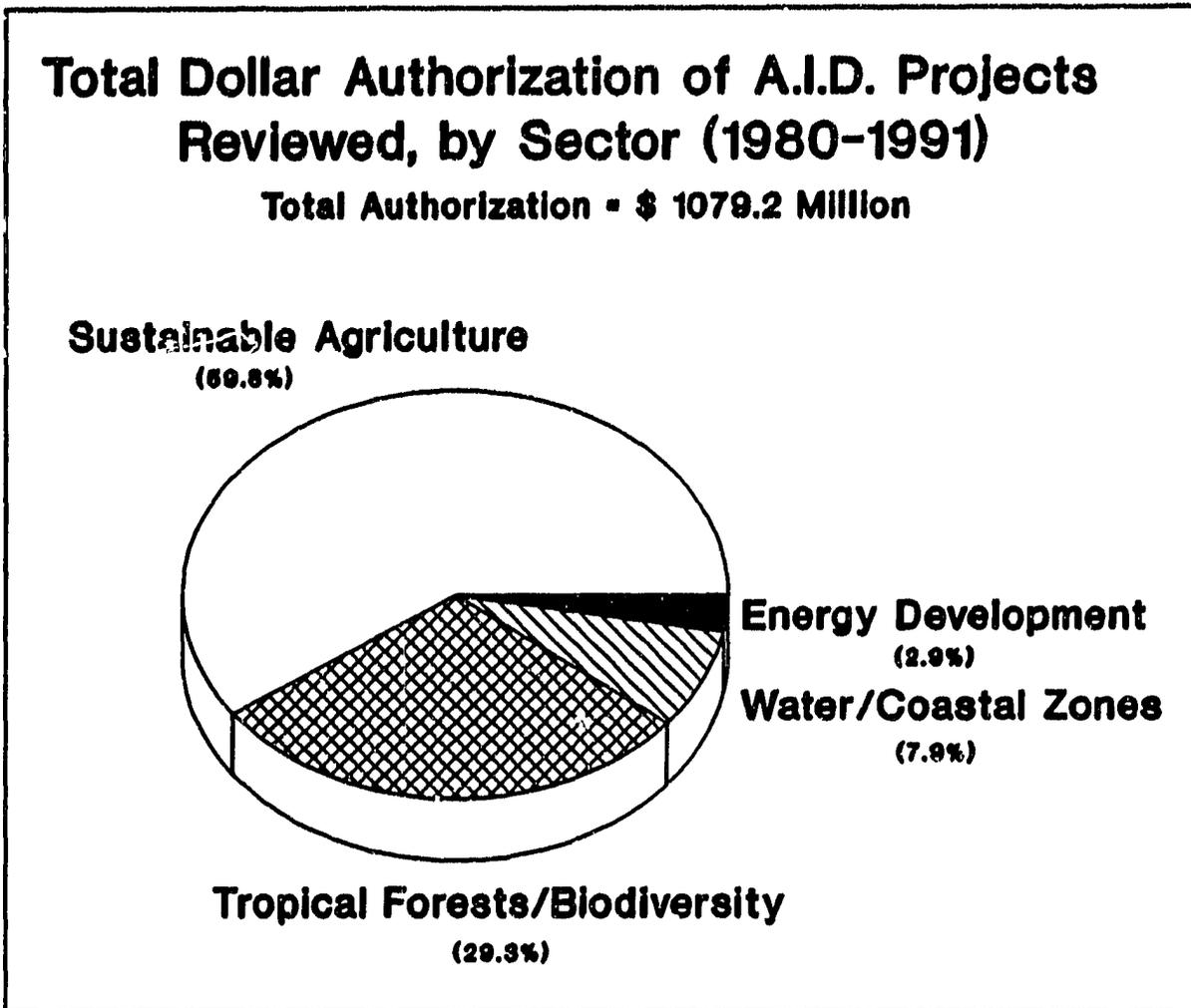
Of the 100 projects reviewed, 24 were designated by title or purpose as agroforestry projects or had a major agroforestry component. These are listed in Table 3. By region, 11 were in Africa, 6 in Asia, 5 in Latin America, and 2 were centrally funded worldwide projects. Of these 24, 10 did not have a forestry component. In this section, we review the 11 agroforestry projects without a forestry component. These are listed in Table 4. (Those that do have a forestry component are reviewed in Section 2.3.) Three of these agroforestry projects are in the LAC region, and seven are in Africa.

2.11 Latin America and the Caribbean

The main thrust of the Chapare Regional Development Project (511-0543) has been coca eradication and substitution with other high-value, economically viable crops. In addition to coca substitution, other issues addressed are low agricultural productivity, forest loss from conversion to agriculture, and migration from the high valleys to the Chapare. These issues have been addressed in several ways by the project, but the only E/NRM component is agroforestry production systems. At the time of the evaluation in March 1991, environmental impacts were judged to be neutral at best by the evaluators. The only "green" output has been improved agroforestry production on farmlands, but this is not quantified.



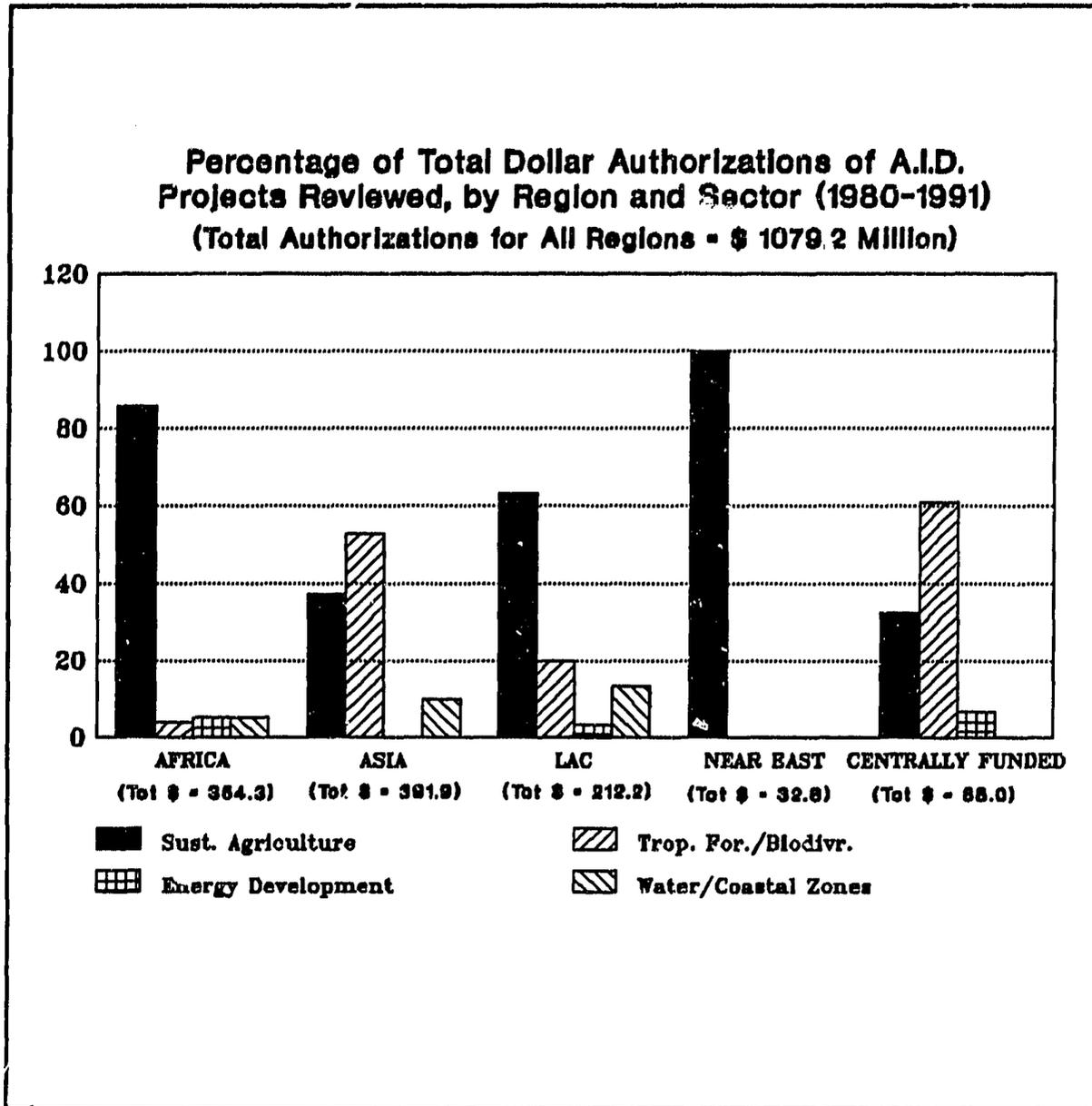
FIGURE 1



Source: Official A.I.D. Project Documents

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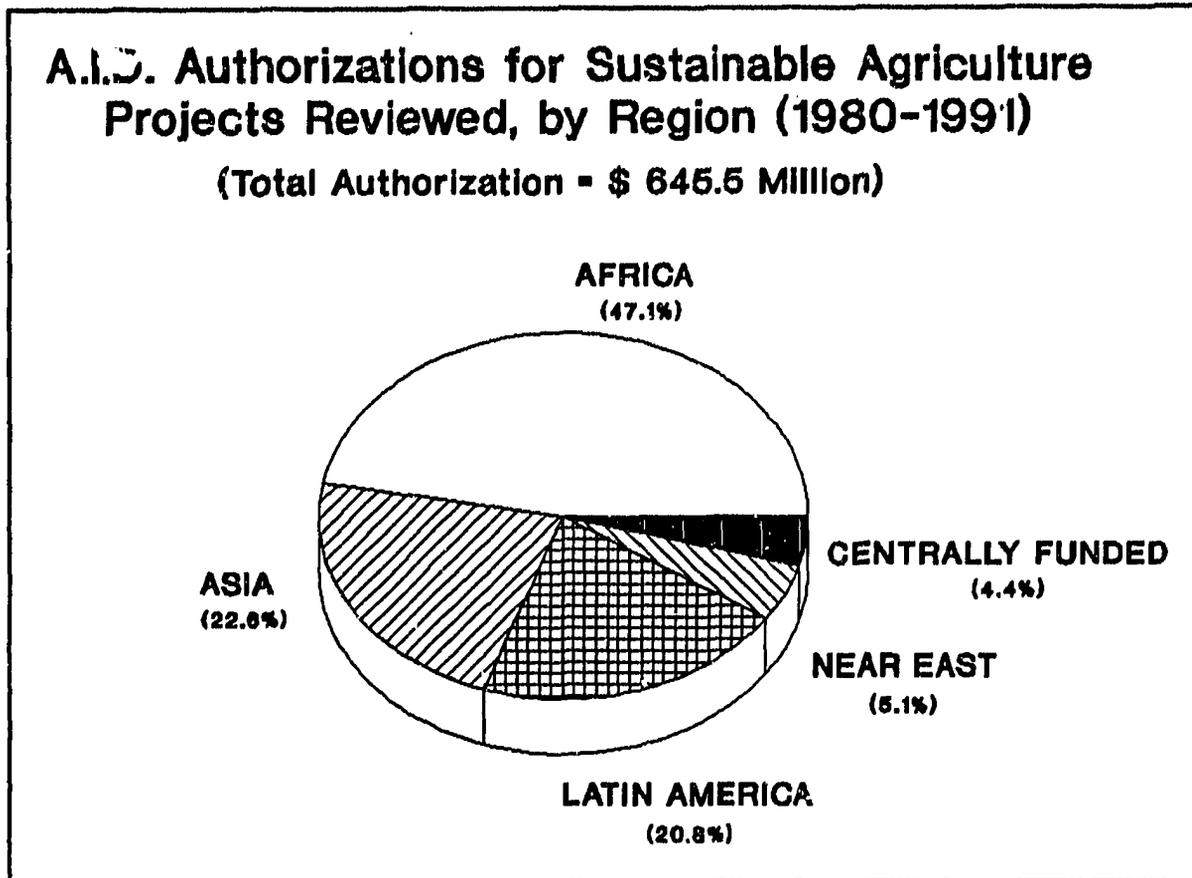
FIGURE 2



Source: Official A.i.D. Project Documents

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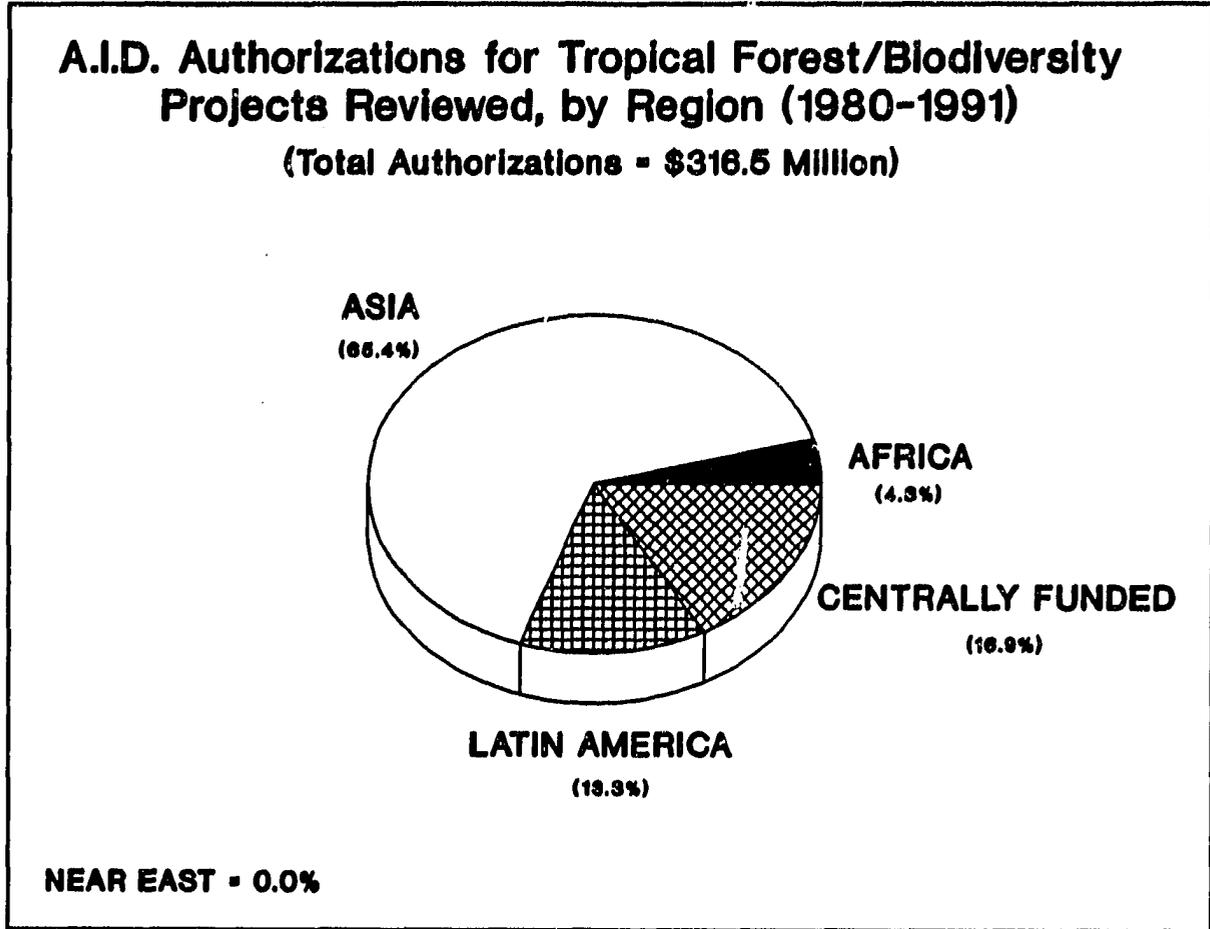
FIGURE 3



Source: Official A.I.D. Project Documents

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FIGURE 4



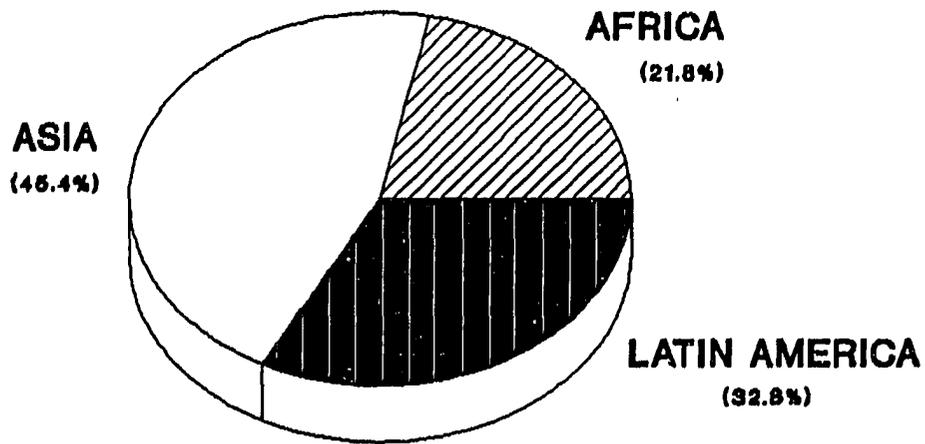
Source: Official A.I.D. Project Documents

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FIGURE 5

A.I.D. Authorizations for Water Resources/Coastal Zones, by Region (1980-1991)

(Total Authorizatlon = \$ 85.7 Milllon)

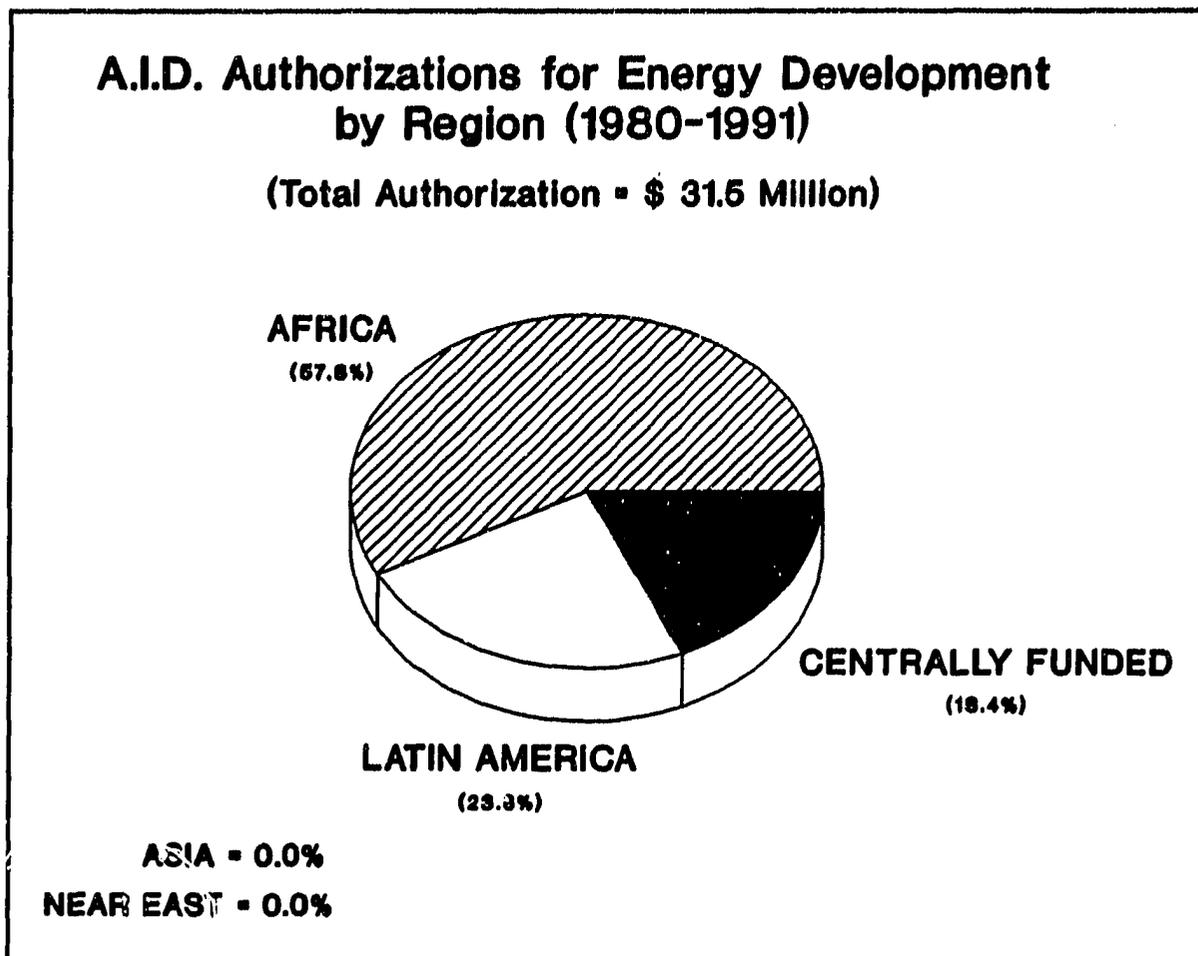


NEAR EAST = 0.0%
CENTRALLY FUNDED = 0.0%

Source: Official A.I.D. Project Documents

98

FIGURE 6



Source: Official A.I.D. Project Documents

89

TABLE 3

ALL PROJECTS WITH AN AGROFORESTRY COMPONENT

NUMBER	COUNTRY	CATG	CATG	CATG	TITLE
3830055	Sri Lanka	FOR	WAT	AGFO	Reforestation and Watershed Management
3860475	India	FOR	AGFO		Madhya Pradesh Social Forestry
3860478	India	FOR	AGFO		Maharashtra Social Forestry
3860475	India	FOR	AGFO		National Social Forestry Program
3910001	Pakistan	FOR	AGFO		Forestry Planning and Development
4930004	Thailand	FOR	AGFO		Renewable Nonconventional Energy
5110543	Bolivia		AGFO	SAG	Chapare Regional Development Project
5210122	Haiti	AGFO			Agroforestry Outreach Program
5270240	Peru	FOR	AGFO	SAG	Central Selva Resource Management
5320101	Jamaica		SAG	WAT	AGFO Hillside Agriculture
5960089	ROCAP	AGFO	FOR		Fuelwood and Alternative Energy Sources - CATIE
6020001	Comoros	AGFO	SAG		Soil and Land Conservation
6210160	Tanzania	AGFO	SAG		Village Environmental Improvement
6500041	Sudan	AGFO	SAG	RAN	Rural Renewable Energy
6500064	Sudan	FOR	AGFO		Eastern Refugee Reforestation
6550003	Cape Verde	AGFO	WAT		Tarrafal Water Resources
6770051	Chad	AGFO			PVO Development Initiatives
6830230	Niger	FOR	AGFO		Forestry and Land-use Planning
6850235	Senegal		AGFO	SAG	Cereal Production Phase II
685PL03	Senegal		FOR	AGFO	PL-480 Title III Food for Development
6880937	Mali	AGFO	ENV		Village Reforestation
6950105	Burundi	FOR	AGFO		Bururi Forest
9365519	World	FOR	AGFO		Forest Resources Management
9365547	World	FOR	AGFO		Forestry/Fuelwood Research and Development

TABLE 4

AGROFORESTRY PROJECTS WITH NO FORESTRY COMPONENT

NUMBER	COUNTRY	TITLE
5110543	Bolivia	Chapare Regional Development Project
5210122	Haiti	Agroforestry Outreach Program
5320101	Jamaica	Hillside Agriculture
6020001	Comoros	Soil and Land Conservation
6210160	Tanzania	Village Environmental Improvement
6500041	Sudan	Rural Renewable Energy
6550003	Cape Verde	Tarrafal Water Resources
6770051	Chad	PVO Development Initiatives
6850235	Senegal	Cereal Production Phase II
6880937	Mali	Village Reforestation

In the **Haiti Agroforestry Outreach Project (Agroforestry I - 521-0122)**, the purposes of the project were to motivate Haitian peasants to plant and maintain trees for fuelwood, lumber, income generation, and soil conservation; to obtain reliable information on the technical, economic, and social aspects of agroforestry in Haiti, and to reduce ongoing natural resource degradation and maximize the land's productive potential. The issues addressed were deforestation, soil erosion, energy scarcity, and rural poverty. Actions funded to address these issues were tree planting (and other soil conservation measures), charcoal and fruit tree plantations to increase household incomes, nursery operations, and research. Project output indicators were listed as sufficient charcoal production to meet most of the anticipated increase in demand, and production of 40 million seedlings on 141 subprojects to distribute to 140,000 farmers. At the time of the interim evaluation in early 1986, it was reported that the farmers were planting the trees more or less according to schedule but were not motivated to maintain them (due to uncertainty about ownership -- but this is not stated in the evaluation). According to evaluators, farmers were planting the trees where they wished and not necessarily to help control erosion. Erosion control impact was not known. Survival rates of seedlings were also unknown due to lack of project documentation. However, a subsequent study (F. Conway, 1986, "The Decision-Making Framework for Tree Planting in the Agroforestry Outreach Project") showed that soil conditions and their improvement were of major concern to many farmers and formed their primary motivation for planting trees.

In the evaluation of the **Haiti Hillside Strategy (521-0000.1)**, a portfolio review of agricultural sector projects from 1971-1990), a general criticism of the evaluators was that, except for the Agroforestry I and II projects, none of the projects had outputs that were measurable (quantifiable) because no numeric data had been collected before, during, or after the projects. In the case of the agroforestry projects, the evaluators state that figures on survival rates of seedlings were grossly exaggerated by the NGOs running the projects. The evaluators harshly criticized the Hillside Strategy:

Nowhere in the Haitian hillside is the use of fertilizer, soil conservation devices, or any of the techniques and intervention package modules noted having a significant impact on the quality of life and well-being of farmers and their families (Executive Summary, USAID's Haiti Hillside Strategy: An Assessment of an Approach, page 9).

It should be noted that the evaluators appear to have been motivated by a strong ag tech/ag biz orientation, as evidenced by their advocacy of private investment, agroindustry and agribusiness, and permanent crop and livestock production (*ibid.*, page 8). Despite all this, the Agroforestry Outreach Project in Haiti provides an excellent model of how trees can be used to generate income and, if properly done, ease environmental degradation. If political circumstances permit, a field assessment of the Haiti agroforestry efforts would be worthwhile.

The **Jamaica Hillside Agriculture Project (532-0101)**, as stated in the project purpose, provided a "grant funding mechanism" to support self-managing subprojects that focus on the production and productivity of economically viable perennial tree crops in two critical watershed areas. Although not specifically stated, the project intended to address the environmental issues of stream sedimentation, soil erosion, and resource conservation and raise awareness of the conservation value of tree crops. Project actions included small grants to community groups, technical assistance and training, sponsorship of workshops, production of a newsletter, and close attention to technological innovations. Output indicators were establishment of a project coordinating committee, approved and functioning subprojects (number unspecified), perennial crop technology training and transfer, and information management.

At the time of the evaluation, the coordinating committee was established and functioning; nine subprojects were functioning; the strategy was working for coffee and cocoa, but little attention had been given to other tree crops; known technologies were being systematically applied, but there was no evidence of technological innovation; and involvement of farmers in design and implementation of subprojects remained weak. The project was judged an overall success by the evaluation team and recommended for continued (Phase II) support. With respect to E/NRM issues, it appears that resource conservation and environmental improvement were of secondary importance to income production goals, rather than specific ends in themselves. The extent to which soil conservation has improved is unclear. The evaluation team pointed out a need for greater emphasis on soil conservation measures. Thus, this project has probably had low to moderate success in improving E/NRM conditions. This lack of emphasis on E/NRM components is generally true of a large number of A.I.D. projects that are primarily driven by economic growth in a variety of guises with E/NRM concerns secondary at best.

In sum, for the LAC agroforestry projects examined, E/NRM outputs and impact are essentially unknown, despite the fact that all three of these projects have achieved successes in other respects. None of the LAC agroforestry projects specifically addresses Women in Development (WID) issues.

2.12 Africa

The Soil and Land Conservation Project (602-0001) in Comoros was specifically designed to address problems of severe soil erosion and to increase agricultural production. Training and technical assistance were provided to extend planting of *Casuarina equisetifolia* in strips along contours to slow soil erosion, train extension agents and nursery workers, and establish demonstration fields. Project outputs were to be formation of bench terraces behind contour strips, treatment of 126 hectares, and a doubling of staple crop yields on the land of 300 families. This project suffered from numerous problems: weak GOC institutional capacity; GOC counterparts inadequately trained; WFP food assistance makes sustainability unclear; GOC not depositing funds to pay extension workers; and quality of TA provided by CARE was not high enough. Only 38 hectares had been treated, and doubling of yield was not possible. This project was judged a failure by the evaluators because it achieved few of its goals. No positive environmental impact could be determined from the evaluation.

The agroforestry component (the only one of five that is E/NRM-oriented) of the Village Environmental Improvement Project (621-0160) in Tanzania sought to reverse environmental damage from lack of vegetative cover by providing training to villagers in agroforestry techniques, establishing school nurseries, and reforesting 10 hectares in each of six villages. The evaluation, near the end of the project, showed that 3 of 6 school nurseries were producing seedlings; 6 forestry extension agents had been assigned to the project; 6,600 seedlings had been planted in 1982, and 30,000 more were projected by the end of 1983; 2 afforestation seminars were held; and 6 schools were involved in afforestation education. The project was deemed a small-scale success and evaluators expect it to have a spread effect. However, the project lacked any baseline data upon which to make a determination of real results in environmental improvement.

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The agroforestry component of the **Rural Renewable Energy Project (650-0041)** in the Sudan addressed issues of environmental degradation, refugee relocation, and poor agricultural/pastoral practices through training and education, nursery establishment, tree plantations, and windbreaks. This project had very specific output indicators:¹

- (1) Establish two nurseries, to produce 3.6 million seedlings;
- (2) Establish 8,000 feddans of plantations. (1 feddan = 1.038 acres);
- (3) Generate 400,000 person-days of employment;
- (4) Introduce extension program to demonstrate benefits of tree planting and agroforestry;
- (5) Establish shelterbelts, windbreaks;
- (6) Train Forest Department personnel; and
- (7) Develop infrastructure for Forest Department.

At the time of the midterm evaluation in 1985, the project had made substantial progress toward achievement of planned outputs:

- (1) Two nurseries with a capacity of 600,000 seedlings established;
- (2) 500 improved charcoal stoves produced;
- (3) Buildings completed and staff hired;
- (4) 250,000 trees planted on household compounds;
- (5) 3,091 feddans of fuelwood plantations established;
- (6) 230,000 person-days of employment generated;
- (7) 317 feddans of windbreaks planted; and
- (8) Forest Department personnel trained.

In addition to substantial employment of refugees, some positive NR results have been achieved from planting trees, shelterbelts, and the like. This project is a good example of a large conservation effort undertaken in extreme conditions — biophysical, political, and economic. The final report says that this project will probably be able to continue without outside support because of rigorous attention in planning and implementing to replicability, commercial potential of activities, and extension/outreach. It is judged very successful. If politics allow, it is a good candidate for field study, along with the Sudan Eastern Refugee Reforestation Project (6500064).

The agroforestry component of the **Tarrafal Water Resources Project (655-0003)** in Cape Verde addressed the issue of upper watershed protection through tree planting programs that were also intended to produce firewood and other benefits for a local area population estimated at 10,000. Upstream watershed protection was judged good on the basis of downstream effects — that is, more agricultural activity. No hard data were available. On the basis of what is reported, success level is judged as fair to low after four years of effort.

The **PVO Development Initiatives Project (677-0051)** in Chad (Sahelian zone) was designed to address deforestation caused by the presence of refugee camps and to stabilize sand dunes through

¹ The original purpose of this project as stated in the PP was purely research and dissemination of renewable energy technology. The purpose changed substantially. See also Project 650-0064 — apparently a concurrent reforestation project.

technical assistance, training, PVO financing, and small-scale irrigation agriculture and agroforestry. Output indicators were given as assistance to refugees, increase in food production, and stabilization of sand dunes. By the 1988 evaluation, CARE had established 38 community and central nurseries and 1,018 individual nurseries, distributed 530,000 seedlings, and established and was monitoring 84 natural regeneration plots. ORT had established 10 village nurseries and one central nursery and distributed 10,000 seedlings. Fruit tree production and nursery development were the most successful interventions in agroforestry. Sand dune stabilization was least successful. Data are not available on survival rate of seedlings. Environmental monitoring was limited to monitoring increased salinization and increases in malaria and schistosomiasis outbreaks. The positive impact on the environment from tree planting was judged to be minimal, but as one evaluator observed, "It can't hurt." Fruit trees were the most popular; however, owners of plots will not allow outsiders to plant date palms, as this confers ownership rights to the planter. Overall, this project is judged relatively successful in achieving outputs in a very harsh environment.

The Cereals Production Phase II Project (685-0235) in Senegal emphasized sustainable agriculture and agroforestry to address issues of reforestation, antidesertification, crop diversification, and extension. The agroforestry component was added in the project extension from 1984 to 1987 with the expected output of reintroducing tree planting in the production system in 60 villages and demonstrating the importance of tree planting in maintaining soil productivity, satisfying fuelwood, construction, livestock and human food needs, and improving farm revenue. This was to be accomplished through technical assistance, training, and a specific WID component. Women were most interested in programs for millet mills, sheep raising, village wells, and vegetable gardens.

Under the agroforestry extension, private nurseries sprang up and provided higher-quality seedlings than the government nurseries. They used a nice range of species. The most popular were the fruit trees. Survival rates after three years were quite high considering the climate problems and lack of rain — from 58-62 percent survival for the woodlots and orchards.

The survival of the windbreaks was less encouraging at 34 percent, and they were not popular with the farmers. Individual planting of trees in fields had a survival rate of 37 percent. Protection from grazing animals was a problem. Survival of seedlings planted within compounds was 48 percent. Intercropping with peanuts was begun in the last year. Protecting the naturally regenerating *A. albidu* seedlings was more successful than raising them in the nursery and outplanting them.

The initial agroforestry program was moderately to quite successful and taught good lessons: that windbreaks are unpopular, fruit trees are popular, and protection of naturally regenerating *A. albidu* seedlings is more effective than nursery raising. There were some positive environmental benefits from tree planting. The extension of the project to 1987 called for an expansion of the agroforestry/soil conservation pilot program, most of which seemed to be popular and successful.

The Village Reforestation Project (688-0937) in Mali sought to restore and protect the natural resource base by increasing villagers' awareness and involving them in environmental restoration and protection. Issues of environmental degradation and desertification were addressed through a variety of agroforestry interventions: experimentation and demonstration of effective revegetation techniques, reforestation, and extension. The expected outputs were 2 tree nurseries; 2 demonstration plots; 10 communal woodlots; 2 experimental plots (40 wood-burning stoves); and rural forestry interventions established in enough villages to test acceptance, efficiency, and replicability. The project did not meet

these outputs. However, it did foster better relations between villagers and GOM extensionists, and it increased awareness of environmental problems. The project was very deficient in training, development of a useful information system, and use of available technology. Although some of the output goals were met, there is little indication that there was significant success in improving E/NRM.

Summary

Of the seven Africa region agroforestry projects reviewed, only one specifically addresses the issue of women in development (Cereals Production — Senegal). In this instance, women displayed more interest in other aspects of the project than in agroforestry.

In none of the seven projects was it possible to quantify E/NRM outputs, much less long-term impact. Judged against intended project outcomes, 1 project was considered a failure, the accomplishments of 2 were deemed low, and 4 were considered successes in meeting the projected goals. As in the case of the LAC projects, the generic problem in determining E/NRM outputs or outcomes is lack of baseline data and quantifiable measures against which to judge performance. For example, several projects mention soil erosion as a problem and agroforestry technologies as a means to improve soil conservation. None of the projects reviewed attempted to determine erosion rates at project start-up by any standard techniques, nor were erosion rates monitored in areas of project interventions. (If such measuring and monitoring did take place in any of these projects, it is not reported in the documents reviewed.)

It may still be possible to quantify E/NRM effects, especially soil conservation, by monitoring erosion rates in sample project intervention areas and in nearby non-intervention areas with similar slope and soil composition.

2.2 Biodiversity Projects

The importance of biodiversity to sustainable development gained increasing recognition during the 1980s. The U.S. Congress has used amendments to the Foreign Assistance Act of 1961 (FAA) in the form of earmarks to help focus A.I.D.'s attention on the importance of biodiversity conservation in fostering sustainable development. A watershed year for A.I.D.'s evolving program to conserve biodiversity was 1987. The Agency obligated more than \$2.3 million for 21 new activities in 15 developing countries to directly protect and conserve wild plants and animals, as authorized in Section 119 of the FAA, with \$2.5 million obligated for the remainder of biodiversity activities (1987 Report to Congress). By 1991, the Agency is estimated to have obligated \$57 million for biodiversity, based on the budget system for Activity and Special Interest (AC/SI) codes (A.I.D. Environment Sector Activities-1991 Summary).

The range and extent of efforts undertaken by A.I.D. to preserve biodiversity reflect both the urgency of the issues involved and the high-profile role the Agency has taken in addressing them. In order to respond quickly to the congressional mandate to preserve biodiversity, one main vehicle A.I.D. initially used was a buy-in to an existing, centrally funded cooperative agreement with an international private voluntary organization (PVO). Having recognized that the majority of expertise in this area rested with the PVO community, A.I.D. funded a consortium of PVOs through a Cooperative Agreement in

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1988. During this period, regional efforts in Africa and Latin America were under way to implement the main focus of A.I.D.'s biodiversity program, initially using small grants to mobilize resources. The main elements of the program to preserve the variability and variety of living organisms and habitats (biodiversity) are four:

- 1) Habitat protection;
- 2) Surveys, inventories, and assessments of animal and plant species;
- 3) Basic and policy research related to biodiversity preservation (excluding domesticated varietal improvement research); and
- 4) Policy dialogue/reform specifically related to biodiversity.

Because of the relative newness of biodiversity projects, few have been completed and evaluated. The preceding four-part outline is based on the definitions of A.I.D. Activity and Special Interest (AC/SI) codes used for budgeting and reporting. The means to implement this range of activities are often of short duration or are complementary to larger projects using grant, cooperative agreement, or buy-in funding mechanisms. Therefore, biodiversity activities so far have not often been subject to A.I.D.'s standard project evaluation process. Based on the review of evaluations for four projects coded for biological diversity on A.I.D.'s Document Information System and carried out from 1980 to 1990, and on several A.I.D. sponsored programmatic overviews, the following issues arise.

Habitat Protection

The majority of habitat protection activities involve the start-up/strengthening of park systems, establishment of buffer zones and educational programs to raise awareness of local-level resource managers. To date, the project evaluations point to real short-term successes in strengthening park management and raising awareness through education. Establishing buffer zones has proven more problematic, because they are often initiated in areas already experiencing resource degradation. Also, the agro-forestry type interventions have a longer gestation period than either changes in management or educational outreach. One cost recovery oriented approach to park management has been the use of eco-tourism to heighten awareness and provide revenues. All three are felt to be worth continued effort as part of an integrated approach to changing the behavior of resource managers and changing the resource base to be managed.

For example, the **Wildlands and Human Needs Program (938-0268)** works to combine local-level conservation efforts with economically viable resource use. The project is structured as a matching grant between A.I.D. and a U.S. NGO, which in turn operates largely through training activities coordinated with local NGOs in country. At midterm the project was viewed as having strengthened local institutions, won widespread local acceptance, and paved the way for implementing existing technical components of resource conservation (land titling, appropriate pest management). Nonetheless, this project represents an early hybrid of both conservation and development projects, rather than a purely biodiversity conservation project, with the bulk of activities focused on low-impact development. Park management and conservation were addressed largely through enhanced management plans that have yet to be implemented or evaluated by A.I.D.

A similar activity, the **Development Through Conservation South-West Uganda Project**, used the same approach aimed at enhanced management plans for protected areas. The primary goal of

the project was to enhance the environmental quality of life for approximately 86,500 subsistence farmers in southwest Uganda. This was to be accomplished by protecting the biological diversity of three remnant afro-montane forests and promoting environmental awareness and sustainable agriculture on adjacent land. It was noted in a 1990 evaluation that this project suffered from the following design and implementation flaws:

- Implementation of proposed management plans was poorly articulated.
- The project structure proposed under the project agreement was thought to be unsustainable.
- Existing indigenous agroforestry may be more productive and certainly more appropriate than proposed project activities for mediating encroachment.
- Road infrastructure development did not take into account environmental impacts.
- There was no provision for baseline data gathering. Therefore, changes in productivity or quality of life could not be accurately measured.

Surveys and Biodiversity Assessments

To provide a sound foundation for policy dialogue and reform and target future interventions, the FAA has stipulated that natural resource assessments be carried out for all A.I.D.-assisted countries. These assessments include sections relevant to biodiversity and are one of the most extensive efforts to date aimed at documenting the state of natural resources. These assessments are not, however, a project unto themselves and are therefore not evaluated. These large-scale assessments are also distinct from regional or site-specific studies focused exclusively on biodiversity.

For those countries with completed assessments, the utility of the assessments is generally high, as they do provide often unique compilations of information important to national decision makers and a forum for policy discussions. The biodiversity-specific studies are often of a more scientific nature and are more directly linked to habitat and/or species conservation. For this second type of study, concern has surfaced that there is no overall Agency strategy for utilizing results beyond, at best, the specific project funding the research. The need for centralized data support and a clear research agenda has been outlined by the Research Advisory Committee of the National Academy of Sciences, and it is hoped that an Agency-wide biodiversity strategy due out in 1992 will address these issues.

Basic and Policy Research

A.I.D. has been funding a wide array of research ranging from buffer zone management in India to elephant conservation in Africa. While the research has a high intrinsic value as new research, several examples have surfaced of work poorly integrated into the larger Mission project portfolio. It should be noted that both policy and basic research provide not only an end product report but also the opportunity to carry through the process. It has been pointed out in the case of Botswana that even if the product is not optimal, the chance to participate in the process has proven useful for Mission and host country staff.

Policy Dialogue and Reform

Recognizing that the responsibility for conservation rests largely with national and state governments but that use of resources is generally at the local level, several projects address issues of policy reform and institutional strengthening. The main mechanism at this point seems oriented toward strengthening PVO capacity to offer a counterbalance to national priorities and broaden local support for conservation. This localized effort is often carried out in conjunction with larger efforts for national policy reform for better resource management through, for example, negotiations for improved land tenure or wider use of sustainable agricultural practices. The intent in supporting local PVOs is to bolster national capacity for policy dialogue.

One of the main mechanisms for enhancing policy dialogue is institutional capacity building. For instance, the **Biodiversity Support Program (BSP)**, subject of a midterm evaluation in October 1991, has its purpose as stated in the Cooperative Agreement:

(To) improve the capacities of nongovernmental and governmental institutions in A.I.D. partner countries and of A.I.D.-assisted programs to identify the critical needs for and economic potential of conservation and wise use of biological resources through safeguarding ecological processes and maintaining the variety of genetic resources (Cooperative Agreement:1).

The types of inputs chosen to move the project toward the above purpose are 1) technical assistance to date in the form of feasibility studies for biodiversity conservation, 2) research grants targeted to fund studies by host-country principal investigators addressing specific issues relevant to A.I.D.'s conservation activities, 3) training to build capacity of host-country scientists and institutions to structure research and development programs, 4) information networking to provide the Agency with an overview of its biodiversity program, and 5) Mission buy-ins (also referred to as pilot demonstrations) for a wide range of related activities.

The allocation of funds and level of effort among components or across regions was not specified in the Project Paper or Cooperative Agreement as a means to ensure flexibility in responding to the Agency's growing need for support for biodiversity research, planning, and projects. As intended, the Mission buy-in category has become the largest funding source for BSP, with more than \$1.4 million in core funds expended and more than \$6.9 million in buy-ins expended by the time of the midterm evaluation (Annex F, Mid-Term Evaluation). According to the midterm evaluation, Africa received the majority of technical assistance, and Latin America the majority of research and training, whereas the rest of the funds and activities are fairly evenly distributed among regions.

The BSP, in the midterm evaluation, is viewed as very successful in the eyes of Mission staff, with more than 50 institutions participating in more than 100 activities. However, the evaluation points out the lack of any strategic planning for the activity to date and the absence of articulation among these highly successful individual components. It appears the Agency's, and BSP's own, institutional capacity has not been well served by what the evaluation terms a "deliberately vague project design" (Mid-Term Evaluation, vii). It should be noted that the evaluation was overall quite favorable and should provide the impetus to refine a largely sound activity.

2.3 Forestry Projects

Thirty-four projects reviewed have a forestry component. Of these, 16 also have an Agroforestry component. None of the forestry projects with an agroforestry component were reviewed above under agroforestry. All will be reviewed here as forestry projects. The 34 forestry projects are listed in Table 5. The projects are distributed by region as follows: 4 centrally funded worldwide, 14 in Africa, 9 in Asia, and 7 in Latin America. Of those that also have an agroforestry component, 2 are centrally funded, 6 are in Africa, 6 in Asia, and 2 in Latin America. As can be seen from Table 5, seven of the projects with a forestry component also have a watershed management component. These projects are reviewed under Forestry because most used reforestation or forest management as the principal means to manage watersheds.

TABLE 5

ALL PROJECTS WITH A FORESTRY COMPONENT

NUMBER	COUNTRY	CATG	CATG	CATG	TITLE
3670129	Nepal	FOR	SAG	WAT	Rural Area Development - Rapti Zone
3670132	Nepal	WAT	FOR		Resource Conservation and Utilization (RCUP)
3830055	Sri Lanka	FOR	WAT	AGFO	Reforestation and Watershed Management
3860475	India	FOR	AGFO		Madhya Pradesh Social Forestry
3860478	India	FOR	AGFO		Maharashtra Social Forestry
3860495	India	FOR	AGFO		National Social Forestry Program
3910481	Pakistan	FOR	AGFO		Forestry Planning and Development
4920289	Philippines	FOR	WAT		Bicol Integrated Area Development III
4930304	Thailand	FOR	AGFO		Renewable Nonconventional Energy
5150142	Costa Rica	WAT	FOR		Conservation Education
5170126	Dominican Rep	FOR	WAT		Natural Resources Management
5180023	Ecuador	FOR	WAT		Forestry Sector Development
5180031	Ecuador	FOR	ENV		Environmental Conservation
5200274	Guatemala	FOR	SAG		Highlands Agriculture Development
5270240	Peru	FOR	AGFO	SAG	Central Selva Resource Management
5960089	ROCAP	AGFO	FOR		Fuelwood and Alternative Energy Sources - CATIE
6250937.09	Mali	FOR	AGFO		Village Reforestation
6330077	Botswana	FOR	SAG	ENV	Rural Sector Grant
6350205	Gambia	FOR			Gambia Forestry
6490122	Somalia	FOR			CDA Forestry Phase I: Refugee Areas
6500064	Sudan	FOR	AGFO		Eastern Refugee Reforestation
6550013	Cape Verde	WAT	FOR	SAG	Cape Verde Watershed Management II
6830230	Niger	FOR	AGFO		Forestry and Land-Use Planning
6850219	Senegal	FOR			Fuelwood Production, Phase I
6850243	Senegal	FOR			Africare Reforestation in Five Rural Villages
6850247	Senegal	FOR			Village Woodlots - Africare
685PL03	Senegal	FOR	AGFO		PL-4&0 Title III Food for Development
6860235	Burkina Faso	FOR			Forestry Education and Development
6860934	Burkina Faso	FOR	AGFO	SAG	Southwest Regional Reforestation
6950105	Burundi	FOR	AGFO		Bururi Forest
9311080	World	FOR			Deforestation and Development
9311090	World	FOR			Forestry Private Enterprise Initiative
9365519	World	FOR	AGFO		Forest Resources Management
9365547	World	FOR	AGFO		Forestry/Fuelwood Research and Development

2.31 Asia

The purpose of the forestry subcomponent of the Nepal Rural Area Development - Rapti Zone Project (367-0129) is "to increase, improve, and preserve the stock of forest products, including fodder and fuelwood, required to sustain increased agricultural and labor productivity." The project addressed the green issues of renewable resource depletion, deforestation, soil erosion, and watershed degradation through the establishment of nurseries, training, plantations, and strengthening of the Forestry Department's development activities. Output indicators were quite specific:

- (1) Establish 60 panchayat nurseries;
- (2) Establish seven nurseries in DOF and Department of Soil Conservation divisions;
- (3) Reforest 9,425 hectares;
- (4) Distribute 400,000 seedlings;
- (5) Demarcate 1,260 kilometers of forest boundaries;
- (6) Establish 60 trial plots; and
- (7) Provide local and academic training for project participants.

In some respects, such as seedling production and nurseries established, the project had exceeded output expectations:

- (1) Seventy-four panchayat nurseries were established.
- (2) Seven DOF and nine DOSC nurseries were established.
- (3) About 2,700 hectares in tree plantations were established at division and panchayat levels.
- (4) Three and one-half million seedlings were being produced and distributed annually.

As the project moved into Phase II (1988), more emphasis was placed on community forestry and local resource management. The Mission has realigned the program to incorporate the local community through extension and education; long-term sustainability appears likely. Seedling survival rates are not reported, and no hard data on environmental impact of the plantations are provided. Implementing forestry programs has significantly increased the capacity of the DOF, a factor that may lead to positive long-term environmental benefits.

The Resource Conservation and Utilization Project (RCUP) (367-0132) sought to halt the rapid deterioration of Nepal's environment through integrated watershed management. Reforestation was one component; soil conservation, infrastructure, and range improvement were the others. An end-of-project output was to be 500,000 hectares affected by forest management, water source protection, range management, and improved agricultural practices. After five years, only 23,100 hectares had been affected (to what extent and by which components are not specified). The project activities were technically sound but not well integrated. Institution building was only a moderate success. A significant increase in awareness and concern of people for NR conservation is reported. The training by the project of technicians in NRM will also help reverse E/NR degradation. Limiting factors will be people's understanding of the problems and their willingness to participate in solutions.

The Reforestation and Watershed Management Project (383-0085) in Sri Lanka was designed with very specific E/NRM objectives: to improve and conserve the environment and natural resources, to conserve and stabilize watersheds in the highlands, and to provide a renewable energy source through commercial NRM. The project addressed the issues of deforestation, watershed instability, and fuelwood

shortage by providing forestry training, conducting forestry research and development, and establishing a forestry extension service. Four output indicators were specified:

- (1) Reforest and stabilize 15,000 acres of denuded watersheds;
- (2) Establish and maintain 35,000 acres of fuelwood plantations;
- (3) Develop a national forestry baseline map; and
- (4) Establish a village charcoal production system and 50 village-level fuelwood plots.

Institutional development has gone well. The National Forestry Extension Plan was developed, and personnel were trained to carry it out. The area planted will fall short of targets because of an overly optimistic estimate, lack of required equipment, and delays in reimbursements. The evaluation says that the impacts on beneficiaries will not be known until 1995, when trees are harvested. The evaluators anticipate significant economic benefits to local communities, loggers, and others. Also, the government's technical capacity in forestry was increased significantly, which should strengthen the government's ability to address the environmental problems. Direct environmental benefits of this project are not known.

The three forestry projects in India, Madhya Pradesh Social Forestry (386-0475), Maharashtra Social Forestry (386-0478), and the National Social Forestry Program (386-0495) all had similar purposes: to increase institutional capacity for implementing social forestry programs and to encourage participation of villagers in the establishment of community forestry plantations that will result in sustainable yields of forest products.

Despite impressive output figures, the Madhya Pradesh project was a failure from an environmental point of view. Political and cultural pressures that influence land use, inflation, steep wage increases, and much bureaucratic interference limit the villagers' abilities to develop extensive plantations and make it highly unlikely that the achievements — plantations, nurseries, seedling production and distribution — will be sustainable without the project.

The early goals of the Maharashtra project were met, and tree planting exceeded original goals, making the project a modest success, but long-term sustainability is problematic, and environmental impact is unknown. Although more people were participating at the end than at the beginning, people do not want to accept ownership of plantations; fuelwood and fodder supplies are not the strong motivations they were believed to be; and long-term planning and training were inadequate.

The National Social Forestry Program has been very successful in wood production and employment generation. Environmental impacts of the project were neglected in the project design. The evaluation indicates that these impacts have been marginal or even negative in effect. However, the project has had an impact on decreasing the pressure from local residents to cut old-growth forests for wood.

Similar to the forestry projects in India, the Forestry Planning and Development Project (391-0481) in Pakistan sought to reverse deforestation, increase forested areas, and increase energy self-sufficiency through institutional and manpower development programs, research, and field operations. The evaluators said that the project was moderately successful in establishing forest plantations, though specifics were not available, but inadequate incorporation of local participants and extension agents into the management of these plantations casts serious doubt on their long-term sustainability. The evaluators

recommended that the technical team place more emphasis on institutional strengthening and farmer and forester training.

The **Bicol Integrated Area Development III Project (492-0289)** in the Philippines had reforestation and watershed management as major components. The evaluation focused on irrigation and farm technologies and did not indicate the results of either the reforestation or watershed management components. A final evaluation or project final report may yield more information if one can be found.

One component of the **Renewable Nonconventional Energy Project (493-0304)** in Thailand was promotion of village woodlots to curb deforestation by providing a sustainable supply of fuelwood. More than 1 million seedlings were planted in seven provinces, many private tree plantations were developed, 800-960 hectares were reforested, trees were growing where there were none before, and schools were selling seedlings to pay for lunch programs. Overall the project was successful in promoting trees for both economic and ecological benefit. Trees have provided soil stabilization and microclimate moderation. Questions on ownership rights to the trees in certain areas may affect long-term sustainability. E/NRM was not a major consideration of this project, but it produced results nonetheless.

Of the 9 Asia region projects reviewed here, the E/NR benefits or impact of 2 are unknown; the E/NR impacts were judged minimal, marginal, or negative for 4; 1 was said to have had a moderate positive impact, but sustainability was questionable; and 2 were reported to have been successful in reversing environmental degradation. No quantifiable measures of E/NRM benefits or impact were provided for any of these projects.

2.32 Latin America and the Caribbean

Although supported only by a small grant over a two-year period, the **Conservation Education Project (515-0142)** in Costa Rica yielded impressive results. The issues of rampant deforestation and general environmental degradation were addressed through support to the Costa Rican Association for the Conservation of Nature (ASCONA) to undertake an environmental public awareness and education campaign. Increases in ASCONA membership, in environmental protection activities by the GOCR, enactment of environmental protection laws and better enforcement of them, and an environmental education program in the schools were some measures used as indicators of success. Membership and contributions to ASCONA both greatly increased, and ASCONA expanded to a national level; carried out radio, TV, and publishing media campaigns; organized presentations in schools, universities, factories, and ministries; sponsored seminars and round tables; completed an inventory of environmental laws in Costa Rica; and investigated and reported on abuses of natural resources. The project has an impressive list of accomplishments and has been highly successful in promoting the concepts of environmentally sound natural resources management. Despite this, in the decade since this project ended, deforestation in Costa Rica has continued, although the rate has slowed.

The **Natural Resources Management Project (517-0126)** in the Dominican Republic provides an example of how too much emphasis on achieving physical outputs can negate desired benefits. This project was designed to address problems of natural resource degradation including deforestation and erosion through strengthening the GODR's planning capacity, environmental education program, interagency administration, and soil and water conservation activities. However, the output indicators of the project make no direct reference to these actions. Instead, they are listed as soil surveys,

Except for the worldwide IPM/EP project, IPM was only a subobjective of these projects. A range of A.I.D. projects supports activities that are aimed at improving the environment through the introduction of IPM practices. IPM in its simplest form is a collection of alternative strategies to keep plant and animal pests below economically damaging levels using cultivation practices (crop rotations), plant and animal breeding for pest resistance or tolerance, biological controls (propagation of natural predators, parasites, and pathogens of pests) and limited prophylactic use of chemical pesticides as a last defense.

Only a few A.I.D. projects have made the adoption of IPM practices an explicit environmental objective. Only one A.I.D. project, the centrally-funded Integrated Pest Management and Environmental Protection IPM/EP Project, has environmental improvement as its primary objective. Most A.I.D. projects seeking to introduce more environmentally sound pest control practices have crop production, price policy reform, agricultural export diversification, or agriculture sector readjustment as primary objectives and include environmental improvement as a residual benefit or secondary purpose.

Among the issues addressed by the **Jordan Valley: Dynamic Transformation Project (278-0266)** was that of resource efficiency, including use of agrochemicals. Within the area of effectiveness of service institutions, rational use of pesticides, including regulations, correct dosage, disposal, and safety was a subobjective. The evaluation noted that pesticide use was quite extensive in the Jordan Valley but that the Ministry of Agriculture has established strict regulations, which are largely effective in preventing major damage to the environment. Any pesticide banned for a specific use by EPA, WHO, or FAO was automatically banned in Jordan; all pesticides required an Arabic language label; and a pesticide residue laboratory had been constructed. However, educating those actually applying the pesticides to the dangers after the moment of application was ineffective. Health problems resulting from pesticides have been documented in Jordan; the extent of environmental contamination has not. This project is an example of appropriate policies strictly enforced that are rendered far less effective than they could be due to lack of appropriate education and awareness. The success rate of the IPM subcomponent of this project must accordingly be judged low.

The **Agriculture and Rural Sector Support Project (ARSSP) (497-0375)** in Indonesia included the subobjective of reducing pesticide subsidies, and a later amendment added an explicit objective of sound E/NR policies with a subobjective of consolidating pollution and hazardous waste disposal in an appropriate system. Two evaluations both judged that the project had made substantial progress toward achieving its policy reform objectives. The pesticide subsidy was completely eliminated, in stages, over a 20-month period. However, the Mission agreed with the view of the evaluators that no correlation could be established between policy changes and USAID or other donor activity. Nevertheless, budgetary support through the project may have made the IPM and subsidy reduction programs possible.

The **High Impact Agricultural Marketing and Production Project (538-0140)** in the Caribbean region had no specific environmental objective, but FAA Sections 118 and 119 and CFR 22 govern all project actions. It thus raises interesting issues concerning projects with nonenvironmental objectives that may inadvertently pose environmental hazards. Agriculture sector investments sponsored by HIAMP included pesticide use. An auditor's report states that required environmental protection measures were not always taken. Two of 10 Trust grantees were not complying with pesticide use regulations. Specifically, Paraquat, a restricted herbicide, was being used; pesticides were stored in a facility being used for food processing; tainted wastewater was being disposed of in a river; and pesticides were being rebottled. On this basis, the project must be judged to have caused environmental damage.

management, and NRM. The project has been very successful in meeting its goals. Although actual impact on E/NRM is not precisely measurable, it is generally accepted that where training and knowledge transfer take place the E/NRM impact will be positive.

The centrally funded Forestry/Fuelwood Research and Development Project (F/FRED) (936-5547) seeks to improve forestry/fuelwood research capabilities in Asia, Latin America, and Africa through support of assessment, improvement, and management of multipurpose tree species (MPTS). Its chief actions (ongoing) are field research and information systems development. This project gets high marks. It addresses a critical need in appropriate technology for agroforestry systems; it is innovative; it has responded quickly to new problems such as psyllid infestation of *Leucaena* throughout Southeast Asia; and it has achieved excellent networking with and support from other donors and host-country governments. Almost all work so far has been in Asia. This project has had a strong positive environmental impact (although indirect) by making available multipurpose tree species that are attractive to farmers.

2.4 Integrated Pest Management Projects

The substitution of other malarial chemical sprays for DDT is one of the earliest A.I.D. initiatives to reform the use of chemical pesticides for environmental purposes. A.I.D. malaria eradication projects that occurred in the late sixties and early seventies fall outside the time frame and focus of this E/NRM assessment. The primary goals of malaria eradication projects were human health concerns, and DDT substitution was undertaken to comply with new environmental hazard guidelines rather than to improve environmental conditions.

An initial search for projects with an Integrated Pest Management (IPM) component yielded 15 projects. Several of these were excluded because of the long time elapsed since project completion, making it difficult to judge impact. Five promising projects were reviewed. One, the Environmental Education II Project in Costa Rica, turned out not to have a specific IPM objective. Thus, the four projects listed in Table 7 form the basis for the findings, conclusions, and recommendations relevant to this category (see below).

TABLE 7

PROJECTS WITH AN INTEGRATED PEST MANAGEMENT COMPONENT

NUMBER	COUNTRY	CATG	CATG	CATG	TITLE
2780266	Jordan	IPM			The Jordan Valley: Dynamic Transformation
4970375	Indonesia	IPM	ENV		Agriculture and Rural Sector Support Project (ARSSP)
5380140	RDO/C	IPM			The High Impact Agricultural Marketing and Production Project (HIAMP)
9364142	World	IPM			Integrated Pest Management/Environmental Protection

2.34 Worldwide

Four worldwide forestry projects or components of projects were reviewed. See Table 6.

TABLE 6
WORLDWIDE PROJECTS WITH A FORESTRY COMPONENT

NUMBER	COUNTRY	CATG	CATG	CATG	TITLE
9311080	World	FOR			Deforestation and Development
9311090	World	FOR			Forestry Private Enterprise Initiative
9365519	World	FOR	AGFO		Forest Resources Management
9365547	World	FOR	AGFO		Forestry/Fuelwood Research and Development

The **Deforestation and Development Project (931-1080)** was actually a study of what forestry activities other major donors are engaged in, constraints under which donors operate, information gaps that A.I.D. might fill, which ecological and geographic areas of developing countries need greatest assistance, and (e) successes in addressing deforestation in developing countries. The issue was deforestation, the action was collection of data, and the product was a high-quality published report. This effort was very successful, and the resulting report has the potential to significantly improve A.I.D.'s E/NRM activities. However, it is difficult to judge the extent to which A.I.D. (Washington bureaus and Missions) has incorporated the findings into new strategies and the extent to which Missions may be coordinating their efforts with other donors as a result of this study.

The **Forestry Private Enterprise Initiative (931-1090)** is a part of the ARIES project. Its purpose is to test and demonstrate private sector approaches to development of the wood and forestry sector. It addresses issues of forest products processing and marketing and the availability of wood products by developing markets for wood-based industries in target countries and encouraging host-country governments and donor communities to support private sector activities in forestry and wood processing. The evaluation was specific for Ecuador although INFORDE operates in several LAC countries. Success in making individuals and groups aware of the benefits of investment in forest enterprises has been modest but was negligible in promoting forest-based enterprises because of donors' emphasis on use of public agencies. This initiative has had little or no environmental impact but clearly has the potential for negative E/NRM impact if sustainable use is not strongly emphasized.

The **Forest Resources Management Project (936-5519)** seeks to decrease forest and natural resource deterioration in developing countries by providing Missions and host governments with sound technical advice and strong field support in forestry research and by mobilizing Peace Corps collaboration on grass roots forestry projects. Originally a 5-year effort (1980-85), it has recently been re-funded as FRM II for at least another 10 years. It addresses the critical need for professional assistance to deal with forestry and NR problems. When evaluated in 1983, the program was well accepted by Missions and bureaus, collaboration with the Peace Corps was productive, a database containing 1,250 professionals who could be called upon for short-term technical assistance had been established, and numerous assistance activities had been carried out by FSP personnel in forestry, agroforestry, watershed

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question whether the results are sustainable. This project, having ended in 1987, may well be worth a field visit to judge sustainability.

Two forestry projects in Burkina Faso (formerly Upper Volta) were reviewed: **Forestry Education and Development Project (686-0235)** and **Southwest Regional Reforestation Project (686-0934)**. The first sought to address issues of deforestation, desertification, soil erosion, and forest and wildlife management through TA and training and development, maintenance, and harvesting of plantations. This project appears to have had no positive benefits, environmental or otherwise. There was a two-year start-up delay; the forest management was carried out by expatriates because counterparts were not trained by the government and were unavailable for planning and implementation of this component. The project's only accomplishment may be that classrooms were constructed at an existing training center.

The second project also had agroforestry and sustainable agriculture components and addressed issues of soil erosion, deforestation, low agricultural productivity, general environmental degradation, and low household incomes. Actions taken included establishment of extension programs, training, nurseries, plantations, and institutional strengthening. The physical outputs were good, but the sustainability issue is raised by the fact that the six departmental nurseries were abandoned after project funds ran out. The project did enhance awareness of E/NRM problems among villagers, but had little success in getting villagers to change their traditional ways. However, there is continued interest by villagers who derived direct personal benefits, meaning there is some hope for long-term E/NRM benefits.

The **Bururi Forest Project (695-0105)** in Burundi addressed issues of deforestation and shortage of timber by providing technical assistance and training to assist the government to increase the forest resource base, develop new sources of fuelwood and construction timber, and preserve a remnant forest. The intent was to establish 1,200 hectares of plantations around the remnant forest, a seedling nursery, and 300 hectares of private and communal woodlots of eucalyptus. Seven-hundred and seventy-four hectares of exotics and 100 hectares of local species were actually planted on degraded soil; an agroforestry extension program was begun; and protection of the remnant forest was provided by guards. Reforestation was successful; no data on specific environmental benefits were available.

Of the 14 forestry projects reviewed for Africa, only one reported (partly) measurable E/NRM results. Judgment on degree of E/NRM success must therefore be quite subjective and based, as usual, on the generally accepted premise that forestry and agroforestry projects, if successful in establishing trees, do have a generally positive impact on the environment. On this basis, we judge four projects to have failed, one to have had marginal impact, two low impact, five moderate, and two good.

The **Eastern Refugee Reforestation Project (650-0064)** in the Sudan was a large-scale reforestation and extension effort designed to replace forests consumed by Ethiopian refugees in the eastern Sudan and to counteract general environmental degradation by promoting tree planting and appropriate resource management practices. The issues addressed were wind and water erosion, deforestation, and lack of fodder, fuelwood, and other tree products. Several of the output indicators of this project are identical to those of project 6500041, Rural Renewable Energy for Sudan. It would appear that the latter changed course and became a reforestation project to counteract the environmental impact of the refugees. This project was successful and had positive benefits for the environment. Although only some of the direct environmental results are quantified (8,741 feddans of block plantations established when the goal was 8,000), other environmental benefits such as soil conservation could have been monitored.

The **Cape Verde Watershed Management II Project (655-0013, an extension of CVWM I)** sought to address the issues of deforestation and soil erosion on steep slopes by a variety of actions that included contour furrows, rock terraces, check dams, subterranean catchment dams, embankment groins, biological soil erosion control agents, and tree planting. A nice variety of tree species was planted, meeting or exceeding project goals, but the midterm evaluation mentions that survival rates varied from one site to the next. No direct measures of environmental benefits are given.

The **Forestry and Land-Use Planning Project (FLUP) (683-0230)** in Niger sought to reverse deterioration of soil and vegetative cover through technical assistance and training. It addressed issues of deforestation, overgrazing, overfarming, natural forest management, and soil and water conservation through the following actions: an inventory of natural resources; initiation of conservation and production sites; establishment of an extension service program; and development of a 20-year resource plan. Although the PP set overly ambitious, these were scaled back, and the result was a successful effort with a positive effect on the environment. The evaluators say that rehabilitation efforts have had positive results in degraded areas, and agroforestry efforts are improving the standard of living. Environmental impact has been positive due to highly successful reforestation efforts. GON has implemented a program whereby residents are given lease agreements to responsibly exploit forest resources. Title is not given to them, but the lease is long enough to encourage sustainable, long-term investments such as forestry. This is considered a model project, and A.I.D. seeks to replicate the innovative tenure arrangements throughout Sub-Saharan Africa.

Four projects in Senegal addressed the issues of deforestation and soil erosion (in one instance, dune stabilization). Three of these also addressed the issue of fuelwood supply. These projects were **Fuelwood Production, Phase I (685-0219)**; **Africare Reforestation in Five Rural Villages (685-0243)**; **Village Woodlots - Africare (685-0247)**; and **PL-480 Title III Food for Development (685PL03)**. Of the first three, the fuelwood project appears to be an unmitigated failure. Only about half the expected area was planted, and growth rate was 1.5 cubic meters per hectare per year, compared to the expected 10 cubic meters per hectare per year. The second achieved twice the hectarage of woodlots expected, with a greater than 90 percent survival rate and was judged by the evaluators as a success with a positive impact on the environment. The third was judged a moderate success at midterm with a recommendation for changing direction because the villagers did not want woodlots; they wanted shade trees, food and fruit trees, and trees in otherwise unused areas. The fourth project is a rare example of success in E/NRM using PL-480 funds, achieving protection of 25,000 hectares of good farmland and stabilization of 3,892 hectares of dunes. Only in the last instance were figures given that can be easily translated into some measure of E/NRM impact. However, because all the labor was paid for by the project, one must

establishment of data collection capability for the Forest Service. Poorly trained personnel, poor communications, and poor financial management hindered this project although it was judged a moderate technical success. The impact on the environment has been marginal. Resolution of personnel problems and much greater personal involvement of the village farmers is necessary for any real progress to be made.

The Rural Sector Grant (633-0077) in Botswana was designed with forestry and sustainable agriculture components to help shape major GOB programs during the 1980s. Although project actions clearly had E/NRM potential, none of the issues addressed (lack of rural employment, low agricultural production, national food deficit, rural to urban migration, and urban unemployment) had specific E/NRM objectives. The chief actions funded were technical assistance and training. The forestry component outputs were to be afforestation by brigades in woodlots for soil conservation, fuelwood and forest products production, establishment of three government nurseries, sandveld plantation trials, and village woodlots. Evaluators reported numerous problems including overemphasis on infrastructure, vehicles and mechanized land preparation, delays in nursery production, overproduction at one nursery and underproduction at others. This project was judged a failure, and the forestry component in particular was determined to be not worth continuing in Phase II. Few of the project goals were achieved. Extenuating circumstances — currency devaluation, government budget crisis, six-year drought, and high turnover of personnel in both USAID and the Ministries — contributed to project failure. There appear to have been no E/NRM benefits derived from this project.

The Gambia Forestry Project (635-0205) sought to slow and reverse the accelerating depletion of the natural resource base and improve efficiency of wood production and use through establishment of village woodlots and plantations in natural forests. One thousand three hundred hectares of Gmelina in forest parks and 50 hectares of village woodlots of various species were to be planted. The plantations were a failure from an environmental viewpoint. Dense natural vegetation was cleared to establish the plantations, tree planting was behind schedule, and survival and stocking rates were reported as extremely low. The farmers preferred fruit and nut trees on the village woodlots. Forty-five hectares were established, an area too small to have any significant impact on natural forest resources. In any event, any such impact was not measured.

The purpose of the CDA Forestry Phase I: Refugee Areas Project (649-0122) in Somalia was to redress deforestation caused by refugees and to provide tree planting, fuel conservation, and work opportunities to strengthen the institutional capability of the National Range Agency at headquarters and in the field. Output indicator goals were established as five fuelwood lots totaling 2,500 hectares, 1.7 million trees planted, 225 to 300 hectares of shelterbelts, 1.5 million shade trees planted, 90 hectares of sand dunes fixed, 10,000 improved woodstoves distributed, and 5 foresters and NRA staff trained. Levels above targets were achieved for fuel woodlots and plantations, but survival rates were reported as poor. Half the shade tree target was achieved with 90 percent survival; 72 hectares of sand dunes were stabilized; 6,328 woodstoves were distributed; and 11 foresters were trained. The fuelwood plantations failed due to harsh climate and rainfall conditions, desiccating wind, inappropriate species selection, and issues of woodlot ownership. Important lessons were learned. Despite poor survival of fuelwood plantings, live fencing of these areas did allow natural regeneration of native vegetation, a positive E/NRM effect — but not quantified. Calculations of fuelwood savings from use of improved woodstoves to determine environmental benefits could have been done as in the CATIE project in Central America, but apparently such measures were not taken.

The fuelwood component greatly exceeded most of its quantitative targets by establishing 503 small farm fuelwood units, 52 village woodlots, 31 plantations, 351 small farm agroforestry demonstration units, and 6 natural vegetation units.

Nine students received M.S. training at CATIE. (Originally, 9 were to be trained at CATIE, and 9 in the U.S., but this plan was amended to have all training take place at CATIE.) Five seminars were conducted at CATIE, 17 seminars were held in country, and two traveling seminars were developed.

The impact of the technology component was measured in the evaluation by the fuelwood saved, the number of beneficiaries, and the number of jobs created. It was estimated that the change to more efficient stoves and industrial kilns and bakery ovens saved 83,000 cubic meters of fuelwood annually, equivalent to 2,000 hectares of forest. Ten thousand households were beneficiaries of improved cookstoves, 130 of improved bakery ovens, and 80 of charcoal kilns. Total employment generated is estimated at 417 jobs created by improved stoves and other wood-burning technologies.

The solar drying component saved an estimated 100,000 cubic meters of fuelwood annually in Honduras for seasalt production, equivalent to 2,500 hectares of mangroves. Two thousand five hundred people benefited directly from the solar dryers, and 1,300 jobs were created in this component. The biogas component was small, and the fuelwood saved is estimated at 900 cubic meters (23 hectares) annually, with 36 beneficiaries and 10 new jobs created.

The estimated total impact indicates the formation of 400 small industries employing more than 1,500 workers, and 13,000 families benefited (although this seems exaggerated because it appears to presume an average family size of 8.7 — high even in Central America).

The program can account for almost 200,000 cubic meters of fuelwood saved as a result of the technology component and widespread demonstration, planting, and training activities throughout Central America. Fuelwood saved can serve as an indirect measure of environmental impact in that it measures the lessening of use pressure on the natural forest. The only goal of the fuelwood research program that could not be met is financial self-sustainability, because CATIE is dependent on external funding for its programs.

Of the 7 forestry projects in LAC, 5 provided no quantitative indicators of E/NRM benefits. The other two, the Central Selva Resource Management Project in Peru and the Fuelwood and Alternative Energy Sources Project run by CATIE for Central America, do provide quantitative measures of E/NRM impact, and both show extensive positive E/NRM benefits. Both are good examples of sound planning, implementation, and technology and of how quantitative measures may be used to ascertain E/NRM benefits. Both are also examples of participatory development at the community level.

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The Village Reforestation Project (625-0937.09) in Mali had the explicit E/NRM objectives of achieving effective reforestation and more efficient use of wood resources at the village level and contributing to the rehabilitation of the renewable resource base. The actions funded to meet these objectives were establishment of nurseries expected to produce 30,000 seedlings per year, strengthening of the extension capabilities of the Forest Service, creation of experimental and demonstration plots, and

development and implementation of 3,000 farm plans, reforestation of 800 hectares, and making available 15 farming systems technology packages to small farmers. The soil surveys were done but were of little use to farmers. Farm plans were hastily made and overly simplistic in order to reach the 3,000 quota. Attempted credit incentives were a failure. Farmers did not want to take the risk. Because the emphasis was on physical quotas rather than on transferring skills to project participants, the project has probably had minimal or no positive effect on ameliorating environmental degradation. In any event, the means to measure such effect is lacking.

Deforestation and erosion are major problems in Ecuador as in many other developing countries. The **Forestry Sector Development Project (518-0023)** sought to address these issues mainly through institutional strengthening of the GOE Forestry Directorate, by developing a national forestry program and other forestry institutions, by establishing productive forestry research and field demonstrations, and by protective forest and watershed management activities in both the highlands and the lowlands. The evaluation, done in year four of the six-year project, indicated that field demonstrations, establishment of productive forestry plantations, and training were proceeding reasonably well, but a lack of institutional strengthening was limiting the effectiveness of the field activities. The latter is critical to any long-term positive impact on E/NRM.

The **Environmental Conservation Project (518-0031)** in Ecuador sought to make people more aware of environmental degradation through educational media on the assumption that a lack of accurate information was contributing significantly to the problem. The project also included demonstration reforestation projects. The demonstrations were a technical success but did not prove to be an effective means to educate people. As a result, long-term environmental benefits are problematic.

The reforestation component of the **Highlands Agriculture Development Project (520-0274)** in Guatemala addressed natural resource depletion by setting a goal of improving 120 hectares of land through reforestation. This 10-year project, which began in 1983, was evaluated in 1988. The evaluation makes no mention of the reforestation goal. (See below under Sustainable Agriculture.)

The well-known **Central Selva Resource Management Project (527-0240)** in Peru was designed to test and institutionalize a methodology for long-term management of the natural resources of the high jungle area of the Palcazu Valley. The results are impressive. Three major forested areas were set aside as reserves and national parks (no information on effectiveness of enforcement), and eight agroforestry systems were established. The Yanasha forestry cooperative was established and is engaged in what appears to be sustainable natural forest management, producing commercial lumber, posts, and charcoal. This project successfully implemented sustainable management of tropical indigenous forests. It is a good candidate for a field visit if political circumstances permit.

The **Fuelwood and Alternative Energy Sources Project (596-0089)**, operated by CATIE in Costa Rica to benefit the Central American countries, is worth reporting on in some detail because it is one of the very few projects with outputs that were quantified in a way that permits at least some judgment of E/NRM impact. The project purpose was for CATIE to develop, demonstrate, and make available for transfer improved tree cultivation practices to increase fuelwood production and supply and efficient, low-cost domestic cookstoves and small and medium fuelwood and nonconventional energy technologies.

The worldwide, centrally funded Integrated Pest Management/Environmental Protection Project (936-4142) sought to help developing countries improve their capabilities to cope with plant pests in an affordable and environmentally safe manner through training, research, and networks of plant protection scientists and IPM specialists. TA and training were provided to developing-country institutions charged with pest control activities. Assessments of impact of pesticide use were funded, and guidelines for safe pesticide handling and use were disseminated. Some networking efforts were attempted. Reports and evaluations document a range of activities. However, indications of any environmental impact, direct or indirect, are absent. Also, no attention has been given to farmer adoption rates for IPM and safe pesticide use practices; thus, impact at the level of improved practices that would have indirect environmental benefits also cannot be documented. The "safe pesticide use" philosophy dominates the project at the expense of non-pesticide IPM approaches to environmentally safe pest control. The support role of the project in relation to Mission programs has kept IPM/EP activities quite removed from the farm and research station level.

In sum, A.I.D.'s IPM efforts are mostly regulatory and have not been particularly effective in moving IPM away from regulation of chemical applications toward biologically based alternatives.

2.5 Range Management Projects

Introduction: Range Management and A.I.D. History

As a modern discipline, range management (RM) is born of the perception that livestockmen of the American West were "mining" the short grass prairies and steppe of the semiarid plains. By definition, RM implies the conscious manipulation of factors bearing on the environment to suit the aims of man. Although the fundamental objective of managing rangelands has customarily been directed to the production of livestock-based products of economic value, rangelands, as managed natural areas,² are increasingly subject to the pressures of competing land uses. Over and above conversion to non-range uses such as agricultural and urban, these include sport hunting, habitat conservation, and timber production.

In essence, little changed with RM's transfer to the development context. As defined by one of the conceptualizers behind the Tanzanian Masai Project, range management is:

the science and art of planning and directing range use to obtain the maximum livestock production *consistent with conservation of range resources*.³

² Rangeland is characterized by a natural or semi-natural vegetation cover that provides a habitat suitable to herds of wild or domestic ungulates. It is generally agreed that rangeland remains rangeland because there is no better economic use of the land; however, various demographic and social pressures can lead to the exploitation of rangelands for purposes to which they are less well suited. This suggests a valid role for regulatory authority.

³ Frank Abercrombie, *Range Development and Management in Africa*. Washington, DC: Bureau for Africa, Agency for International Development. The Masai Project was one of the earliest and longest-running (building on efforts beginning in 1959, it ran from 1970-1980) Agency-funded ventures into improving African livestock systems.

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The early development of rangeland management in the United States, with its inherent conservation dimension, suggested a USAID comparative advantage as a donor in this area. In the 1970s and even earlier, rangeland degradation and desertification were widely perceived, especially in North and Sub-Saharan Africa, as serious threats to future productivity and economic growth. With attention focused by the great 1968-1974 Sahelian drought and accompanying perceptions of rampant desertification, resources were mobilized. Conceptually, RM seemed to offer much to address these parallel problems, and a widespread program of technology transfer was embarked upon.

To date A.I.D. has implemented nearly 60 projects having some direct link with range management. Most of this activity took place in North and Sub-Saharan Africa. Despite this focused effort, by the early 1980s the Agency had concluded that livestock production, and especially RM, was not an area of overall effectiveness and success. The frequently conflicting aims of conservation and maximizing production (increasing exports and foreign exchange) have apparently been difficult to reconcile. Further, production maximization goals are often inconsistent with local interests and the logic of local production systems. Participation and enthusiasm of herders and livestock owners is reported to be low. The bulk of this sizable sectoral program was terminated and not renewed. Only a few RM projects persist or are in the design and proposal stage.

Project Descriptions

Of the A.I.D.-supported programs or projects, very few were designed with range management per se as the central goal. Frequently, range management was included as a separate component or subcomponent of a more comprehensive activity, as an element of one of the following projects:

- An integrated livestock project;
- An overall agricultural sector or productivity project;
- A marketing or commercialization activity;
- A multidimensional natural resources management activity; or
- A research, training, or institutional support operation.

In those cases where *range management* was clearly the focus of the project (see Table 8), such as with the Morocco Range Management Improvement Project (608-0145), the thrust of the effort was frequently on institution building and only indirectly on the rangeland. Even when land management was a core concern as in the case of the Lesotho Land Conservation and Range Development (632-0215), *people* were not in the first instance (excepting notable cases such as the Niger Range and Livestock and Integrated Livestock Projects), the core around which RM activities were designed. Table 9 below shows a breakdown of the projects reviewed according to project type and location.

into improving African livestock systems.

The Morocco Range Management Improvement Project (608-0145) was designed as an institutional support project the goal of which was to strengthen the capacity of Morocco's Livestock Directorate/Range Management Service (DE/SP) to plan and implement applied research, extension, and range management programs. In those terms it can be counted as largely successful; the Services budget tripled, and trained technicians are in place. However, a sense of ownership by herding populations of the activities supported remained minimal, as did social science analytical capacity within the Range Management Service. Without a long-term rangeland policy and without local-level institutions' control of resource access and use of communal lands, adoption rates of improved practices were minimal. In the absence of a comprehensive National Rangelands Policy, the local A.I.D. Mission suspended progress toward a second phase. It would be interesting to assess in the post-project period the effect the institutional effort has had in meeting what was considered a fundamental precondition to successful RM in Morocco's extensive grazing areas.

Botswana's Range and Livestock Management Project (633-0015) initially focused on technologically viable but inequitable large-scale ranch development but later expanded to include a broad-based group formation strategy to extending improved RM practices, thereby addressing the issue of participation. More than 11,100 groups involving 20,000 resource users were activated. Despite these levels, one evaluation cited the failure to develop an effective strategy for providing technical assistance to farmers' groups as the project's major weakness. Technology transfer was sub-optimal. Not inconsequentially, progress at the policy level was cited as being limited by the GOB's failure to pass a conservation law and by a general lack of commitment to the effort required to improve range ecology.

In Kenya, at least the three projects reviewed were actively focused on institutional strengthening and technology transfer in the livestock and range sector in the late 1970s and early 1980s. From the evaluations it was difficult to discern whether any meaningful synergy was achieved. Three efforts appeared closely tied. The Kenya Livestock Development Project (615-0160) was essentially a loan to support elements of the National Range and Ranch Development Project (615-0157). Together these efforts focused on ranch development in several areas of the country and on range and water point development in the Northeast Province. These field activities were in turn to be reinforced by the development of a range research infrastructure and program coupled with training of academic, research, and technical staff in the field of range management. This training, research, and human resources development was accomplished through a subcomponent of the Agricultural Systems Support Project (615-0169).

In the Somalia Central Rangeland Development Project (649-0108), A.I.D. undertook the range management portion of an integrated multidonor program geared to the livestock production systems of Central Somalia. In this context A.I.D.'s focus was on the development and testing of appropriate technologies or range management practices and training. Implementation was difficult because of weak initial design, lack of flexibility during execution, and logistical difficulties associated with the multidonor framework and with the remote project area.

TABLE 8

PROJECTS WITH A RANGE MANAGEMENT COMPONENT

NUMBER	COUNTRY	CATG	CATG	CATG	TITLE
3670132	Nepal	WAT	FOR	RM	Resource Conservation and Utilization
6080145	Morocco	RM			Range Management Improvement
6150157	Kenya	RM			National Range and Ranch Development Project
6150160	Kenya	RM			Kenya Livestock Development Project
6150169	Kenya	RM			Kenya Agricultural Systems Support Project
6210093	Tanzania	RM			Masai Livestock and Range Management Project
6210122	Tanzania	RM			Livestock Marketing and Development
6210122	Tanzania	RM			Livestock Marketing and Development Project
6310004	Cameroon	RM	SAG		North Cameroon Livestock and Agricultural Development Project
6320215	Lesotho		RM		Land Conservation and Range Development Project
6330015	Botswana	RM			Range and Livestock Management Project
6350203	Gambia		RM		Mixed Farming and Resource Management Project
6490108	Somalia		RM		Central Rangeland Development Project
6500018	Sudan	RM			Blue Nile Agricultural Development Project
6500020	Sudan	RM	SAG		Western Sudan Agricultural Research
6640312.8	Tunisia		RM		Central Tunisia Rural Development Project/Range Management Subproject
6820201	Mauritania	RM			Guidimaka Integrated (or Mauritania) Rural Development Project
6830202	Niger	RM			Range and Livestock Management
6830242	Niger	RM			Integrated Livestock Project
6850202	Senegal		RM		Eastern Senegal Range and Livestock Project
6850224	Senegal		RM	SODESP	Project
6860203	Burkina Faso	RM			Upper Volta Village Livestock Project
6880201	Mali	RM			Livestock Development Project I

TABLE 9

DISTRIBUTION OF RANGE MANAGEMENT PROJECTS BY COUNTRY AND TYPE

TYPE	NUMBER	COUNTRIES
Primarily Range Management	3	Morocco, Botswana, Somalia
Integrated Livestock	8	Niger (2), Senegal (Eastern), Mali, Tanzania (Masai), Burkina, Kenya (2)
General Agricultural	5	Gambia, Cameroon, Tunisia, Sudan, Mauritania
Marketing/Commercialization	2	Senegal (SODESP), Tanzania
Multidimensional NRM	2	Nepal, Lesotho
Research, Training, Institutional Support	2	Kenya, Sudan

Two projects in Tanzania, the **Masai Livestock and Range Project (621-0093)** and the **Livestock Marketing and Development Project (LMDP) (621-0122)**, emphasized rationalizing beef production in extensive grazing systems. Production efficiency and increasing off-take were the major preoccupation in each of these projects. These objectives were pursued through the organization of commercial and group ranches. RM was addressed in the LMDP through a Range Management and Water Development subcomponent. Water points, cattle trails, and RM were poorly coordinated. The technological package appears to have been highly inappropriate to the local culture and production systems. Herders were asked to cede animal ownership and fundamentally alter grazing patterns. Only 8 of 37 ranches even developed RM plans. Environmental impact was not measured, but was probably negative. In the latter stages of the project RM was all but abandoned in favor of upgrading management, order buying, construction, market reporting, and live cattle grading capabilities and on developing a grading/pricing structure.

The **Range and Livestock Project (NRL) (683-0202)** and its follow-on, the **Integrated Livestock Project (ILP) (683-0242)**, establish Niger as the stage for the exploration of innovative approaches, particularly participatory models. The NRL is notable in placing the herder and the existing production systems at the center of the development effort. NRL must be counted among the early successes in moving away from a top-down to a participatory development approach. It was a research and pilot project and successfully studied the existing situation in the pastoral zone. Project TA was carefully chosen and reflected expertise in the languages and cultures of the region. GON support to the Northern Pastoral Zone was questionable, and tension was created by having project teams working closely with local herders under different principles than those pursued under the government's *société de développement* (that is, induced mass participation). The pilot project led to a strong and flexible design for the follow-on integrated Livestock Project. ILP later met problems when drought reinforced minimal GON administrative support and forced a redesign in midproject. This redesign led to the dropping of field-based activities in range management and moved concerns to the policy and research side. The focus of ILP was on the creation of a GIS-based pastoral biomass monitoring exercise combining satellite and

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ground data. The information was to lead to better government preparation for variable pasture conditions and to the diffusion of this information to livestock owners (particularly when destocking was recommended). This pastoral early warning system (EWS) continues after project completion.

The Eastern Senegal Range and Livestock Project (685-0202) epitomizes the generation of post-Sahelian drought projects that were designed in the mid-1970s and implemented into the early 1980s. As such it represents an attempt to direct the predominant integrated rural development model of the period toward the extensive livestock sector. Reflecting the concern with desertification and drought, the project's purpose was first to protect range resources in the project zone and second to improve livestock production in the project zone (Toulededi/Sarre or Bakel zone of Eastern Senegal). It was hoped that the project would lead towards an integrated model of livestock and range development for Senegal and the Sahel in general. The model would involve better water and range management combined with fewer, more productive animals (higher offtake). Detailed research questioned the dynamics of degradation as well as several management assumptions and led to recommendations to proceed more incrementally and with caution. The GOS showed increasing sectoral interest in livestock and designated the Eastern and Northern Ferlo rangelands as a *zone de naissance*, or breeding zone. This agroecological model based on zonal differentiation was formalized in the related SODESP Project (685-0224). SODESP aimed to organize herders to serve as suppliers of young stock, and in the process limit animal numbers and practice less environmentally damaging management. RM under this locally managed parastatal completely disintegrated as did much of the rest of the project eventually. The concept of zonation failed because it dissociated the herder from his means of production and social continuity, the herd. From an institutional support standpoint, SODESP embodies the inefficiencies that led the Agency to withdraw support to parastatals in favor of privatization.

At the same time the Senegal and Niger projects were undertaken, the other Sahelian states were implementing similar institutional support and technology transfer projects. In Burkina Faso (then Upper Volta), the Village Livestock Project (686-0203) emphasized integrated livestock production in a mixed farming setting. The pilot phase (baseline data collection and trial solution testing) of the project made headway in defining local-level management parameters and constraints in an area of spatially overlapping production systems (sedentary, short- and long-distance transhumance), but progress was stopped with the decision, contrary to the evaluation team's recommendation, not to proceed with a second phase. In Mali Livestock Development I (688-0201), RM as the motor of the Sahel grazing component in a multicomponent project, suffered from severe lack of resources and personnel problems. Impact, even in the Doukoulomba demonstration area, was negligible. The North Cameroon Livestock and Agricultural Development Project (631-0004), like the VLP in Burkina, inadequately addressed the issue of scale of the intervention unit; that is, the zone of intervention did not include all the grazing areas of the resident herders and seasonal users. Further, the project was limited by acting in isolation from the numerous agencies responsible for natural resources evaluation and land use planning. Like many other livestock projects, success was limited by unrealistically short time horizons and the lack of follow-through beyond the pilot first phase. Gambia's Mixed Farming and Resource Management Project (635-0203) combined RM with various other dimensions of resource planning and management as well as agricultural development. The focus seemed to be on neither the land or the people, but more on the animals, specifically cattle, and their place in the various production systems of the small country. A similar project in Chad ended just prior to the cutoff date for the present review.

In the **Guidimaka Integrated Rural Development Project (682-0201)** in Mauritania, a range management test area was established 8 kilometer north of Selibaby to demonstrate the basics of ruminant nutrition to Mauritanian technicians. Promising work was carried out in range management but needed to be complemented by a national policy to promote controlled access to land. Trial efforts to promote women's participation in the project failed. Progress was limited by operational factors that typically limit RM projects: (1) The project paper and project agreement were very vague, providing less than technically sound recommendations; (2) The project management and implementation staff did not have the technical knowledge to supplement and correct the PP design; and (3) The remote location of the project site magnified all the other problems.

Nepal's Resource Conservation and Utilization Project (367-0132), discussed above under "Forestry Projects," and the **Lesotho Land Conservation and Range Development Project (632-0215)** dealt with rangeland units that were more tightly restricted by the areas' mountainous topography. In a sense this may have contributed to the latter's success in implementing a reasonable measure of control in access and grazing behavior of animals in the project area. Because of its initial success, the LCRD has increased the area in Range Management Areas (RMA's) from 34,000 hectares in 1985 to over 130,000 in 1990. This control is supported and sanctioned by the project and seconded by the GOL. Ultimate success will depend on local beneficiaries being able to manage internally and retain exclusive use rights. The evaluation recommends a 20-year minimum period to transfer control of resources to local groups and indicates that continued outside regulatory or enforcement input may be an essential ingredient for sustainability. Despite this uncertainty LCRD is one of the Agency's most successful RM projects.

In contrast to Lesotho, the **Central Tunisia Rural Development Project/Range Management Subproject (664-0312.8)** was unable to achieve viable control in the communal grazing perimeters established by the project. As a result RM practices were adhered to only in a limited number of sites, and their acceptance apparently had more to do with project-supported incentives than local ownership and endorsement. Economic studies called into question the cost-effectiveness of range improvements such as subsoiling and reseeded. In Sudan, after limited experience in the **Blue Nile Agricultural Development Project (650-0018)**, where fencing was tried as a control measure, project staff limited activity to vegetation monitoring in the Damazin area. The research theme was picked up in the **Western Sudan Agricultural Research Project (650-0020)**, where three range research stations were established in a multidonor effort.

Summary

Given the constraints under which A.I.D.'s range management projects were operating, the overall accomplishments, though incremental and uneven, are nonetheless remarkable. This is particularly the case for training and raising the level of awareness of the importance of range issues in host-country governments and to a lesser extent for research and baseline data collection. Targeted outputs in these areas were often met or exceeded. However, RM activities usually either lacked an effective technical package or were unable to find viable mechanisms for introducing change into customary practices of husbandry and range control. At times they failed on both counts. Improved practices were rarely adopted or adopted only for limited areas and often maintained only for the life of the project.

A.I.D. programs essentially trained a generation of mostly African range managers and did much to expand the domain of host-country livestock services beyond their traditional and narrow concern with animal health toward a more comprehensive concern with animal production and marketing. RM comprised a key component of this institutional reinforcement. Progress notwithstanding, the cumulative impacts, as assessed at the individual level in terms of positive (biophysical) changes in rangeland ecology, appear in almost every case to be negligible

This early development thrust into the livestock sector was characterized by a plethora of overambitious multipurpose projects that attempted to combine numerous and often contradictory components into a single unified whole. They set out project objectives that would have, in any event, been impossible to attain in the usual three- to five-year project cycle. Although many were conceived as multiphase projects with 10- to 30-year time horizons, most were terminated after an initial research and/or pilot site phase.

When, by the late 1970s, it became clear that results were not meeting expectations, a number of efforts were launched to determine what steps would be necessary if the portfolio were to be appropriately reoriented. The challenges and criticisms confronting livestock development were effectively addressed in two A.I.D.-funded policy workshops.⁴

The first, held at Cold Harbor in 1979, laid out criticisms, largely from a social science perspective, mostly of technological failings. In a background paper commissioned by A.I.D.'s Office of Evaluation, Horowitz attributed the "poor success of livestock sector interventions to fundamental discrepancies between the assumptions commonly made about pastoral behavior and the social and ecological realities of . . . pastoral life," and that "if that track record is to improve there must be a far better articulation between those realities and the interventions."⁵ The second workshop, held two years later at Harpers Ferry, led toward a strategy for dealing with and overcoming identified constraints that were later expressed in the *Africa Bureau Livestock Development Assistance Strategy*⁶. This remains the last major programmatic initiative to treat range management. As such, the present assessment would be well served by revisiting the predominant concerns of that time and examining subsequent progress, made in those cases where programs were not simply phased out, in surmounting the difficulties identified.

Has range management proven itself as a viable, environmentally sound model in developed country private and public rangelands, and if so, is it appropriate for transfer to the developing country context? Some environmentalists think not; viewing livestock development as essentially an ecologically destructive effort to rationalize beef production, Rifkin argues:

⁴ Both were jointly sponsored by the Bureau for Program and Policy Coordination and the Africa Bureau.

⁵ Michael Horowitz, *The Sociology of Pastoralism and African Livestock Projects*. A.I.D. Office of Evaluation.

⁶ Agency for International Development, *Africa Bureau Livestock Development Assistance Strategy Paper*, AFR/TR/RD, December 1982.

Cattle are among the major environmental threats facing the planet today. Their role in undermining the earth's biosphere needs to be examined and assessed (p.191). For example, the modern cattle complex is destroying many regions of the African continent. [Herdsman] find themselves unable to survive the steady barrage of economic and environmental assaults . . . (p.216).⁷

Why, despite 30 years of assistance, does foreign aid seem unable to come to grips with defining the essential components of a support program for environmental management in the semiarid rangelands?

2.6 Sustainable Agriculture Projects

Twenty-nine of the green projects reviewed have a sustainable agriculture component. Of these, 13 have already been described above under Agroforestry or Forestry, and one under Range Management. Of the remaining 15, 3 are more appropriately reviewed below under Watershed Management. The decision was made on the basis of where the emphasis in project implementation seemed to lie.

It is important to note that few, if any, of the projects included solely because of a sustainable agriculture component were designed specifically for E/NRM objectives. In most cases, project objectives were phrased as increasing productivity, increasing export earnings, or decreasing soil loss (as a means of maintaining productivity rather than to reduce environmental damage). Thus, for sustainable agriculture, a key question is "What is it designed to sustain?" Sustaining a steady flow of exportable fruit is a far cry from sustaining an array of subsistence crops, protective vegetation, and clean water. For this exercise, the projects included were based on an indication in project documents that some part of the project objectives was to ensure sustainability through environmental stabilization of the crop-producing areas. Those that sought mainly to sustain cash flow while ignoring environmental costs and benefits were omitted.

The 29 projects with a sustainable agriculture component are listed in Table 10. The 16 projects with a sustainable agriculture component and no forestry or agroforestry component are listed in Table 11. The North Cameroon Livestock and Agricultural Development Project has been reviewed above under Range Management. Projects 527-0220 (Peru), 538-0108 (St. Kitts/Nevis), and 655-0006 (Cape Verde) are reviewed below under Watershed Management.

Of the 12 sustainable agriculture projects reviewed here, 4 are in the Asia region (3 in Indonesia and 1 regional), 2 are in the LAC region, 5 are in the Africa region, and 1 is worldwide.

⁷ Jeremy Rifkin, *Beyond Beef: The Rise and Fall of the Cattle Culture*. New York: Dutton Books (1992).

2.61 Asia

The **Citanduy II Project (497-0281)** in Indonesia sought to increase food production through better use of soil and water resources. It addressed issues of local and national capacity in comprehensive watershed management, food production, and soil and water resource conservation by establishing model farms, introducing improved agricultural technology, rehabilitating irrigation systems, and establishing high-yield rice blocs. Although plagued by administrative and financial complexities and a number of exogenous factors as well, this project achieved moderate success in regard to its expected outputs. Although no actual measures of environmental benefits were reported, it was reported that appropriate data (micro and macro hydrologic and sedimentation data) are being collected.

The **Uplands Agriculture and Conservation Project (UACP) (497-0311)** in Indonesia addressed issues of low agricultural productivity, soil erosion, and weak institutional capacity by institutional strengthening at the provincial, district, and farm levels and demonstration plots in two watersheds in the Java uplands, each treated with soil conservation measures and a new cropping system. This project has been moderately successful in addressing issues of institutional development and soil conservation, but there are questions about the sustainability of project innovations. Reversion to simpler cropping systems has occurred at several Sustainable Uplands Farming Systems (SUFS) sites, SUFS planning is not well adapted to environmental conditions and farmer needs, and expansion of SUFS sites has been slower than planned. A major problem has been the inability of the GOI to provide agreed upon funding.

The **East Timor Agricultural Development Project (497-0330)** in Indonesia had no specific environmental component in the original grant agreement. The evaluation and final report both mention soil conservation as a goal of this project, but it has not been successful because farmers have not wanted to adopt the techniques, and the current slash-and-burn system continues to degrade the environment.

Determinants of Irrigation Problems: Technical Assistance (931-1005) was a regional Asia project intended to improve procedures for the design of new irrigation systems and rehabilitate existing systems. It addressed the issue of the interaction of socioeconomic factors with biophysical factors through data collection, technical assistance, and conferences. While this project had no specific environmental component, it had the potential for significant environmental benefits. Because it did not meet any of its objectives, it was an environmental failure.

Of the 4 Asia region projects, 2 were moderately successful, and 2 were failures. E/NRM impact could not be measured for any of them, but appropriate data were being collected in one and should permit solid measures of environmental benefits.

2.62 Latin America and the Caribbean

The **Improved Water and Land Use in the Sierra Project (Plan Meris) (527-0156)** in Peru sought to achieve these goals through increased production, increased area under cultivation, an expansion of cropping alternatives, an increase in water use efficiency, a reduction of soil loss from erosion, and strengthening GOP technical capacity at the regional level. Small-scale irrigation systems were funded. One year before project completion, achievement of increased yield goals were well behind targets for potatoes and slightly to moderately behind for other crops (maize, wheat, barley, fava beans, yucca).

Success was judged to be low by the evaluators. In our view, this project had no specific E/NRM objective. The mention of a reduction of soil loss from erosion in the project purpose statement seems incidental to the other objectives and does not appear to have been a particular concern of the project. Thus, E/NRM benefits, if any, were simply a by-product of other project activities.

The **Integrated Rural Development Project (532-0046)** in Jamaica sought to increase agricultural production on small hillside farms in selected watersheds, control erosion, and strengthen the Ministry of Agriculture's capabilities. Project actions included soil erosion measures, reforestation, intensified agricultural practices, technical training, and road construction. The agricultural component of this project was a complete failure, and there were no positive environmental benefits. Agricultural production increased only slightly, and there was no demand and no market for what was being produced.

Of the two sustainable agriculture projects in LAC, the success of the project in Peru was low, and the Jamaica project was a failure. In neither case were data available to measure E/NRM impact.

2.63 Africa

The **Land and Water Resource Development Project (632-0048)** in Lesotho addressed issues of land degradation, low agricultural productivity, and overgrazing by training Ministry of Agriculture personnel, providing technical assistance to carry out conservation practices, and providing equipment and transport services. Thirty-one conservation plans were completed covering an area of 69,367 hectares, and 4,107 hectares of agricultural land were protected by applied conservation practices. However, agricultural productivity and household incomes have not increased, and there is little evidence that project activities will have any effect outside of project boundaries. The evaluators placed the blame on the farmers and herders for not making use of improved cropping, agronomic, and grazing practices. It seems that no one made any effort to understand why the people were not adopting the "improved" practices. Environmental benefits appear to have been minimal.

The **Gambia Soil and Water Management Unit Project (635-0202)** sought to establish such a unit within the Ministry of Agriculture and Natural Resources; develop appropriate technology for agripastoral methods; train soil and water specialists to apply solutions at national and village levels; halt and reverse environmental damage occurring due to traditional methods; increase food, forage, wood and cash crop production; and decrease susceptibility to drought and other threats. The SWM Unit was established and has been fairly successful in organizing farmers, and the farmers have been fairly active in carrying out SWM, which, one hopes has continued since the end of the project in 1988. Indirect measures of environmental benefits are production of good soil conservation manuals, improvement of 500 hectares of agricultural land through introduction of four technology packages, and construction of 65 kilometers of contour measures which affected 325 hectares. Direct measures, such as decreased erosion rates, were not provided.

TABLE 10

ALL PROJECTS WITH A SUSTAINABLE AGRICULTURE COMPONENT

NUMBER	COUNTRY	CATG	CATG	CATG	TITLE
3870129	Nepal	FOR	SAG	WAT	Rural Area Development - Rapti Zone
4970281	Indonesia	WAT	INST	SAG	Citanduy II Project (Java)
4970311	Indonesia	SOIL	SAG	INST	Uplands Agriculture and Conservation Project
4970330	Indonesia	SAG			East Timor Agricultural Development
5110543	Bolivia	AGFO	SAG		Chapare Regional Development Project
5200274	Guatemala	FOR	SAG		Highlands Agriculture Development
5210000.1	Haiti	SAG	AGFO	SOIL	USAID's Haiti Hillside Strategy
5270158	Peru	SAG	WAT		Improved Water and Land Use in the Sierra
5270220	Peru	WAT	SAG		Soil Conservation
5270240	Peru	FOR	AGFO	SAG	Central Selva Resource Management
5320048	Jamaica		WAT	SAG	Integrated Rural Development
5320101	Jamaica		SAG	WAT	AGFO Hillside Agriculture
5380108	St.Kitts/Nev	WAT	SAG		St. Kitts-Nevis Resource Management
6020001	Comoros	AGFO	SAG		Soil and Land Conservation
6210180	Tanzania	AGFO	SAG		Village Environmental Improvement
6310004	Cameroon	RAN	SAG		N. Cameroon Livestock and Ag Development
6320048	Lesotho		SAG	WAT	RAN Land and Water Resource Development
6330077	Botswana	FOR	SAG	ENV	Rural Sector Grant
6350202	Gambia	SAG	RAN		Gambia Soil and Water Management Unit
6450088	Swaziland	SAG			RDA Infrastructure Support
6500020	Sudan	SAG	RAN		Western Sudan Agricultural Research
6500041	Sudan	AGFO	SAG	RAN	Rural Renewable Energy
6550008	Cape Verde	WAT	SAG		Cape Verde Watershed Management
6550013	Cape Verde	WAT	FOR	SAG	Cape Verde Watershed Management II
6640312	Tunisia	SAG			Dryland Farming Systems Research
6850235	Senegal	AGFO	SAG		Cereal Production Phase II
6860934	Burkina Faso	FOR	AGFO	SAG	Southwest Regional Reforestation
9311005	Asia Regional	SAG			Determinants of Irrigation Problems: TA
9364127	World	SAG			Water Management Synthesis

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TABLE 11

PROJECTS WITH A SUSTAINABLE AGRICULTURE COMPONENT AND NO FORESTRY OR AGROFORESTRY COMPONENT

NUMBER	COUNTRY	CATG	CATG	CATG	TITLE
4970281	Indonesia	WAT	INST	SAG	Citanduy II Project (Java)
4970311	Indonesia	SOIL	SAG	INST	Uplands Agriculture and Conservation Project
4970330	Indonesia	SAG			East Timor Agricultural Development
5270156	Peru	SAG	WAT		Improved Water and Land Use in the Sierra
5270220	Peru	WAT	SAG		Soil Conservation
5320046	Jamaica	WAT	SAG		Integrated Rural Development
5380108	St. Kitts/Nevis	WAT	SAG		St. Kitts-Nevis Resource Management
6310004	Cameroon	RAN	SAG		N. Cameroon Livestock and Ag Development
6320048	Lesotho	SAG	WAT	RAN	Land and Water Resource Development
6350202	Gambia	SAG	RAN		Gambia Soil and Water Management Unit
6450068	Swaziland	SAG			RDA Infrastructure Support
6500020	Sudan	SAG	RAN		Western Sudan Agricultural Research
6550006	Cape Verde	WAT	SAG		Cape Verde Watershed Management
6640312	Tunisia	SAG			Dryland Farming Systems Research
9311005	Asia Regional	SAG			Determinants of Irrigation Problems: TA
9364127	World	SAG			Water Management Synthesis

The **RDA Infrastructure Support Project (645-0068)** in Swaziland addressed issues of soil erosion, poor agricultural practices, and overgrazing through strengthening of the Rural Development Area program's capability for NRM and by installing and maintaining erosion control works. Although significantly behind schedule just one year before the PACD, the evaluators judged that significant progress had been made in improving the quality of life for rural people: incomes had increased, and they had better access to markets. The soil and irrigation projects have protected the NR base, and acreage requirements for subsistence farming decreased due to better agricultural practices. The project was judged a moderate success by the evaluators because soil and irrigation projects have protected the natural resources, and the acreage required for subsistence farming has decreased. No quantitative measures of environmental benefits were found in the documents reviewed.

The **Western Sudan Agricultural Research Project (650-0020)** was designed to improve the capability of the Sudanese Agricultural Research Station to develop and test improved systems that conserve and rehabilitate natural resources and improve the standard of living of the farmers and pastoralists of the Western Sudan. The principal project action was to create an agricultural research infrastructure. This project is reported to have been marginally successful in preparing research and extension programs (due to lack of qualified Sudanese personnel) and in getting farmers to adopt better practices. However, there is not much evidence in the documentation to support this.

The **Dryland Farming Systems Research: Small-Holders Subproject (664-0312)** in Tunisia was part of a larger Integrated Rural Development Project for Central Tunisia. Problems of erosion and low production of cereals and forage were addressed by conducting research on technological packages introducing new varieties of seed and new methods of seeding. It was expected that barley production

would increase by 100 to 400 percent. The project was several years behind schedule. The program was not sustained after the project ended. Nonetheless, the A.I.D. monitoring team judged the program to have been successful because it met some of its goals. There is little indication of a positive impact on the environment.

Of the 5 sustainable agriculture projects reviewed for Africa, the subjective judgement in regard to E/NRM benefits is that 1 was a failure, 2 had minimal/marginal success, 1 fair, and 1 moderate.

2.64 Worldwide

The centrally funded **Water Management Synthesis Project (936-4127)** sought to improve productivity and economic performance of irrigated agriculture and to assist governments in developing countries to improve their institutional capabilities in irrigation systems development and operation. This was done through Mission buy-ins. There were coordination and other management problems, but the Missions seemed to be pleased with the work done. Environmental impact is unknown in any direct sense. However, greater productivity from better management of irrigated lands has the potential to take the pressure off more fragile lands and natural areas. Therefore, the project probably had an indirect (but unmeasurable) positive impact on E/NRM.

2.7 Watershed Management Projects

All watershed management projects have either a forestry/agroforestry or sustainable agriculture component or both as the means of management. Thus, most watershed management projects have already been described above. The three described here lacked sufficiently specific information about activities and actions in the documents we examined to place them under agroforestry, forestry, or sustainable agriculture.

The **Soil Conservation Project (527-0220)** in Peru sought to consolidate, strengthen, and institutionalize a GOP soil and water conservation system with the General Directorate of Waters and Soils of the Ministry of Agriculture and Food and to develop and disseminate soil conservation technologies, decrease production risks, and increase land potential to maintain long-lasting use of soils. Training, institutional strengthening, soil conservation, and natural resource protection for sustainable production were the actions implemented by the project to achieve its purposes. The project provided extension training to 4,504 farmers, established 2,529 erosion control test plots, provided conservation training to 802 professionals and paraprofessionals, and increased understanding of conservation problems by relevant institutions. Socioeconomic data indicate that farmer income has increased, production risks have decreased, there has been improvement of degraded lands, and significant soil and water conservation has been accomplished. This project appears to have been highly successful in terms of positive environmental benefits both directly and indirectly (through strengthening both resource users' and the GOP's capacities in soil and water conservation).

The **St. Kitts-Nevis Resource Management Program (538-0108)** sought to establish appropriate soil and water management practices in demonstration areas on agricultural land and to strengthen institutional capacity to maintain and expand these management practices. Project targets were achieved or almost achieved. There was good cooperation and enthusiasm from farmers, especially in Nevis.

However, bad decisions on the part of the Ministry of Agriculture, personnel changes, and a failure to institutionalize the new conservation practices as policy (primarily in St. Kitts) lead to the conclusion that the long-term environmental benefits are little or none. In this regard, the project must be judged a failure.

The Cape Verde Watershed Management Project (655-0006) was designed to protect soils from erosion, increase and improve the use of underground water, and expand the land surface under cultivation. This was done through training, strategy development for environmental rehabilitation and conservation, and construction of dams and irrigation works, terraces, and contour ditches. Although monitoring could have been better, it is evident that this project was successful. Trees with pigeon peas as ground cover, vegetables, and other vegetation, combined with contouring and terracing, led to a marked reduction in runoff from heavy rains and controlled soil erosion.

Two of these watershed management projects were successful, and one was a failure. As with many other projects, the failure to have a positive environmental impact was due to institutional and policy problems, not to inappropriate technology.

3. ISSUES

3.1 Introduction

The preceding review reveals that A.I.D. has, since 1980, designed and implemented a wide variety of projects and programs that have included green realm E/NR objectives. In many of these projects environmental objectives have become more explicit, and project design has become more sensitive to operational complexities. Among the more recent projects the importance of policy reform has come to the fore. In addition, Agency strategy can be seen in recent years to be shifting away, to some extent, from a project focus toward a program approach to implementation.

The documents show that, within the green realm, the general problems of environmental and natural resource management that can or should be addressed are, by and large, clearly identified but not always well understood. One sign of this lack of understanding is that proposed solutions for identified problems oftentimes do not address important underlying issues. Nowhere is this more evident than in proposed technological solutions that ignore social, institutional, and policy constraints to the effective and sustainable use of the technologies.

At the most general level E/NR problems in the green realm revolve around the issue of conservation versus development. Development uses resources and therefore requires tradeoffs in resource conservation. The overall issue that overlays almost all E/NR projects, therefore, is how best to achieve a balance between current development needs and the conservation of resources that will be needed by future generations. One problem observed in many of the project designs and evaluations that were reviewed for this study was a tendency to deny that such tradeoffs exist and that hard choices often had to be made.

Specific E/NRM problems identified in green realm project documents include the following:

- Habitat destruction and loss of biodiversity;
- Deforestation;
- Overgrazing;
- Soil erosion and watershed degradation;
- Pollution from agrochemicals; and
- Policies that foster environmental degradation.

As mentioned, these problems were, with certain exceptions, usually well identified and defined. The issues that need to be addressed in CDIE's E/NR assessment are not, therefore, those of problem identification. Rather, they are issues that revolve around the strategies and tactics that have been, or should have been, used to help developing countries resolve these problems. The evaluations reviewed suggest that several recurring issues merit study. These issues can be divided into three categories:

- (1) Planning and Design;
- (2) Implementation; and
- (3) Impact Measurement.

3.2 Planning and Design Issues

In addressing E/NR problems in the green realm, program planners and designers have had to make several strategic decisions and, from a review of projects, it appears that E/NR considerations have seldom been seen as primary objectives.

Objectives and Beneficiaries

Although substantive E/NR problems have, as noted above, been reasonably well identified in the projects reviewed, project objectives to address these problems and the tradeoffs among various objectives have not always been well thought out at the design stage. The objectives expressed in many project designs leave one with the impression that environmental considerations are, at best, secondary. In sustainable agriculture projects, for example, objectives are frequently stated not in terms of achieving sustainable production but in terms of increasing yields and generating income in the short term. Soil conservation, if mentioned as an objective at all, seems almost an afterthought. The tradeoffs, moreover, between development and resource conservation are seldom well defined.

Another issue in project design is that of recognition of factors that may have a serious impact on project outputs and outcomes. For example, some of the so-called "exceptional" or "unexpected" problems encountered on projects, and upon which project failures were blamed, should not have been unexpected at all. In several projects, climatological conditions were blamed for project failures when, in fact, extremes in temperature or rainfall are not uncommon in the project areas. In Senegal, where droughts are not uncommon, the Fuelwood Production Project failed due, in part, to low rainfall. The Landslide and Soils Stabilization Program in Nepal failed to control landslides along the roadway because of a "freak" storm that wiped out much of the project works, but such storms are in fact *not* an exceptional occurrence in the area. Range management projects generally take place in so-called marginal

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environments, but it is rare that provision is made at the design stage for what to do in the event of severe drought, a phenomenon that characteristically and recurrently affects rangelands and herding populations. Without such contingencies, negative impacts on project management and implementation occur and are pointed out frequently in project evaluations. The Renewable Energy Program in the Sudan provides a good example of how to incorporate effectively extreme physical, political, and economic conditions into project strategy and to succeed despite these challenges.

With respect to beneficiaries, the general issue is one of identifying who the various stakeholder groups are and how each group may gain or lose as a result of project activities. Who is expected to benefit is not always clear. Are the intended beneficiaries local villagers, the general public, tourists, government agencies, private sector enterprises, women, or a combination of these? And for those who potentially gain from the project, are there others who will potentially lose? Gender considerations are germane here. To what extent can gender-specific interventions enhance the beneficial impact of E/NRM interventions? In the project documents reviewed, there is little evidence of any effort to incorporate gender concerns, specifically the concerns of women's groups. Some project papers contained a paragraph or two explaining how the project would address women's use of natural resources, but, for the most part, these appear to have been token statements with few on-the-ground activities to back them up. Women in developing countries have great influence on resource use and often have unique needs. Gender concerns appear to be an often ignored but critical element in the success or failure of E/NRM projects.

An issue to be examined during the field assessment phase, then, is the extent to which gender considerations are being addressed and fully incorporated in project designs and implementation activities and the extent to which such incorporation will enhance environmental, economic, and social benefits of A.I.D. projects. A.I.D. has a department within the Research and Development Bureau devoted to Women in Development (WID) issues, and all Missions now have WID officers. To what extent are these resources being appropriately utilized by E/NRM projects?

National versus Regional Strategies

Many E/NR problems in the green realm are common to several countries. Deforestation, habitat destruction and loss of biodiversity are problems throughout the humid tropics. Soil erosion is severe in the Central American and Andean countries of Latin America and in the mountainous areas of Asia and Africa. Policies that foster environmental degradation can be easily identified in Brazil, Ecuador, Nepal, the Philippines, and Botswana, for example. An issue that should be examined in the E/NR assessment of green realm projects is under what circumstances it may be more effective to work with one country and when greater benefits may accrue to working with several countries simultaneously either through a regional organization or through similar national organizations. A related issue is under what circumstances it might be advantageous for A.I.D. to assist in the creation of appropriate regional organizations where these do not exist.

Public Sector versus Private Sector Strategies

Most of the projects reviewed here began (and some ended) before the initiation of A.I.D.'s private sector initiatives. Most projects, therefore, focused exclusively or almost exclusively on support

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to the public sector and on working with public sector agencies and their representatives. Occasional support for local NGOs is the exception to the rule. It is evident from the projects reviewed that A.I.D.'s public sector strategy with respect to E/NRM has floundered, most frequently on the shoals of organizational incapacity and inappropriate policy. Under the agroforestry extension component of the **Cereals Production Phase II Project** in Senegal (685-0235), for example, private nurseries sprang up and provided higher-quality seedlings and a better range of species, with better survival rates than the government nurseries. Thus the issue arises of whether, for example, sustainable forest management or preservation of biodiversity or sustainable agriculture might not be better achieved by working directly with the private sector (including NGOs) either instead of, or in addition to, governmental organizations.

Are there some E/NRM problems that the private sector can deal with more effectively than the public sector? This issue would appear to be especially important to examine during the current assessment in view of the recent emergence of untested ideas about the environmental effectiveness of private sector development — the idea, for example, that privatization will save the tropical forests. Disillusionment with the ineffectiveness of the public sector in dealing with E/NRM in developing countries should not be permitted to trigger wholesale acceptance of the private sector as a source of salvation. A cursory review of the history of private sector misuse of natural resources in the U.S. should make one wary of facile solutions.

Project Duration

E/NR objectives can seldom be achieved in the few years that make up the normal life cycle of A.I.D. projects. Sustainability, a central objective of all E/NRM, cannot even be effectively measured in short spans of time. Individual projects may achieve many or most of their designated outputs within the normal three- to five-year span of A.I.D. projects, but the long-term impact of such projects can seldom be determined within such a brief period. This raises two related issues. First, should A.I.D. adopt a longer time horizon in providing assistance, at least for some types of green realm projects; and second, should provision be made for periodic monitoring in a project area well after a project ends?

Coordination and Cooperation with Other Donors

Related to the issue of project duration is that of coordination and cooperation with other donors. A.I.D. frequently coordinates its efforts with those of the multilateral and regional development banks, but this is usually in the form of attempts to implement complementary projects within the same sector rather than multidonor contributions to the same program. At issue are the effectiveness of multidonor coordination and cooperation and the extent to which A.I.D. has sought to, or should seek to, leverage its own resources against those of other donors to achieve program goals. The effectiveness of such coordination is seldom evaluated. In the **Central Rangelands Development Project** in Somalia (649-0108), poor donor coordination and overambitious programming resulted in a 75 percent reduction of the area targeted for intervention. Ideally, of course, multidonor participation should be coordinated by the host country, but the realities of institutional and organizational weakness and inadequately trained personnel are not generally conducive to this solution.

3.3 Implementation Issues

Several general issues bear examination with regard to project implementation. Have the components of green realm projects turned out to be those most needed or appropriate for the resolution of E/NR problems? Most green realm projects include several components, only some of which seem designed to address either directly or indirectly E/NRM problems. When projects have included a variety of activities, have available resources been appropriately allocated and have they been efficiently utilized? Also, has implementation of various activities been timely?

Salient implementation issues encountered in the review of green realm projects can be classified according to the following categories:

- Institutional capacity and strengthening;
- Awareness and participation;
- Technology development and transfer;
- Resource ownership and access;
- Environmental and economic policy reform; and
- Agency management and administration.

Institutional Capacity and Strengthening

The weak capacity of developing country institutions is a problem that is not unique to E/NR projects. But because awareness of E/NR issues is a relatively recent phenomenon in most developing countries, the problem of non-existent or weak institutional capacity is particularly acute in the implementation of E/NR projects. Two important issues are involved here: how best to create or strengthen organizations to enhance chances for sustainability of E/NRM activities and which organizations to support. Many of the projects reviewed had institutional strengthening as an objective, but results varied greatly.

Weak capacity, lack of clear-cut lines of authority, conflicting mandates, or problems of centralization versus decentralization often result in project outcomes that are detrimental to stated environmental objectives. At issue is how to determine and apply the methods of institutional strengthening most appropriate to a given situation. Several methods have been tried in the projects reviewed — technical assistance, counterpart on-the-job training, participant training, in-country workshops, third country workshops, private sector workshops, and U.S. or other foreign degree program training. As noted, the results have been quite varied.

The issue of which organizations may be most effectively supported by A.I.D. admits of no single solution and also deserves study within different contextual scenarios provided by different projects. From the projects reviewed, government organizations, limited by outreach capacity and vested interests, did not appear to provide effective mechanisms for resolving issues of local resource use and management. Determining appropriate roles for and strengthening private sector and nongovernmental organizations was reported to be necessary and important in the performance of a number of projects.

The strengthening of local NGOs achieved considerable success in a number of projects. In general, local NGOs empower local resource users so that they may play more active roles and assume

appropriate management responsibilities as stakeholders in the process of integrating conservation and development activities. NGOs have proven their merit in agroforestry projects in Haiti and Jamaica, in buffer zone and park management activities in Kenya and Uganda, in sustainable agriculture in Burkina Faso, and in improving the clarity and security of resource tenure in Mali. The issue of local NGO participation in E/NRM efforts relates closely to that of participatory development.

Awareness and Participation

Awareness and participation constitute two related issues. The first refers, in general, to the extent to which people at all levels, from local communities to national government decision-making posts, are aware of environmental and natural resource management problems and their importance to a sustainable future. The second concerns the search for ways to promote the participation of beneficiaries and other stakeholders in identifying and effecting solutions to these problems.⁸

The review of documents reveals that the success of E/NR awareness programs financed by A.I.D. differed according to the approach used. In the Conservation Education Project (515-0142) in Costa Rica, the problems of rampant deforestation and general environmental degradation were addressed by A.I.D. through support for an environmental public awareness and education campaign undertaken by the Costa Rican Association for the Conservation of Nature (ASCONA). Some of the measures used as indicators of increased environmental awareness included increases in ASCONA membership and in the government's environmental protection activities, enactment of environmental protection laws and better enforcement of them, and the establishment of an environmental education program in the schools. Membership in and contributions to ASCONA both greatly increased. ASCONA expanded to a national level, carried out radio, TV and publishing media campaigns, organized presentations in schools, universities, factories and ministries, sponsored seminars and round tables, completed an inventory of environmental laws, and investigated and reported on abuses of natural resources. The project has an impressive list of accomplishments and has been highly successful in promoting the concepts of environmentally sound natural resources management. Moreover, all this was accomplished with only minimal investment. In contrast, in the Ecuador Environmental Conservation Project (518-0031), where awareness strategy relied mostly on the use of demonstration plots, the technical soundness of the demonstration plots did not prove to be an effective means for developing and mobilizing either awareness or participation.

Another dimension of the awareness issue concerns the extent to which project designers are aware of and take into account the range of political, economic, or social factors that may impede obstacles to the adoption of sound environmental practices. The focus, for example, of early range management projects such as those in Kenya, Botswana, and Tanzania (Masai) was on land management with little account taken of the socioeconomic conditions that influence the behavior of herders. In the arid northeast of Kenya, herders targeted as beneficiaries of the National Range and Ranch Development Project (615-0157) were expected to provide calves to the highlands, but the project failed at least partly because the management system was designed for cattle in an area "where camels, with

⁸ It is by now well documented that participation of beneficiaries and other host-country personnel in the design and implementation of projects bears a positive relationship to project effectiveness and sustainability.

quite different requirements, are at least of equal importance" (PD-AAQ-282). The concept of ecological zonation as an organizing principle, combined with inattention to cultural variables, contributed to the failure of range management in the **SODESP Project** (685-0224) in Senegal, where a government parastatal aimed at transforming northern transhumant herders into calf producers for southern finishing operations.

In contrast, the research carried out in the first phase of the **Niger Range and Livestock Project** (683-0242) showed that complex traditional systems for regulating land use under demographic and economic pressure could be used as building, rather than stumbling, blocks to implement grazing control and modern range management. The focus of the project was on working with people rather than working on land. Indicators developed to monitor the impact associated with this shift from land to people included such measures as lack of chronic food shortages, increased milk production, stable prices of the major food grains, and local surpluses.⁹

With respect to participation, the document review reinforced a lesson that should now be well learned but seems to be too seldom applied: Projects that do not address issues in which people are interested or do not address them in ways that participants feel are feasible will fail. In the **Natural Resources Management Project** in the Dominican Republic, for example, farmers were not consulted in advance about the soundness or the costs of adoption of the project's technological package. As a result, the farmers made little effort to apply the project's technologies and felt that they could not afford to take the risks inherent in the project's credit incentives. In contrast, the **Gambia Soil and Water Management Projects** promoted participation by encouraging farmers to organize themselves into semi-autonomous decision-making units. This has given the farmers a more pronounced sense of ownership of project activities. Rates of adoption are projected to be high under these conditions.

In some cases, it would appear that project implementers learned from mistakes and were able to salvage a project by providing better incentives for resource users to participate. In the **Rural Area Development-Rapti Zone Project** (367-0129) in Nepal, the greater success of the second phase is attributed to increased efforts to get the local community involved through extension and education. The **Cereal Production Phase II Project** (685-0235) in Senegal also met with greater success in implementation once extension programs for tree planting were under way.

When green realm projects do not achieve intended results, environmental or otherwise, several questions frequently arise. Why do farmers or other beneficiaries use or not use the results of project research? To what extent have targeted beneficiaries adopted the project's technologies? If the rate of adoption is low, why? What factors influence the popularity of one technology over another? Was an attempt made to encourage beneficiary participation? If so, and if participation is still low, why? What factors influence the spread of technology to nonproject beneficiaries? For agricultural projects, have farm plans been made, and, if so, have they been followed?

One general, albeit preliminary, conclusion that can be drawn from the review of green realm E/NR projects is that the active and continuing participation of intended beneficiaries is positively correlated both with short-term socioeconomic gains and long-term E/NRM benefits. Another conclusion

⁹ The approach was not fully tested because a drought in the mid-1980s truncated field operations of the follow-on Integrated Livestock Project.

is that projects that promote technological packages through demonstration with little beneficiary participation are less likely to succeed. Both these hypotheses can and should be tested in the field with a larger sample and a wide variety of projects.

General E/NRM objectives are to decrease and reverse human-caused processes of environmental degradation and to manage natural resources sustainably. In the absence of generally accepted and appropriate environmental indicators for A.I.D. projects and the systematic and periodic monitoring of these indicators, it is difficult to ascertain if there is an approach to development interventions that merits special consideration for its potential to yield E/NRM benefits. However, on the basis of our review of projects, it would appear that **participatory development** — that is, development that incorporates all stakeholders and especially direct beneficiaries at the local level into the project design and implementation process — is the best general route to achievement of these objectives. Although this represents a departure from the standard A.I.D. development process, participatory development appears to warrant testing in a variety of contexts and under a variety of conditions to determine if it is the most effective means of achieving long-lasting, sustainable results in the realm of environmental and natural resources management.

Technology Development and Transfer

Under this heading, the review focused on several potential issues:

- Technological soundness;
- The flexibility and capacity of programs and projects to modify and adapt technologies to local circumstances;
- The use of research to validate, modify, or replace technologies; and
- Methods of technology transfer.

For many of the projects reviewed, *the most salient issue was not the scientific soundness or biophysical appropriateness of the technologies being introduced.* The main issue, rather, was the social and economic appropriateness of the technologies. Few of the evaluations questioned, for example, the scientific soundness of such standard A.I.D.-promoted technologies as tree planting, revegetation of degraded slopes, alley cropping, soil stabilization, and protected areas management, all of which have great potential for reducing environmental degradation while simultaneously increasing productivity in many countries. Several evaluations, however, did, raise the issue of the transferability, appropriateness, and acceptability of the technologies within specific local contexts.

The overall issue concerns the extent to which technologies that have proved viable in the United States and other developed temperate zone countries are appropriate in subtropical and tropical developing countries? How do biophysical conditions and socioeconomic variables such as existing technologies, local knowledge and beliefs and practices, availability of capital, and existing policies affect the range of potentially viable choices of technology packages?

Agency-funded efforts in range management provide a case in point. A.I.D.-sponsored range management activities in the developing world combine public resource management and private stock ownership, a model borrowed from the Western United States and Australia. The variables available to

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the manager include varying stocking rates, off-take rates, herd composition, and herd movements. A secondary set of more costly direct manipulations of the environment — including ripping, brush control, reseeding, and clearing firebreaks — are also available but seldom cost-effective. The manager uses an assessment of vegetation quantity, quality, and trends to judge *carrying capacity* and adjust stocking rates. The strategy is straightforward but depends on a sophisticated grasp of plant ecology and plant and animal interactions.

Several assumptions call into question the appropriateness of the model in developing countries. Physical manipulation of the environment does not always produce expected benefits. On many of the iron rich soils of West Africa, for example, ripping (subsoiling) will produce a short-term increase in regeneration and vegetative cover, but after a few years the vegetation will "melt" back into a crusted hardpan with lower productivity than prior to the intervention. In the Sahelian steppe of Niger and elsewhere, firebreaks were used to protect perennial pastures, but the bulldozed cuts were invaded by aggressive annual grasses that acted like tinder after the rainy season and were thus counterproductive. In the Eastern Senegal Range and Livestock Project (685-0202), 185 kilometers of firebreaks were subsidized, fire watch towers were constructed and never used, and an educational program for brush fire control failed to mobilize villagers. In another example, reseeding with imported forages was not successful in Morocco's Range Improvement Project (608-0145).

Another important variable affecting the success of range management projects is that of social and spatial *intervention units*. Many range management projects failed to correctly circumscribe the geographic dimensions of the target population's production system or to adequately account for the demands of competing production systems on the same land area (for example in Botswana). Extensive systems were only partially encompassed by the project zone, making the establishment of meaningful management units impossible. Attempts to work with extensive herding in mixed farming zones were limited by differing spatial needs of people with varied and often competing production systems. In both the North Cameroon Livestock and Agricultural Development Project (631-0004) and the Upper Volta Village Livestock Development Project (686-0203), new management practices could not be implemented because seasonal transhumant herders were not included in the project. Where attention was given to this issue in defining the area of intervention, as in Lesotho's Land Conservation and Range Development Project (632-0215), the possibility for meaningful control of animal numbers and movements was increased.

Crucial to the achievement of E/NRM objectives is the issue of rates of adoption — how adoption can be accelerated while still ensuring lasting positive effects. During the past decade, A.I.D. has sought better methods for transferring technology in its environmental programs. The reviews show that projects that attempt to transfer scientific research through demonstration plots and pilot projects, which are usually operated by foreign experts and with inputs that are often unaffordable by local residents, rarely translate into usable systems for target communities. The Environmental Conservation Project in Ecuador was judged a technical success because some activities promoted tree planting and other conservation measures; the demonstration techniques of the project, however, proved unsuccessful in getting people to continue these practices on their own. In the Land and Water Resource Development Project in Lesotho, evaluators blamed the farmers and herders for failing to adopt the "improved" cropping, agronomic, and grazing practices that were demonstrated by the project while making little effort to ascertain the reasons for this lack of acceptance.

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In recent years, A.I.D. has placed more emphasis on community involvement, extension, and appropriate technology as means of transferring ideas and systems that are intended to result in long-term environmentally sound E/NRM practices. A good example of where research has been successfully applied in the field to address E/NR issues is the **Forestry/Fuelwood Research and Development Project (936-5547)** in Asia. This project has resulted in, among other things, an extensive information network on multipurpose tree species for use in agroforestry and reforestation systems. Solid scientific research combined with a clear understanding of the needs of grassroots-level extension agents in working with villagers has made this project successful in raising awareness of multipurpose trees' usefulness.

Although there has been considerable attention in recent years to the appropriateness of technology, appropriateness remains an issue in a number of projects. The **Rural Sector Grant (633-0077)** in Botswana, for example, was unsuccessful in large part because it relied too heavily on capital-intensive infrastructure, vehicles, and mechanized land preparation. Recently, A.I.D. has placed greater emphasis on labor-intensive, low-tech, appropriate technology systems that are easily maintained and replicated. However, in the majority of these instances, there is little emphasis on monitoring and data collection that would permit measurement of E/NRM benefits.

Resource Ownership and Access

Ownership of and access to natural resources are important issues for sustainable resource management. The question of whether forest or rangeland is owned commonly, communally, or privately is a critical factor in the success of many projects.

A clear understanding of who has access to range resources and under what circumstances is fundamental to the effective functioning of any range management system. Such an understanding is especially critical in areas where transhumant populations coexist with sedentary or village-based systems or where other land uses put pressure on the resources historically used for extensive livestock production. Without such an understanding open access to range resources will predominate, resulting in a degradation of common areas. What is needed is administrative, juridical, and organizational mechanisms to cope with these competing pressures, but few of the A.I.D.-financed range management projects either foresaw the need for such mechanisms or provided for their establishment.

In working the land for any purpose, project participants need assurances that they will benefit from their labors. Lack of such assurance appears to be a fundamental flaw in many of the village-based woodlots and reforestation efforts. The large social forestry projects in India, **Madhya Pradesh Social Forestry (386-0475)**, **Maharashtra Social Forestry (386-0478)**, and the **National Social Forestry Program (386-0495)** all encountered problems with participants' lack of desire to plant on communal lands where trees were susceptible to poaching, grazing, or confiscation by local officials. In the National Social Forestry Project, there was greater success when farmers were able to plant trees on their own land. Clear understanding of local customs governing ownership and use rights to land and land resources are critical ingredients of a resource management plan. Lack of such understanding can subvert an otherwise technically sound plan, as appears to have been the case in the **Thailand Renewable Nonconventional Energy Project (493-0289)**. The interim evaluation of the **Haiti Agroforestry Outreach Project (Agroforestry I-521-0122)** reported that farmers were planting trees according to schedule but were not motivated to maintain them. Uncertainty about ownership of the trees may have contributed to the farmers' lack of motivation, although this was not stated in the evaluation.

Environmental and Economic Policy Reform

A number of policy reform issues emerged from the review of green realm E/NR projects. Are current economic policies damaging to the environment? Conversely, are environmental policies overly constraining economic development? How can an equitable balance be achieved between economic needs in the present and resource conservation needs for a sustainable future? What types of policy reforms might foster the achievement of such a balance? What might be the necessary tradeoffs between ideals and reality, given particular economic and ecological situations? Integrated Pest Management, Range Management, and biodiversity illustrate the potential impact of policies on the outcomes of E/NRM project components.

The environmentally damaging application of pesticides in developing country agricultural programs results from the overuse and/or misuse of chemical pesticides. The overuse of pesticides is often traced to the undervaluing of pesticides through agriculture input subsidy policies aimed at stimulating "modern" farming practices. Although there is clear evidence that, in the short run, pesticides do boost crop production and reduce risk of crop loss under proper usage, the excessive use of pesticides can raise crop production costs in the longer run due to pest tolerance build-ups that can lower yields even with increasingly costly pesticide applications.

Motivating developing country governments to reduce or eliminate input subsidies that stimulate overuse of pesticides has been an objective of several A.I.D. initiatives in the policy reform area. One of the objectives of the Indonesia Agriculture and Rural Sector Support Project (ARSSP) (497-0375) was the total elimination of pesticide subsidies. Indonesia did in fact eliminate pesticide subsidies, but the interim evaluation of the ARSSP suggests that this occurred more as a result of earlier scientific evidence plus efforts to reduce government budget deficits than because of A.I.D.'s influence on policy change through the ARSSP. The ARSSP may have contributed to accelerating the pace of the subsidy reduction and increased the staying power of the reform but political and economic considerations within the Government of Indonesia were the main cause of the subsidy reforms.

The Indonesia experience poses an interesting issue of price policy. To what extent can price policy reform contribute to pesticide uses that are more environmentally sound and encourage alternative (biological) pest management practices? Although pesticide use is only one component of Integrated Pest Management strategies, A.I.D. evaluations show that many A.I.D.-supported IPM programs have been "captured" by their pesticide components, and the focus has been environmentally sound pesticide use rather than identifying and introducing IPM alternatives to pesticide use. It appears that A.I.D. has yet to bring a balanced IPM strategy into its environmental programs in ways that ensure pesticide use will not be overly emphasized. When environmentally sound pest control is secondary to other project objectives, isolated pest control actions may not protect either human or natural environments.

The issue of price policy can be generalized. How, for example, might prices serve as incentives for better forest management and sustainable production of forest products? How might price policies create a more favorable environment for the maintenance of biodiversity?

IPM provides a classic example of incongruence between regulations (policies) and project objectives. When development assistance has primary objectives that facilitate pesticide use indirectly, and so include environmentally sound pest management only as a residual or secondary purpose, the careful adherence to CFR 22 may conflict with the larger objectives of the project.

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In the Eastern Caribbean, the High Impact Agricultural Marketing Project (HIAMP) (538-0140) was designed to promote economic growth through the private sector. In this case an NGO (Eastern Caribbean Agribusiness Development) was formed under HIAMP to administer investments in small, high-growth business through an Agriculture Venture Trust, also formed and funded under HIAMP. The Trust would seek potential high-growth agricultural enterprises, take minority equity positions in them to provide growth capital, and in some cases stimulate employment and output in agriculture. At the time it was conceived, HIAMP was a new departure for A.I.D.

Foreign assistance funds appropriated by the U.S. Congress and subject to 22 Code CFR 216 flowed from USAID to the Trust, which took minority capital positions in small business. To help achieve the project purpose ("improving the investment environment by relieving development constraints to private capital inflows"), a categorical exclusion to Reg 22 was sought and obtained from USAID. Under the exclusion, the Trust was given the responsibility of ensuring compliance — but probably had no knowledge of pesticide provisions under Reg 22 and subsequently did not comply with them.

The situation that developed in the Eastern Caribbean illustrates two linked issues involving A.I.D. regulations. First, how far down the funding chain can the Agency realistically expect to enforce compliance? Here, the Mission *granted* funds to the Trust, which purchased a minority equity position in a for-profit private business. When the majority owner neglected to comply with A.I.D. regulations, what recourse did the Mission have? Second, do the provisions of the regulations, in this case CFR 22, conflict with the main purpose of the project, as cited in the preceding paragraph?

From a development standpoint, rangeland management is affected by two major economic issues: ownership of the capital (herds) and the value of rangeland-derived commodities in the marketplace. Because the forage available from rangelands is a public good, the question is: To whom does the value-added from its use accrue? The first issue, ownership, thus cuts across the entire range of social equity questions: male/female, herder/farmer, rural/urban, elder/youth. The second depends on both the local context (exchange value of livestock products relative to grain, sugar, cloth, and other household goods) and on the macro economy.

Competition from cheap frozen beef from Australian, South American, and European red meat exporters and current recessionary pressures in domestic and coastal export markets have affected and continue to affect demand for Sahelian beef. Low prices and low demand translate to social instability (concentration of herd ownership, intergenerational strife, conflict with agriculturalists) and disincentives to capital investment.

Rangelands are often distant from markets and population centers, and the commodities produced are frequently urban luxury goods. Encouraging off-take as an ecological management tool, 1) often ignores equity concerns, 2) implies change in harvest technology: beef versus symbiotic milk or grain exchange, and 3) renders local populations more dependent on political economic factors beyond their control. Livestock owners tend to be attracted to aid programs because of these subsidies and not because of the attractiveness of the range management intervention itself. In this sense, both the participation and the economic costs of such programs appear to be unsustainable. In the Central Tunisia Project (664-0312.8), for example, where over 6,000 participants in 25 sites were drawn into improved management programs, only a limited number of livestock raisers on three sites judged that range and herd management improvements were sufficient to continue participation after subsidies were lifted.

Biodiversity is an area of growing Agency interest but new to many development practitioners. In a very real sense, biodiversity has become an issue unto itself. To what extent should biodiversity be conserved at the expense of economic growth? This is a thorny issue not only in the developing countries but in the United States as well; and opinions tend to be polarized. Policy reforms conducive to the maintenance of biodiversity have been hard won (and may now be losing ground) in the United States. Yet, to achieve sustainability of resource use, policy reforms that protect biodiversity are imperative, here and in developing countries.

Listed below are some of the broader cross-cutting issues for the biodiversity section of an E/NRM evaluation:

- **Relevance.** Given that biodiversity conservation is often in conflict with short-term local and national interests, what are Missions and U.S. PVOs doing to ensure relevance to national economic development agendas? Conservation may be relevant to the biophysical realm, but what lessons can be learned about the human welfare costs that may make conservation more widely acceptable?
- **Impact.** What purpose-level indicators are presently used for biodiversity (in addition to those compiled by PRISM)? How, apart from a positive change in indicators, does a Mission measure or plan to measure the impact of biodiversity conservation?
- **Sustainability.** What types of biodiversity conservation lend themselves to continuation beyond A.I.D. funding? Are endowments of local PVOs a workable mechanism? Can national governments become effective stewards of biological resources, and if so, how?
- **Efficiency.** Given that A.I.D. has a mandate to invest in biodiversity conservation, what balance is appropriate between evidence of immediate results and longer-term capacity-building and sustainability issues? Is this even an explicit concern in Agency programming? Is efficient investment in biodiversity an economic measure, a biophysical one, or both?

ENRM Project Management and Implementation

The issue of A.I.D. management performance often appears to determine the effectiveness of an otherwise well-designed project. Many projects encountered difficulty because of poorly trained counterparts, bureaucratic red tape (A.I.D.'s and the host government's), rapid personnel turnover, poor financial management, poor communication, delays in implementation, an overemphasis on infrastructure, commodities, and other capital-intensive undertakings at the expense of environmental objectives. Poor timing of project activities is another management issue that may seriously handicap a project.

3.4 Impact Measurement Issues

An overarching and serious issue is the identification and use of appropriate E/NRM indicators. Until E/NRM indicators are included in project design, measurements are made prior to

project implementation, and indicators are monitored at intervals throughout the life of a project and ideally beyond, it will not be possible to arrive at accurate assessments of the environmental impact of A.I.D. projects. When project objectives are phrased in terms of sustainability, as they often are, it is imperative that sustainability be precisely defined. What is to be sustained? For whom? And for how long in order to judge that sustainability has been achieved?

If A.I.D. wishes to know what impact its projects are having on the environment and on NRM, the Agency must build into project designs both baseline measurements of appropriate E/NRM variables (such as soil erosion rates and sedimentation rates) and the means to monitor these variables periodically throughout the life of a project. To ascertain truly long-term environmental impact, such monitoring must continue well beyond project completion.

The review of A.I.D. documents reveals that the failure to include sound information systems in green realm E/NR projects has made it difficult to make judgments about changes that may have come about as a result of A.I.D. assistance. This is not to say that no changes have occurred; it is only to say that the data upon which to make such determinations have seldom been systematically collected and compiled.

With regard to E/NRM impact, environmental damage is often immediately evident, whereas improvements are often not discernable for several years. Many of the projects reviewed may well have already had or will have a positive E/NRM impact. However, only in rare instances are environmental benefits measurable. Projects that aim, for example, to address problems of soil erosion generally do not provide for the measurement of erosion rates prior to or during project implementation or after project completion. The same general problem obtains with agroforestry, forestry, and sustainable agriculture projects.

Numerous evaluations concluded that projects were successful because output indicators — trees planted, retainer walls installed, hedgerows constructed — had been met. Whether these outputs led to successful outcomes or longer-range impact — that is, whether environmental change occurred and whether such changes were environmentally beneficial and sustainable — is, however, difficult to ascertain.

In the National Social Forestry Program (386-0495) in India, vast areas were reforested; yet, the evaluation indicates that it is not known what, if any, environmental effect reforestation had. In Jamaica, the Integrated Rural Development Project (532-0046) laid out specific goals for reducing sedimentation in the rivers. The evaluation, however, did not present any evidence that sediment levels had changed at all or that they had ever been measured. One objective of the Land and Water Resource Development Project (632-0048) in Lesotho was to increase agricultural productivity, but the evaluation concluded that there was no way of knowing whether productivity had increased or decreased by the completion of the project. In Guatemala, the Highlands Agriculture Development Project (520-0274) had specific output indicators for reforestation, but the evaluation made no mention of reforestation achievements, so we do not know whether or not any reforestation was carried out.

Some projects had negative impacts on the environment and on the communities in which they were implemented. One of the most conspicuous examples is the Luwu Agricultural Development Project (497-0244) in Indonesia. This project called for clearing of jungle, rain forest, swamps, mangroves, and savannah areas in order to relocate settlers from other islands. The evaluators rated this

project a success because its achievements matched its objectives. But project activities also resulted in widespread loss of forest and other environmentally sensitive areas. The **Gambia Forestry Project (635-0205)** is a similar case in which farmers were encouraged to clear indigenous vegetation in order to plant gmellna and fruit and nut tree species. The overall environmental impact of such activities is likely to be negative. In Jamaica, implementation of the **Integrated Rural Development Project (532-0046)** disrupted the local economy by inflating local agricultural wages and encouraging production of crops with little market demand. This caused so many problems that the E/NR components described in the project paper were not even mentioned in the evaluation.

The **Fuelwood and Alternative Energy Project (596-0089)** for Central America is a rare example of monitoring success. In this project, the environmental benefits of project accomplishments were actually calculated. However one judges the accuracy of the calculations, the project should be examined as a potential guide for designing methods of measuring the environmental benefits of green realm projects.

4. RECOMMENDATIONS FOR FIELD STUDIES

This section identifies projects that we believe are worthy of consideration for field site visits because of the potential information about the effectiveness of A.I.D.'s E/NRM efforts that they may yield. Projects were chosen principally on the basis of information available in the documents reviewed. Geographic coverage and types of project activities were also used as criteria for deriving a cross-section of choices. These projects are listed in a matrix (Table 12) with the issues that may be addressed through their detailed examination. For countries actually chosen for field visits, it will, of course, be advisable

to review the entire existing Mission portfolio of projects with an E/NRM component, placing particular emphasis in terms of time and effort on those projects for which the major thrust is E/NRM.

India: Madhya Pradesh Social Forestry (3860475)
Maharashtra Social Forestry (3860478)
National Social Forestry Program (3860495)

These huge social forestry projects in India may be good for field visits — substantial sums have been spent on them, and the results are obvious. Lessons can undoubtedly be drawn with regard to how these massive plantations can provide both economic benefits and environmental stability. These projects are also intended to empower the GOI to handle the social forestry program, so it would be good to find out what impact these projects have had in institutional strengthening that leads to environmental consciousness and the ability to implement programs of sustainable resource management.

These projects were not overwhelming successes, but they have had an effect on decreasing deforestation. As large as they are, there is surely some sort of visible environmental impact. They are likely to have fairly complete records, also.

Indonesia: Luwu Agricultural Development (4970244)

This appears to be a complete environmental disaster because it encourages settlers to clear forest and other fragile areas for agriculture. After 10 years, how are these areas faring? This is a good example of the old style approach to "development," namely, that land is not usable unless it is cleared and planted.

Madagascar

Biodiversity is an area of growing Agency interest but one that is new to many development practitioners. In a very real sense, biodiversity has become an issue unto itself. To what extent should biodiversity be conserved at the expense of economic growth? This is a thorny issue not only in the developing countries but in the United States as well, and opinions tend to be polarized. This portion of the evaluation of E/NRM activities could be very useful in formulating next steps in Agency programming. Therefore, this area in particular would benefit from an examination not just of impacts in the field but also attention to Agency modes of operation. Issues such as Mission versus A.I.D./Washington perspectives on implementing priorities and the feasibility of generalized indicators fall under this topic as well. Constraints to evaluating A.I.D.'s biodiversity work include the relative newness of the activities and the modes of funding these activities. Grants and cooperative agreements have different reporting requirements that do not always lead to neatly packaged final project evaluations. Therefore, one of the important outcomes of this portion of the evaluation should be a better understanding of past, present, and planned modes of Agency funding in relation to reporting requirements and the development of performance indicators. Amending the selection criteria may be necessary to include projects that are completed but not yet evaluated, thereby offering the best input for future designs of field-level activities.

The broader cross-cutting issues for the biodiversity section of an E/NRM evaluation are listed briefly below:

- 1) **Relevance.** Given that biodiversity conservation is often in conflict with short-term local and national interests, what are Missions and U.S. PVOs doing to assure relevance to national economic development agendas? Conservation may be relevant to the biophysical realm, but what lessons can be learned about the human welfare costs that may make conservation more widely acceptable?
- 2) **Impact.** What purpose-level indicators are presently used for biodiversity (in addition to those compiled by PRISM)? How, apart from a positive change in indicators, does a Mission measure or plan to measure impacts of biodiversity conservation?
- 3) **Sustainability.** What types of biodiversity conservation lend themselves to continuation beyond A.I.D. funding? Are endowments of local PVOs a workable mechanism? Can national governments become effective stewards of biological resources, and if so, how?

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- 4) **Efficiency.** Given that A.I.D. has a mandate to invest in biodiversity conservation, what balance is appropriate between evidence of immediate results and longer-term capacity-building and sustainability issues? Is this even an explicit concern in Agency programming? Is efficient investment in biodiversity an economic measure, biophysical, or both?

TABLE 12

GREEN PROJECTS PROPOSED FOR FIELD VISITS AND ISSUES TO BE ADDRESSED

COUNTRY/ REGION	PROJECTS FOR PROPOSED FIELD VISIT	ISSUES TO BE ADDRESSED
INDIA	Madhya Pradesh Social Forestry Maharashtra Social Forestry National Social Forestry Program	Can measures of E/NRM impact be derived from project data? Can sociocultural variables account for variation in success levels? How have management, administration, bureaucracy influenced project outcomes? What is the relationship between institutional capacity and success in the field?
INDONESIA	Luwu Agricultural Development	What have been the environmental impacts of this poorly conceived project? What have been the cultural impacts? What is the current condition of the lands and the people?
HAITI	Agroforestry Outreach Program	Can retrospective data on E/NRM impact be obtained from the project areas? How has the project fared under conditions of extreme institutional instability at the national level? What tree-planting practices are the farmers currently following? Has there been a spread effect?
LESOTHO	Land Conservation and Range Development	Impact on rangeland and individual animals has been positive, but what is the overall economic impact from reducing access? Who are the losers from restricted access and what is their perspective? Are Grazing Associations and RM Areas financially and administratively sustainable? Does the success of this project depend on other A.I.D.-funded activities in the country?
NIGER	Forestry and Land-Use Planning	Are there special circumstances — social, economic, or political — that account for the success of the tenure arrangements? To what extent might cultural context constrain success in other areas/countries of Africa?
PERU	Central Selva Resource Management	What cultural variables contributed to the success of this project? How important was outside guidance? Does the technology still appear to be producing sustainable E/NRM results? What have been the E/NRM benefits of the project to date?
TUNISIA	Central Tunisia Rural Development Project/Range Management Subproject	What are the bottlenecks in transferring technically effective interventions to the intended beneficiaries? What is the appropriate role of the state with regard to local resource control and tenure questions? Why did some perimeters adopt improved technologies and others not? Without subsidies (stopped in 1989), are livestock producers continuing to participate in the RM program?
SUDAN	Rural Renewable Energy	What specific variables — cultural, institutional, economic, administrative — account for the success of this project under the extreme biophysical, political, and economic conditions in which it operated?
ASIA	Forestry/Fuelwood Research and Development	Are there specific cultural factors that have contributed to the success of this project in Asia? Exactly how has applied research been linked with extension and education to produce good results?

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Haiti: Agroforestry Outreach (5210122)

This project is a good example of what can be done to rejuvenate wasted lands through tree production. The plantations are economically very important. The implementers were successful in demonstrating the viability of these plantations, and thus they have been popular among farmers planting on their own land. If the country and project areas can not be visited directly, more detailed collection and analysis of secondary materials might be considered. These data could then be used in a comparative manner where another hillside agroforestry program was chosen for field study. Possible alternative field sites include Jamaica (532-0101, relatively less successful), Ecuador, or Lesotho.

Lesotho: Land Conservation and Range Development (632-0215)

The first Range Management Areas (RMAs) were established in 1983. Culling and marketing of sheep and cattle have increased, range quality has improved, and government is encouraging the formation of new areas and local management associations. The model is expanding but is at least partially based on external control of access. The question of local ownership and stakeholder analysis, especially distinguishing between winners and losers in the new context, renders this an excellent candidate for study. Other NRM activities in the country and a follow-on to this project further support the Lesotho case.

Morocco: Range Management Improvement Project (603-0145)

In contrast to the RM project in Lesotho, the RMIP ended as, at best, a partial success. Local participation was unenthusiastic, and external authority was insufficient to bring about much change at the ground level, but the concerned government institution was reportedly strengthened. The local Mission suspended further support to RM pending the development of more comprehensive rangeland and extensive grazing policies. Did project activities have an indirect impact in addressing these preconditions to effective RM in Morocco's semiarid communal rangelands?

Peru: Central Selva Resource Management (5270240)

This project contains one of the few mentions of successful implementation of sustainable indigenous forest management. This system is being used to produce commercial lumber, posts, and charcoal from the natural forest.

Niger: Forestry and Land-Use Planning (6830230)

This project is a prime candidate for a field assessment precisely because it has been so successful that A.I.D. is considering its innovative land tenure arrangements as a model for forestry projects throughout Africa. It would be useful to determine if there are any special circumstances or conditions — social, economic, or political — that account for the success of the land tenure arrangements and the absence of which might constrain success in other areas.

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Sudan: Rural Renewable Energy (6500041)

This project is a good example of what can be done under extreme biophysical, political, and economic conditions. Some good E/NR activities such as planting trees and shelterbelts were carried out despite the hostile environment. Careful attention was paid to making it replicable and emphasizing the commercial potential of environmentally sound activities.

Tunisia: Central Tunisia Rural Development Project — Range Development and Management Subproject

In this project, a wide variety of range improvements was tried, many of which were declared technical successes. Yet, adoption rates were low. What economic and policy constraints limited the impact as measured by the adoption of improved practices?

Asia: Forestry/Fuelwood Research and Development (9365547)

This project is an outstanding case of using applied research to promote effective extension and education campaigns. This project uses grassroots-level research on multipurpose tree species to encourage use of these trees in agroforestry systems. It has carried out very good research and used this knowledge to assist farmers with their production problems.

Deforestation and Site Visits

Many A.I.D. countries throughout the world are suffering serious deforestation problems. Within the context of site visits to examine the environmental portfolio of USAID Missions, it would seem particularly worthwhile to examine the problem of deforestation by addressing the issues that may be major contributors to it. Although this recommendation does not fit conveniently into the project recommendation format used above, there are particular countries where an examination of the issues surrounding deforestation might be particularly enlightening. Ecuador, Madagascar, Indonesia, Thailand, and Nepal are all countries with continuing serious deforestation problems. In all of these cases, it is suggested that price policy may be a major contributor to the problem. This suggestion should be tested in the field.

Integrated Pest Management

It is also suggested that price policy is a major issue with regard to the use of chemical pesticides in Indonesia. The combination of deforestation problems, the Luwu Agricultural Development Project's negative environmental impact, and the price policy and other issues surrounding IPM make Indonesia a particularly good choice for the collection of useful information in the field.

Biodiversity

Because biodiversity is a relatively new area for the Agency, there will be few substantial impacts in the field from completed projects. However, there are far more completed activities than have been formally evaluated and entered into A.I.D.'s Document Information System. Despite substantial A.I.D. support, countries such as Costa Rica, Ecuador, the Philippines, Kenya, and Madagascar are not turning up as having any completed evaluations of biodiversity activities. They may still present viable potential for field assessment. Many biodiversity activities, for example, have a long track record but have been funded through grants and other mechanisms that do not result in DIS evaluation literature.

Activities such as ecotourism and debt-for-nature swaps are similarly under-represented based on the levels of Agency funding for these adjuncts to biodiversity conservation. At this juncture, there are two avenues for further study.

First, based on the material gleaned from the Document Information System, try to review the programmatic and field-level impact of the early, centrally funded activities. An evaluation of this sort will necessarily focus more on process and modality issues than lasting substantive progress toward biodiversity conservation. This is an important area in its own right to inform Agency planning but will yield relatively little by way of new material on the state of A.I.D.'s ability to successfully conserve biodiversity. This type of information will be of greatest utility to planners and policy specialists within the Agency but will offer relatively little guidance to practitioners in the field.

Second, a means to document better the current state of the art for implementing biodiversity conservation, is a field assessment of those Agency activities known to be completed in key countries receiving funds for conservation but that have yet to receive formal A.I.D. evaluations. This would involve working from the planning documents for projects in selected countries, rather than evaluations.

In order to provide A.I.D. management with program-level input for future planning, the following areas warrant study during the field study. At this point it would probably be premature to judge the portfolio of biodiversity projects already evaluated on their ability to exhibit significant outcomes (goal and purpose-level effects) and may be better to use meeting stated project objectives as proxies. This is, however, an important area for discussion when designing the final set of field methodologies.

- 1) **Habitat protection.** What amount of land area has come under protection and how does this compare with not having carried out the activity? Has the type of management plan proposed or implemented been well integrated into the existing systems (legal standing, budget allocations, formal training mechanisms, staffing levels, and so on)? How well have ancillary activities such as buffer zone maintenance been phased in; and do they meet stated needs for local resources and economic returns?
- 2) **Research.** Regardless of the specific goals of a given research activity, is the research integrated into the larger institutional setting (within the Mission and host country)? Has the research served any other purposes than those of the specific project (institution building, expanding central data sets, indigenous skill building)?

- 3) Policy dialogue and reform. Has the project had a documented effect on changing policies related to biodiversity conservation (pricing for natural resources, legal reform, land tenure, and so on, per project outputs)? Has this change in policy had a measurable effect on biodiversity conservation? Is the project designed to measure such a change?

Because biodiversity involves biophysical conditions, each project reviewed should include in-depth field visits both to survey local inhabitants and to survey the physical site. Given that biodiversity projects comprise only a small portion of Mission portfolios, it will be difficult to ascertain program-level achievements. Placing such micro-efforts in context will need methodological input from CDIE.

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ANNEX III -- BROWN REALM

A.I.D. ENERGY AND URBAN/INDUSTRIAL ENVIRONMENTAL PROJECTS

1. PROJECTS REVIEWED

1.1 Defining the Brown Realm

This annex assesses A.I.D. projects in the urban/industrial and energy sectors — the "brown" realm. Reviewers selected 115 documents comprising 34 projects for detailed review. Of these documents, approximately 70 percent were evaluation reports, 10 percent other project review documents such as audit reports, and the remaining 20 percent policy documents.

Each of these documents was reviewed in detail in either paper (hard copy) form or on microfiche at the A.I.D. library. Forty-eight project evaluations were analyzed, and 12 policy documents were reviewed. Review began with placing the 34 projects in a series of categories, referred to as sectors, based on major issues addressed by each project. After all of the projects had been reviewed, the sectors were consolidated into either energy, industry, or other. Each sector was further subdivided to more precisely reflect how a project addressed an issue. The sectors and subsectors used in this report are listed in Table 1.

1.2 Overlap with Green and Blue Projects

During the review, a number of projects were considered that could have been classified as being in either the "blue" (coastal and marine) or "green" (rural, land-based) realms. The project team considered these projects together and made the classification on the basis of the following considerations.

Blue-Brown. For projects with blue-brown overlap, a determination was made as to whether the focus was on the impacts of emissions or on the emissions themselves. If the project's primary purpose centered on the reduction, monitoring, recovery, recycling, or disposal of liquid wastes or of waste discharges into water bodies, the project was classified as "brown." If the project considered the impacts of such pollution on aquatic ecosystems, it was considered a "blue" project. A total of 18 projects in the initially listed as "brown" projects, were classified as "blue" projects, and the information was transferred to the person evaluating those projects.

TABLE 1

PROJECTS REVIEWED, BY SECTOR AND SUBSECTOR

<u>Sector and Subsector</u>	<u>No. of Projects</u>
Industry	
Resource Recovery	1
Pollution Research/Control	2
Industrial Efficiency/Production	2
Ground Water Monitoring/Analysis	1
Air Quality Monitoring	1
Energy	
Alternative Energy	7
Sector Assistance	2
Conservation	3
Conventional Energy/Technical Assistance	1
Energy Efficiency	1
Hydropower	2
Policy Initiatives	3
Renewable Energy	3
Energy Research	1
Energy Management	1
Technology Transfer	2
Other	1
TOTAL	34 projects

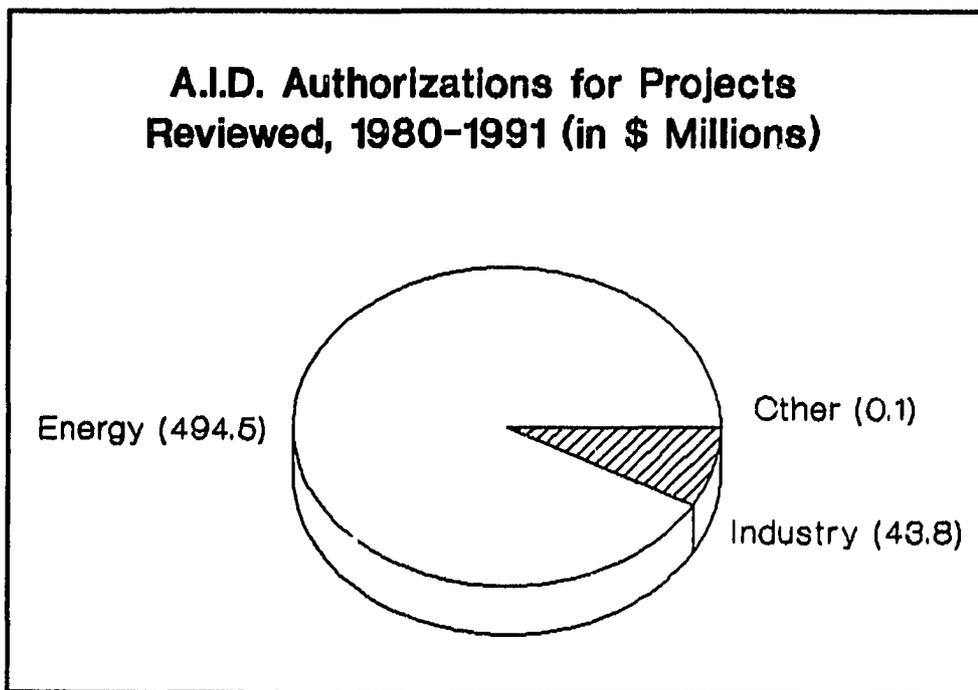
Green-Brown. The primary areas of green-brown overlap were in rural energy. Projects concerned both with woodlots or watersheds as rural energy sources and with rural energy use were particularly difficult to classify. If the project primarily addressed energy production, energy use, or energy conservation, it was classified as a "brown" project. If the project was largely concerned with the management of woodlots, watersheds, or other primarily biological aspects of energy, the project was classified as a "green" project. A few of the projects with an energy component reviewed here are also reviewed in the green realm annex.

2. PROJECT SUMMARIES

2.1. Overview of the Brown Realm

The A.I.D. projects reviewed in this annex had a total authorization value of \$538 million. Of this total authorization, approximately 92 percent was designated for projects that were classified in the energy sector. Of the remainder, \$44 million in authorizations were classified in the industry sector. Figure 1 shows the dollar authorization for each sector.

FIGURE 1

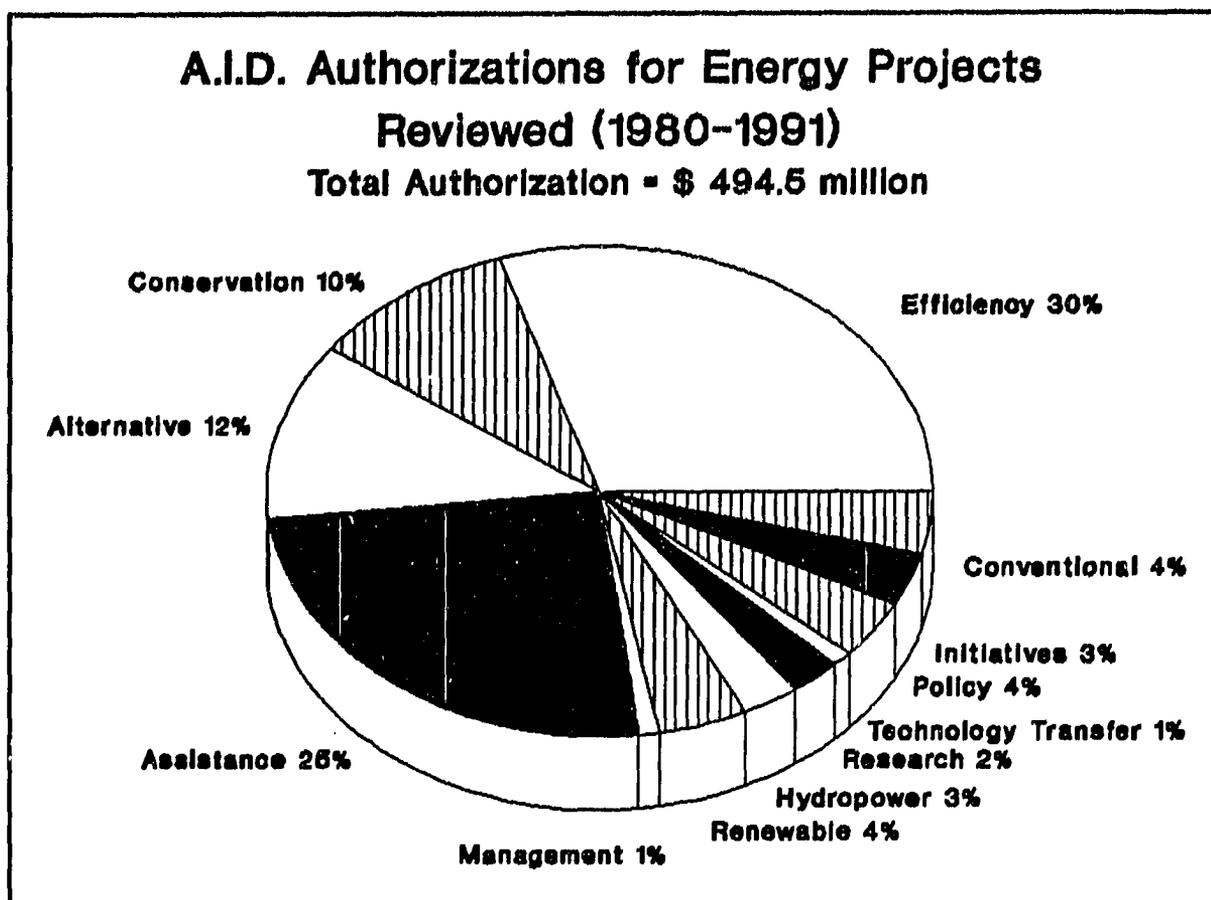


Source: Official A.I.D. Project Documents

2.2 Energy Sector

The 26 energy sector projects evaluated in this report had a total authorization value of \$495 million, or roughly 92 percent of the total of all projects reviewed, yielding an average project authorization of \$19 million. These projects were classified into 12 subsectors. Individual project authorizations in these subsectors varied from as little as \$32,000 to as much as \$140 million. Figure 2 presents the breakdown in authorizations within the energy sector according to subsector.

FIGURE 2



Source: Official A.I.D. Project Documents

There have been many different approaches to energy issues, but all have one underlying theme of environmentally sound, efficient use of energy. A.I.D. has focused its activities on assisting countries to increase their energy self-sufficiency, reduce needs for fossil-fuel imports, or lower their rates of deforestation through more effective energy management, production, distribution, end-use, and conservation.

Alternative Energy. Projects in the Alternative Energy subsector amounted to \$58.4 million in authorizations. These projects are listed in Table 2. The projects focused on the development of local fuels that could be used as an alternative to coal, oil, and other conventional fuels. The projects promoting alternative fuels also served to reduce the amount of deforestation caused by felling for firewood. The alternative fuels which these projects promoted included peat, biomass, solar heating, geothermal, and fuelwood from woodlots. These projects were largely aimed at residential and rural energy users, although some also focused on urban areas and industrial energy use. The majority of

projects included a component on energy efficiency through the use of improved stoves in rural areas, and through improvement of end-user technologies at the industrial level.

In general, these projects tended to be moderately successful, with more than 65 percent of intended tasks accomplished. The success of these projects was often due to the local nature of the project, with extensive interaction between the contractor and the end-users of energy sources. The extension aspects of the projects allowed contractors to meet regularly with end-users and tailor the project activities to the needs of the local communities.

TABLE 2
ALTERNATIVE ENERGY PROJECTS

Project No.	Country	Title	\$\$\$ (million)
3860474	India	Alternative Energy Resources Development	5.0
4920294	Philippines	Nonconventional Energy Development	7.2
5180029	Ecuador	Alternative Energy Sources	2.7
5960089	Central America	Fuelwood and Alternative Energy Sources	3.2
5960134	Central America	Central America Energy Resources	10.2
6950103	Burundi	Alternative Energy, Peat II	8.0
9365701	World	Impact Assessment of Low Cost Energy Technology	5.8

The primary problems encountered by these projects were the following:

- The large projects tended to become enmeshed in bureaucratic management problems between the Agency and the local government.
- Alternative fuel sources developed were insufficient to meet the growing demands of end-users.

Renewable Energy. Renewable energy projects represented the fifth largest authorization within the energy sector, with total authorizations of \$21.1 million. Related to the alternative energy projects in their goals of altering energy use patterns, the renewable energy projects concentrated on providing incentives for the use of renewable energy sources in an environmentally sound manner. Projects in this sector entailed the development of woodlots, charcoal stoves, promotion of wind and solar power,

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micro-hydro energy generation, and the institutional development of in-country agencies promoting renewable energy sources. Renewable energy projects were carried out in Thailand, Morocco, and Sudan.

These projects are of two basic types:

- Institution-building and training projects to promote indigenous development of renewable energy technologies and policies; and
- Projects that focus on village-level energy-related issues.

The **Renewable Nonconventional Energy Project** in Thailand (493-0304) had 10 diverse components that collectively addressed energy development issues on a broad scale. These components included development of a National Energy Information Center, various energy planning activities, the construction of four micro-hydroelectric installations at village locations, and a number of small-scale components such as charcoal production, improved cooking stoves, and pyrolysis of rice husks.

The **Renewable Energy Development I Project** in Morocco (608-0159) was, by contrast, an institution building project, aimed at institutional capacities to develop renewable energy technologies. As such, training was a major component which was to be carried out by short-term and long-term consultants. The project did not have sufficient planning with regard to the operational framework of the new institution (Center for Renewable Energy Development — CDER), and the issues and questions the Center was to address. This design failure was in part a result of A.I.D. playing a minor role in the initial stages of the project to develop the CDER. However, a more fundamental cause of problems in the project was:

A.I.D./Washington's insistence to prove its point — that the project must be a financially viable commercial investment — disregarded field and host-country advice, not to mention the views of the very scientists first sent to the USAID Mission to help design the PID. This A.I.D./Washington-inspired change in project objectives caused several hundred thousand dollars of central funds to be spent . . . on design efforts which have generated reports of dubious utility (Evaluation of Phase I, Document XD-AAB-007, page 5).

In addition, the development of a CDER was new for Morocco as well as new for USAID, and as a result, the Project Paper and agreement were overly optimistic in their scheduling.

The original purpose of the **Sudan Renewable Energy Project** (650-0041) was to develop renewable energy sources in rural areas directly affected by deforestation. The project changed focus from rural energy to incorporating biomass production and use in urban areas. This change permitted a greater level of innovation and diffusion in the urban areas. Project opportunities for success were greatest in urban areas because of the concentration of charcoal users, as well as manufacturers and users of stoves. While the ultimate beneficiaries of SREP are the urban poor, the immediate effects will be felt by the small farmers, local artisans, and stove producers. This project was particularly successful because it supported relatively few studies and focused instead on obtaining high-caliber staff and

equipment and moving Renewable Energy Development Grants (REDG's) into the field. The outputs from the Sudan project were both effective and well documented in the evaluation report. The primary output of the project was the establishment of nurseries producing about 172,000 seedlings/year.

Energy Conservation. Three projects were identified in this study, which approached the issue of energy conservation. These were the Energy Conservation and Resource Development Project in the Dominican Republic (517-0144), the Conservation component of the Djibouti Energy Initiatives Project (603-0013), and the Resource Conservation and Utilization Project (RCUP) in Nepal (367-0132). Together these three projects had authorizations of \$49.7 million.

With an authorization of \$17.5 million, the Energy Conservation and Resource Development Project in the Dominican Republic attempted to address energy conservation issues through a number of innovative activities in the development of mini-hydro energy generation and industrial conservation.

The Mini-Hydro component was designed to develop small-scale, local, environmentally benign electrical energy production in rural areas. The Mid-Term Evaluation of this project indicated that 55 sites were investigated as possible hydro power sites, of which 25 were selected for reconnaissance studies, resulting in recommendations for further investigation of 17 sites. There were administrative problems, particularly relating to relationships between the contractor and the local energy authority (COENER) that housed the project. The report notes that many of these problems related to the fact that mini-hydro is a new field. As a result, the administration of the project did not fit easily into either CDE or INDHRI, organizations that are responsible for water resources and power generation respectively. The report also noted that the A.I.D. Energy Officer did not monitor or backstop the contractor sufficiently. (See below under Hydropower for additional information on mini- and micro-hydropower projects.

A particularly innovative component of the project was the promotion of energy conservation in the industrial sector. Specifically, this component involved COENER carrying out energy audits of private sector industries. By the 1985 midterm evaluation of the project, some 35 of the 50 audits contemplated had been carried out. However, COENER was not able to project a professional level of competence, in part due to poor management and inadequate compensation. As a result, the project suffered problems in the energy auditing activities. Specifically, inadequate staff were available to carry out audits, and personnel lost considerable time when plant personnel were unavailable during scheduled visits. Despite these limitations, the program was likely to produce significant savings in energy consumption. The 1985 Evaluation Report estimates that industrial energy savings could amount to \$10 million annually by the year 1990.

The energy conservation activities carried out under the Djibouti Energy Initiatives Project had four objectives:

- Establishment of model sites for demonstration of energy-saving technologies and installation of a few prototypes;
- Establishment of short-term training courses for industries;

- Contribution to the National Energy Assessment; and
- Development of a set of documents to study and promote energy conservation.

The project achievements were several:

- A National Energy Assessment, which focused on techniques for industrial end-users to conserve energy, was completed.
- A manual on energy-conserving construction techniques was prepared.
- A training course was completed.
- Plans for energy-efficient housing units were completed.
- Assistance to the private sector was provided for use of waste oil as fuel substitute for energy-intensive cement bricks, which would save an estimated \$3.3 million annually.

The Resource Conservation and Utilization Project (RCUP) in Nepal focused on natural resource conservation and management. Originally focused on policy directives and use of fuelwood resources, the project evolved to address local "green" issues the A.I.D. mission believed would increase the level of local participation in the project. In particular, the project evaluation made the following observation:

Where activity objectives were more focused and attainable, where the geographic focus was more on the panchayat level, and where incentives and assistance to encourage more self-reliant local-level natural resource management were evident, USAID's efforts are more likely to have a positive impact over the long term.

Energy Efficiency. The A.I.D. Regional Office for Central America and Panama (ROCAP) sponsored the Regional Industrial Energy Efficiency Project, with an authorization of \$8 million. The project consisted of three main components: industrial programs, training, and database development. The industrial programs included energy audits, field and pilot demonstrations, and energy efficiency seminars. The project completed 25 level I (basic) audits and 35 level II (detailed and instrumented) audits during the first half of the project. In addition, the project developed a series of energy seminars, which had 1,500 participants.

The evaluation document praised the project:

The project was one of the most interesting energy conservation projects currently being conducted in developing countries and has the potential of becoming one of the most successful.

The project was successful for several key reasons:

- The project was the only truly regional energy conservation effort in the world and integrated day-to-day operations in addition to common policies and objectives.
- The private sector was actively involved in and was an actual beneficiary of the project.
- The project received revenues from private sector participation in seminars and for audit training.
- The project was able to attract and retain experienced and qualified engineers to conduct the energy audits on a continuous basis.
- The project encouraged public and private financial institutions to invest funds for energy conservation and increased understanding of the interactions between public policy and energy.

Hydropower. Two projects were evaluated that used hydropower as a means of reducing a country's needs to burn fossil fuels. These projects had the indirect environmental goal of preserving nonrenewable resources.

The **Micro/Mini-Hydroelectric Project (493-0324)** was designed to help reduce Thailand's dependence on imported fossil fuels used for electricity generation. Specifically, the project aimed to provide a broad institutional setting for the development of mini-hydropower and was implemented by the National Energy Administration (NEA). A site selection model was developed based on economic, financial, and social variables, and six mini hydroelectric systems were constructed. The major drawback to this project was the effect of fuel price fluctuations on the economic viability of the hydropower plants.

As part of a Cooperative Agreement between A.I.D. and the U.S.-based National Rural Electric Cooperative Association (NRECA), the **Small Decentralized Hydropower (SDH) Project (936-5715)** was designed to develop a methodology for implementation of small hydroelectric systems for rural areas at USAID Missions and in developing countries as an alternative to remote diesel generation. The project was divided into five phases: Resource Assessment, Planning, System Development, System Implementation, and Technology Transfer. Resource materials were prepared in many forms including a SDH Data Base, SDH Economics Handbook, and a Micro-Hydropower Sourcebook. Four technical workshops were held worldwide to encourage cost-effective development of decentralized hydropower. Mini-hydro is a new field that represents low-cost technology that could revolutionize agricultural and industrial productivity (see PD-AAN-570 "An Assessment of Evaluations of A.I.D. Renewable Energy Projects: A Search for Cost-Effective Replicable Technologies, 1987"). In addition, SDH can serve as a source of local, rural energy production with minimal environmental impacts. As a result of this project's assessment, S&T/EY included decentralized hydropower as a key energy option in other A.I.D. renewable energy programs. However, changing economic conditions, such as the local prices of petroleum-based products, can significantly impact a project's economic feasibility.

Energy Sector Assistance. The **Energy Sector Assistance Project in Jamaica (532-0065)** was designed to assist Jamaica in reducing its dependence on imported petroleum through promotion of conservation and development of its indigenous resources. This project aimed at implementing solar

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water heating and conservation and developing of institutional structures to evaluate management and implement those energy options.

Unfortunately the Energy Division was unable to attract and retain the required complement of professional staff at current approved rates of salary. The division failed to do so because the organization administering the project paid, on average, 63 percent below the amount paid by the private sector or other statutory organizations. As a result, recruitment and retention of skilled and experienced personnel were significantly inhibited. The high staff turnover prevented continuity in energy development planning and implementation of the program. In addition to these logistic and recruitment issues, the project faltered because of policy and pricing actions by the government. For example, a tax of 37 percent of cost on solar water heaters essentially removed most of the purchase incentives for households.

Despite these handicaps, the project did carry out some energy audits and establish contracts for retrofitting equipment. The project also prepared a cadre of locally competent auditors for future training needs.

Energy Policy. Two energy policy projects were evaluated: The Costa Rica Energy Policy Development Project (515-0175) and the Energy Policy Development and Conservation Project (EPDAC, 936-5728). Total authorizations for these two projects were \$19 million.

The goals of the Costa Rica Energy Policy Development Project were the following:

- To strengthen the GOC capacity for energy planning;
- To produce short- and medium-term national energy plans;
- To address short-term energy problems; and
- To carry out specific projects and investigations in the areas of renewable energy and energy conservation.

Project administrators were extremely ambitious, setting as verifiable indicators a 6 percent annual growth rate and a decrease in the level of imported petroleum to 30 percent of total energy use. The evaluation of this project illustrates the difficulty in independently verifying the actual accomplishments of a project. For example, the project evaluation report (XD-AAT-784-B) noted, "The stated project purpose, to strengthen the Government of Costa Rica's capacity for energy planning, has been achieved even though many of the objectively verifiable indicators of project goal achievement presented in the project paper have not and may never be met." It is difficult to interpret such statements or use them in future project designs. The project did make substantial contributions to energy planning:

- Preparing a "holistic" description and view of the energy sector that was accepted by other energy and economic planning agencies;
- Supplying adequate data for energy sector planning, especially on demand and supply options;

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- Training experienced energy planning professionals, to permit continued energy sector planning; and
- Developing good working relationships among various government and independent energy planning agencies.

Development impact was not included in the evaluation report, which recommended carrying out an impact evaluation after national elections were held.

The **Energy Policy Development and Conservation (EPDAC) Project**, centrally funded, had two main components: the **Energy Conservation Services Program (ECSP)** and the **Energy Policy and Planning Development (EPPD)**. The evaluation suggested that the project needed to enhance the promotional package for the EPPD and that the components should be integrated more closely. The evaluation also concluded that A.I.D./Washington needs to communicate more closely with field Missions on the purpose and focus of the project. Specifically, the evaluation notes that A.I.D./Washington and its contractor do not listen to the marketplace feedback closely enough and do not market the program effectively to Mission staff or within country.

Energy Research. The only project in the energy research subsector was the **PUSPIPTEK Energy Research Laboratory** in Indonesia (497-0333). The purpose of this project was to assist the GOI in establishing a viable, professional energy research and development laboratory which would conduct applied research, support energy-related industry, and assist the private sector with technical and economic feasibility analyses for energy programs, projects, and technologies. An important secondary purpose of the project was to promote U.S. steam generation, coal preparation, and combustion technology and knowledge. The evaluation pointed to the project's importance in meeting the energy research needs of the GOI but was unable to detail any quantitative progress made in the project.

Conventional Energy - Technical Assistance. USAID's Office of Energy, Bureau for Science and Technology (S&T/EY) funded the **Conventional Energy Technical Assistance (CETA) Project** with a total authorization of \$20.8 million. The primary purpose of this project was to provide worldwide access to a range of technical assistance, including identification, evaluation, and development of conventional energy resources, and the utilization of these resources. Although the project did not have the development of environmentally sustainable energy resources as an expressed purpose, a number of the subprojects carried out under the CETA project did promote the use of environmentally "friendly" technologies. By its midterm evaluation, 12 subprojects had been carried out under CETA. Of these, two subprojects had direct environmental impacts: the Thailand Natural Gas Utilization and the Jamaica Cane Energy Study.

The CETA project illustrates important managerial and administrative impediments to the development by A.I.D. of a comprehensive energy policy that could be implemented throughout the world. Although the contract received high marks for technical and managerial competence, the project did not receive sufficient support from local A.I.D. staff. In addition, S&T was unable to demonstrate to the Missions the importance of the project or the importance of environmental issues in energy development. In rating project results and impacts, Missions judged potential environmental impacts as either not applicable or of very low priority in all but two countries, Pakistan and Costa Rica. This low rating did not signify a lack of environmental impact because most of the projects initiated had significant

or potentially significant impacts. Rather, it demonstrated the low priority of environmental considerations on the part of Mission staff, and the inability of A.I.D./Washington to demonstrate the need to give environmental issues a higher priority in energy projects.

The evaluation noted the need for the project to focus on those areas where CETA could be the best support vehicle. One of these areas is "advanced innovative environmentally sound technologies and power systems related to conventional resources" (Document No. PD-ABA-333; page 33).

Energy Initiatives. The Energy Initiatives for Africa (EIA) Project (698-0424) had its origins in the 1980s, when high oil prices led to an Agency-wide policy that emphasized the importance of energy as an overall development issue and encouraged the use of renewable energy sources and technologies. At that time, the Agency had few officers with sufficient training available for placement in Missions in Africa. The regional EIA was designed to promote new energy initiatives and technologies and overcome the human resource deficit within the missions. The total project authorization was \$17.5 million.

The final evaluation report detailed the expected outputs of the project:

- Creation of a trained staff of energy specialists;
- Establishment of country energy plans;
- Information sharing on energy matters;
- Demonstration of self-sustaining agroforestry, reforestation, and forest management programs and adoption of the models "on at least five times the acreage of the demonstration sites themselves" in each major ecological zone in Africa; and
- Successful energy conservation programs.

As broad and innovative as the project was at its conception, it was unable to achieve much of its potential, for a number of reasons. First, the project suffered from the shifting political climate in the United States, resulting in budget cuts over the life of the project. Second, the project did not have a midterm evaluation, which left all parties involved with little coherent understanding of how the project should be altered to become more effective. Third, the subproject components were limited to \$200,000 each, which resulted in regional staff viewing the project as burdensome. Without a project advocate, such as an energy or forestry staff person, local Missions viewed the project as a low priority.

In addition, the project failed to achieve its potential because it was reoriented at midterm by the deletion of all numerical expected outputs, and elimination of the goal of establishing energy plans in each participating country as well as the need to demonstrate models of forest management outside the demonstration sites.

Based on the problems encountered, the final project evaluation contains several worthwhile observations worth reiterating:

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- Projects with specialized issues such as energy (and environment) should be managed from an A.I.D. office with in-house expertise in that field. Failure to do so will lead to inadequate supervision of the contractor's technical judgment.
- Regional projects in Africa should not be managed from Washington.
- Long-term projects require commitment from the agency, and A.I.D.'s top management should assess the political climate before such commitments are made.
- Midterm evaluations should be an absolute requirement for any project with four years' duration or more.
- A.I.D. should not permit large projects to undergo redesign without competent, disinterested advice either from within or outside the agency.
- Approval of generic subprojects should be granted as part of the project to allow Mission staff to implement projects with a minimum of bureaucratic limitations.

Energy Management - Technology Transfer. The Technology Transfer for Energy Management (TTEM) Project was designed to improve energy efficiency in the Philippines. This \$5 million project specifically focused on improving energy efficiency by industrial and commercial users through the promotion of new technologies and the provision of loans for end-user investment in energy-efficient technology. The project also disseminated information on energy conservation to industrial users.

The project suffered from many deficiencies that severely limited its potential impact on the industrial users. The selection of subprojects lacked needed direction, and the marketing of the project benefits and the demonstration loan fund to industrial users was weak. The project personnel also did not appear to have made a concerted effort to locate and develop the capabilities of equipment manufacturers and vendors for use in the project. In addition, those applications of new technology have emanated from the largest companies in the Philippines, which tended to benefit least from demonstration loan funds, in terms of both spread and total interest cost savings.

It should be noted that the two-person evaluation team was divided on a number of judgments about the project. One member viewed the project as well conceived but underperforming; the other questioned the validity of the project design and the prospects for improved performance.

2.3 Industry Sector

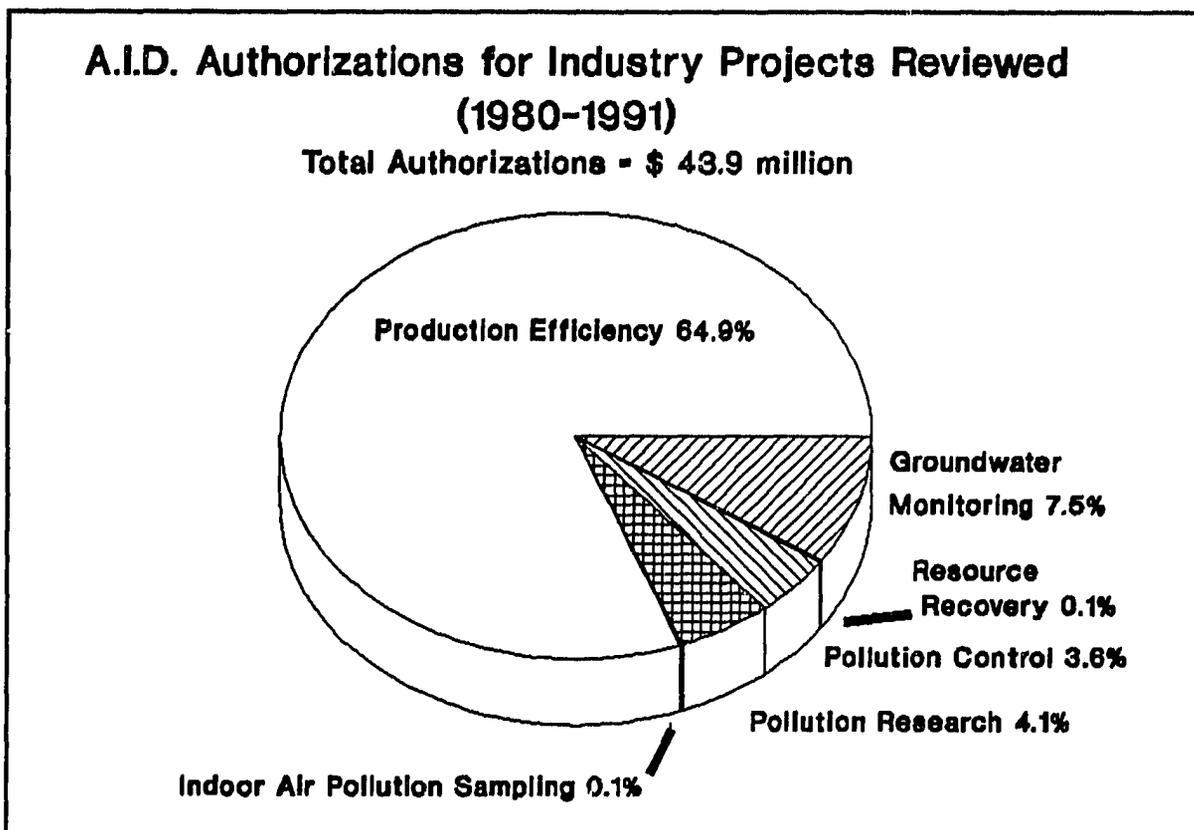
The industry sector review, with a total of \$43.8 million in authorizations, included seven projects. These projects were classified into six subsectors. Although the average authorization per project in the industry sector was \$6.3 million, three of the projects were very small — below \$100,000. Authorizations for the other four projects ranged between \$1.5 million and \$28.5 million. Figure 3 presents the breakdown of authorizations in the major subsectors for the industry sector.

Pollution Control. Only one project was evaluated that involved control of pollution from industrial sources. With a total authorization of \$1.5 million, the **Private Sector: Industrial Pollution Control Project (298-0174)** was designed to establish a mechanism for the transfer of U.S. experience and technical expertise in industrial pollution abatement to the growing industrial sector in the developing countries in the Near East Region. In addition, the project used the World Environment Center (New York, NY) as an international environment information service. The project used environmental engineers who were provided by U.S. companies on a pro bono basis. This approach was considered appropriate for the following reasons:

- **Environmental.** The private sector has contributed to environmental quality in the United States and can use this experience without making costly mistakes.
- **Economic.** The missions carried out by U.S. environmental experts allow these experts to identify new markets and investment opportunities.
- **Political.** Visits by staff from U.S. multinational companies can lessen the "deep mistrust of the companies . . . among Third World leadership."

(No information was provided in the document examined on the relative success of this project.)

FIGURE 3



Source: Official A.I.D. Project Documents

Resource Recovery. Only one waste recovery project, **Waste Streams and Integrated Resource Recovery Systems in Developing Countries (936-1406)** was found in the search. This small (LOP authorization \$100,000) project involved a study of the potential for improving public health in medium-sized cities in Southeast Asia by financially viable, integrated waste recovery systems producing useful commercial products. The project showed that integrated approaches to waste recovery are technically feasible, but that adverse market conditions and institutional weaknesses severely limit the practical application of integrated resource recovery. The report concluded:

Practical application of truly integrated (as opposed to sector) approaches has been severely limited by adverse financial conditions, in particular by low market prices for resource recovery products and by institutional differences.

Medium-sized cities lack the capacity to establish and maintain integrated resource recovery systems.

The main beneficiary of the project, according to the evaluation, was the City of Tacloban (Philippines), which received a substantial amount of technical information on recovery systems that "may serve as a basis for future resource recovery activities."

Pollution Research. Pollution research was supported in one subproject of A.I.D.'s **Science and Technology Development Project in Tunisia (664-0300)**. This project sought to increase the flow of pollution control technology to Tunisia. The subproject's purpose was to establish a pollution control laboratory capable of testing for industrial environmental pollutants. The project also was designed to assist, when requested, in setting environmental standards, and establishing effective cooperation among government agencies, industry, and the public in developing economically feasible regulations, laws, policies, and procedures for the control of pollution.

The evaluation reported on progress in the development of the laboratory. The outputs of the project included the provision of laboratory equipment, on-site training, and seminars on state-of-the-art pollution control. In spite of these accomplishments, the laboratory only operated at a sub-optimal level because the GOT did not provide sufficient personnel for training at the time when U.S. technical counterparts were available. In addition, management of the laboratory was seriously deficient, and "the local personnel at [the lab] were not capable of carrying out an effective pollution control program" (Document No.: PD-AAI-663-A). The report makes no mention of any progress toward the larger policy goals of assisting the GOT in developing environmental standards or regulations.

Ground Water Monitoring. This small project (LOP authorization of \$ 38,000) was carried out in conjunction with the USAID-funded construction of the Aqaba wastewater treatment facility in Jordan. The purpose of this project was to monitor the groundwater adjacent to the plant and ensure adequate treatment at the start for both chemical and bacteriological effluents. Although the project was small, it supplemented the scientific work being carried out by local agencies (Royal Jordanian Scientific Society) and as a result was enthusiastically supported. Based on the evaluation, the project appeared to have carried out successfully its monitoring activities at the start-up of the plant, and additional monitoring was to be carried out after the project by local personnel.

Indoor Air Pollution Sampling. The **Resource Conservation and Utilization Project (RCUP)** in Nepal (367-0132) had, as one of its activities, the improvement of cookstoves in rural areas. As a companion study to this project, a program of indoor air pollution sampling was carried out to collect emissions data from traditional (flueless) and improved (flued) cookstoves and assess the exposure rates of rural Nepali adults to indoor air pollutants. This study project had an authorization of \$100,000. The

study showed that Nepali women were exposed to significant doses of particulates, carbon monoxide, formaldehyde, nitrogen dioxide, and benzo[a]pyrene and that the combustion of biomass fuels and concentrations were significantly greater with traditional stoves than with the improved stoves.

Industry Production. The Environmental Activities Subproject (EAS) of the Industrial Production Project (IPP) in Egypt (263-0101) was intended to plan, design, and implement a number of industrial and pollution control subprojects. The subproject focused on the severe pollution of air and water in the form of untreated industrial wastes, air pollution, dust emissions, and automobile exhaust. Of the total of \$28.5 million authorized, the project allocated \$6.5 million for technical assistance and \$22 million for the purchase and installation of pollution abatement systems.

The project completed in-depth feasibility studies at 15 companies for renovating production systems and controlling pollution. In 1984, an A.I.D.-financed procurement for 16 separate pollution control activities at six public sector companies was initiated. All of these tasks should have been completed within three years, or by October 1987. However, at the time of the evaluation, only 9 tasks at 4 companies remained active, and only 2 had been completed and were functioning as intended. The GOE expected that pollution control equipment would eventually be procured for more than 50 factories in selected industries. The 1990 project audit concluded somewhat contradictorily:

Consequently, after more than 11 years of project activities and the expenditure of \$14.7 million . . . there has been little if any reduction in public sector industrial pollution in Egypt. However, several significant pollution control tasks were nearing completion, and much progress has been made after the start of this review. (Document No.: PD-ABB-802).

Likewise, the evaluation report (Project Doc.: PD-AAP-513) was severely critical of both project design and implementation. The report drew the following conclusions:

- The IPP project design was based on an incomplete assessment of need and without a clear strategy in mind.
- The limited assessment resulted in unfocused goals and objectives.
- The unclear statement of goals resulted in a design that had uncoordinated and diverse components.
- The design of the project did not adequately define the role of key decision makers and, in fact, contributed to role conflict.

The evaluation, carried out in 1982, did note that the project had some positive outcomes that should be capitalized on:

- A better awareness of the environmental problems facing Egypt's industrial sector; and
- A shift toward structural reform that would have an impact on firm-level performance.

The USAID Mission in Egypt, however, noted that the Environmental Activities Subproject audit and evaluation reports did not accurately depict the abatement of pollution that had been achieved to date. Specifically, the Mission reported the following accomplishments of the subproject:

- Reduction of product loss by 90 percent and elimination of 2,500 metric tons per year of organic waste;
- Neutralization of 1.5 million gallons per day of acidic process wastewater;
- Control of 300 metric tons of organic waste per year;
- Collection and disposal of 2,500 metric tons per year of industrial solid waste;
- Trapping and neutralization of 1.5 metric tons per year of hazardous chlorine gas;
- Control of 360,000 metric tons per year of suspended solids; and
- Prevention of discharge of 7,200 metric tons of caustic ammonia waste into the Nile River.

2.4 Energy and Industry Results

Energy management, policy, and conservation programs have been most effective where A.I.D. has been careful to develop marketing for the projects and ensure local participation. Examples of such cooperation and participation at the local village level include the Sudan Renewable Energy Project (650-0041), Alternative Energy Resources Development (386-0474), and the Renewable Non-conventional Energy Project (493-0304) in Thailand. At the private-sector-level, examples include the Alternative Energy Resources Development Project (386-0474) and the Regional Industry Energy Efficiency Project (596-0095), which has had extremely good results, and participation from the private sector.

When A.I.D. has focused more on institutional cooperation, such as through parastatal bodies or other government agencies, or when the Agency has depended on its Missions to actively pursue a project, the results have been less successful. Examples in the private sector include the Alternative Energy Sources Project (518-0029) in Ecuador, Renewable Energy Development I Project in Morocco (608-0159), and the Energy Initiatives for Africa.

Large regional projects, such as the Energy Initiatives for Africa, were less effective because the Agency was unable to gain the full support of regional bureaus and Missions. In many cases, neither the regional bureaus nor the Missions concurred that energy was a high priority, a commitment that was required for project success. Additionally, Missions often lacked the technical expertise required to carry out the program. Regional projects appear to require a technically qualified "champion" or advocate within the Mission to be successfully carried out. In the absence of such advocacy, these projects were not fully integrated into existing Mission programs.

Ideally, renewable energy projects must be evaluated within the larger context of land degradation and long-term environmental considerations. Many of the renewable energy projects evaluated here addressed fuelwood supply with the expressed goal of lessening the rate of deforestation for energy production. Approaches included increasing fuelwood supply via local, self-sustaining woodlots, more efficient stoves, more efficient charcoal production, and increased efficiency of end-use technologies. These activities have been particularly successful when carried out at the village level.

In contrast to fossil fuels, renewables, with the exception of fuelwood, generally produce electricity with little or no pollution of air and water. However, the economic advantage of reducing

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dependence on imported fossil fuels and manufactured goods related to energy technology may be traded off against environmental degradation when local natural resources (renewables from an energy standpoint) replace imported energy sources. Evaluation of renewable energy sources (crop residues and animal dung) must also consider their alternative uses in a broader environmental context — for example, soil replenishment. These factors should be carefully integrated into project design and implementation.

Many of the Agency's programs could have been made more effective through a stronger focus on implementation, integration, and beneficiary analysis.

A.I.D. did not always fully understand the needs of the targeted beneficiaries, especially in the private sector, and did not adopt a market-driven approach in designing projects. In addition, projects often lacked a mechanism for the Agency to gain information from the target groups. As a result, some training and technology transfer projects failed to attain the desired goals because of a lack of interest from the private sector. In contrast, ROCAP's Regional Industrial Energy Efficiency Project represents an good example of how targeting the private sector can generate considerable enthusiasm among the project beneficiaries and lead to greater-than-anticipated project successes.

A.I.D. should continue its efforts to quantify realistic goals and objectives of projects and to assess the level of success in reaching these goals. The lack of such quantifiable standards inhibits the Agency's efforts to make evaluations an effective tool for assessing project success.

Several areas exist where the United States has a technological lead or where the Agency has a comparative advantage and therefore could have a major impact in the development process. These areas include environmentally sustainable conventional energy production and total quality management applications to industrial efficiency and pollution control.

To date, A.I.D. has not focused on conventional energy production from coal-fired plants, an area in which the United States has held a technological lead for decades. Although sufficient coal reserves are not present in many developing countries, there are significant opportunities for improving the existing coal-fired plants in some regions of the world, especially portions of southern Latin America, Southern Africa, and parts of Asia, such as Indonesia. Such activities could assist in addressing the now widely recognized problems associated with carbon emissions, the carbon cycle, and greenhouse gases. Improved conventional energy production technologies will also be useful in the new programs in Eastern Europe.

Many U.S. corporations are leaders in the world in the use of Total Quality Management (TQM) practices as they apply to environmental management. These practices view pollution as a symptom of wasteful and inefficient production processes. Some of A.I.D.'s projects, such as the Industrial Production Project in Egypt, have not fully integrated a pollution control program into the project's overall goals. Rather, procurement of pollution control equipment has been an "add-on" activity. The development of TQM practices in industrial projects could significantly reduce pollution while promoting industrial productivity. Some of these concepts are included in the programs currently being developed for Eastern Europe but could be equally applicable to other regions.

Global climate change has implications for international trade, economic development, industrial production, technology transfer, renewable and conventional energy development, forestry management, agricultural practices, transportation design, and a myriad of other issues. There exists an opportunity for the Agency to integrate a number of previously separate development activities in order to address the issue of global climate change. The Agency is not in a position of comparative advantage to address global climate change on a project basis. However, the need to integrate the diverse aspects of the issue

does match the Agency's comparative advantages of being able to coordinate and integrate these diverse issues into a single program and to promote development guidelines for effectively addressing the issue.

3. ISSUES

3.1 Competing Objectives

The review of A.I.D.'s environmental activities in the "green" and "blue" realms concluded that A.I.D. had done a good job of identifying environmental problems that needed to be addressed. The review further concluded that the issues that needed to be examined during the E/NR assessment in these realms revolved not so much around problem identification as around the strategies and tactics A.I.D. has used, or should have used, to help developing countries resolve the problems that have been identified. With brown realm projects, however, one of the core issues that still needs to be addressed concerns tradeoffs between competing objectives.

In this review of the brown realm, A.I.D.'s activities were divided into two areas: energy projects and urban industrial projects. The problem of competing objectives obtained in both areas.

In the energy sector, A.I.D. projects frequently feature two competing objectives. One objective deals either with expansion or increases in productivity of energy facilities (another dam, a more productive power plant, more rural electrification) or with identifying and developing locally available sources of energy (peat, biomass, solar heating, geothermal) that could substitute for imported oil. The rationale for this objective is mostly economic, stemming from a recognition in the late 1970s and early 1980s that imports of oil were adversely affecting economic development and increasing debt. At the same time, it was recognized that a reduction in oil imports could contribute to the unsustainable use of existing forest resources for fuelwood and that other sources of energy such as hydroelectric power had their own potentially deleterious environmental consequences. Thus, another A.I.D. objective in the energy sector is to ensure the environmental soundness of energy projects. These two objectives were found to conflict at times. An evaluation of the Conventional Energy Technical Assistance (CETA) project, for example, found that A.I.D. Mission staff often assigned low priority to environmental considerations.

The same set of competing objectives was frequently present in A.I.D.'s industrial projects. A recurrent finding of this review is that pollution controls were often viewed as a low-priority add-on to industrial projects. The 1982 evaluation of Egypt's Industrial Production Project (IPP) noted:

The environmental component is the least related to the goals of the IPP, because there is no established link between environmental improvement projects and economic development. Although environmental concerns have a high social value, their relationship to capital assistance projects is tenuous and remote in terms of contributing to the economic development of Egypt. . . . in numerous cases pollution control has been very costly and has detracted from the productive capacities of economies.

The impact of emissions management on industrial efficiency and the use of emissions management as a sign of product and process quality are now widely recognized and endorsed by U.S. industry. Many leading U.S. corporations apply Total Quality Management (TQM) principles to environmental management. They view environmental management as directly related to their economic development and profitability and as an indicator of overall quality.

One of the issues that should be addressed in the E/NR assessment, therefore, is the extent to which — and how — competing growth/efficiency and environmental objectives have been reconciled in the design and implementation of brown realm projects. In particular, the assessment should examine the extent to which environmental objectives are included in energy or industrial projects as an afterthought or as an integral part of the project's overall objectives. An examination of this issue could point in the direction of the Agency's transfer of TQM principles to the industrial sector in developing countries.

3.2 Transfer of Technology

Technology development and dissemination is a particularly important component of brown realm projects. In both the energy and industrial sectors, much of A.I.D.'s work has consisted either of transferring proven American technologies to the developing countries or of carrying out applied research to test imported technologies and adapt them to local settings. In the energy sector as a whole as well as in several industrial sectors, the United States has been perceived, correctly, by developing countries as having a technical comparative advantage over other donors.

This is particularly true in the area of environmentally sound technologies. In the energy sector, A.I.D. has been a leader in the development and dissemination of technologies involving wind and solar power, mini- and micro-hydro energy generation, charcoal stoves, and the uses of geothermal energy. In the industrial sector, A.I.D. has also provided leadership in the promotion of technologies dealing with waste disposal, waste recovery, water safety, and air pollution.

A.I.D.'s efforts to promote brown realm technologies have met with mixed results. Some technologies have been fully adopted and some partially adopted, whereas some have not been adopted at all, or, if adopted, not sustained. Alternative energy technologies have been fairly well accepted, especially when project staff encouraged end-user participation and feedback in adaptive designs. Pollution control technologies have fared less well. In the Egyptian IPP, for example, an evaluation reported that only 9 of 16 planned pollution control activities in 4 (compared to a planned 6) public sector companies had been initiated.

The evaluations provide little information as to the determinants of successful technology transfer. Were the technologies technically deficient? (At least one evaluation — of the alternative energy project in Burundi — found that the technology being used was outdated.) Were they too costly? Were users insufficiently trained? The E/NR assessment should address these issues. In general, the issue can be phrased as follows: What are the principal factors influencing the soundness, adoption, and sustainability of environmentally sound technologies?

3.3 Promotion and Marketing

Several evaluations suggested that systematic promotion or marketing of environmentally sound policies or technologies is an important factor influencing project success. An evaluation of the EPDAC project, for example, suggested that the project needed to enhance the promotional package for the Energy Policy and Planning Development (EPPD) component. An evaluation found that the Costa Rica Energy Policy Development Project would have had more impact with better promotion to the private sector of policies developed by the project but that the government of Costa Rica appeared to resist engaging itself in these promotional efforts. The same general finding applies to the Central America Energy Resources Project. The energy-efficient technologies and the demonstration loan fund

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that were at the core of the TTEM project in the Philippines were found to suffer from a weak marketing effort. Demonstration alone, however, was found insufficient to ensure adoption of environmentally sound energy technologies in the Sudan Renewable Energy Project.

Because of short-term financial disincentives and for other reasons, a strong demand either for environmental policies and regulations or for environmentally sound technologies cannot be assumed. The E/NR assessment should, therefore, examine the extent to which — and how — more aggressive public information, promotional, or marketing campaigns can improve the sustainable adoption of the environmental policies and technologies developed and disseminated in A.I.D.-financed projects.

3.4 Economic Policies and Incentives

Another determinant of success frequently mentioned in the evaluations involved costs, prices, and price policy. Technology adoption and utilization rates were found, for example, to be price elastic. In the Renewable Nonconventional Energy project in Thailand, hydro power was accepted by villagers once they saw that hydro was cheaper than diesel; on the other hand, the high initial costs of solar power constituted a constraint to utilization. Similarly, a tax on solar water heaters in Jamaica rendered this technology, promoted through A.I.D.'s Energy Sector Assistance Project, financially unattractive. In Costa Rica, the attractiveness of gasohol as an alternative energy source was found to be quite sensitive to the price of sugar. The costs and market prices of recovery products were revealed to be a problem in a waste recovery project in the Philippines.

Economic policies were an issue in several projects. Host-country policies regarding taxes, incentives, and pricing mechanisms and regulation were found to have a significant impact on energy and industry sector projects. Fluctuations in the price of conventional fuels, for example, may seriously affect the viability of alternative energy projects such as hydropower plants. In general, A.I.D. has attempted, especially in the last decade, to emphasize the use of the private sector and to encourage governments to rely more on market forces. The Electricity Sector Assessment in Egypt, for example, noted that the GOE's sluggishness in reducing subsidies was promoting waste, inefficiency, and low industrial productivity. On the other hand, an evaluation of the Morocco Renewable Energy Development I Project criticized the zealotry of A.I.D./Washington for its insistence that the project's key institution be commercially viable.

The E/NR evaluation should attempt to ascertain how more rigorous financial and economic analysis, as well as intensified policy dialogue with host-country governments during project design and when redesign is being considered, might improve brown realm projects. The evaluation should also assess the circumstances under which reliance on the private sector and market forces are appropriate for energy and other brown realm environmental projects.

3.5 Participation and Private Sector Involvement

As with so many other development projects, the active participation of beneficiaries in the project design and implementation of brown realm activities was found to be an important determinant of project success. In the Resource Conservation and Utilization Project in Nepal, for example, impact was found to be enhanced by the encouragement of resource management at the panchayat level. Other projects in which success was attributable to participation at the village level included the Renewable Energy Project in Sudan, the Aqaba Wastewater project in Jordan, and the Alternative Energy

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Resources and Renewable Nonconventional Energy projects in Thailand. Conversely, lack of participation was cited as a problem with the Renewable Energy Development Project in Morocco.

Several cited the participation of the private sector as important to project success. The LAC Bureau's **Regional Industrial Efficiency Project** improved its effectiveness and efficiency by adopting the recommendation of a first evaluation to increase private sector participation in seminars and energy audits. Private sector feedback was also important in gaining acceptance for technologies promoted through LAC's **Fuelwood and Alternative Energy Sources Project**.

The E/NR assessment should examine ways in which beneficiary participation in the design and implementation of brown realm projects can improve project effectiveness, efficiency, and impact.

3.6 Institutional Capacity and Development

A.I.D. has long recognized that projects tend to succeed when they receive institutional support, and E/NR brown realm projects are no exception. Policies and technologies are not conceived, developed, tested, extended, or marketed in a vacuum; all these activities are carried out by institutions, and strong institutions are needed for these activities to be sustained.

It is not surprising to learn, therefore, that the brown realm evaluations reviewed in this study frequently identified institutional factors as important to the success or failure of projects. For example, the integrated recovery of industrial wastes and their conversion into useful products was found to be technically feasible, but the medium-sized cities of Southeast Asia lacked the institutional capacity to establish and maintain integrated resource recovery systems.

An evaluation of the **Energy Conservation and Resource Development Project** in the Dominican Republic identified four institutional problems, one or more of which were flagged in other projects as well. One involved the "fit" of the new technology — in this case, mini-hydro — with the ongoing activities of established institutions — in the Dominican case the water authority and the power generation authority. A second problem was that these two institutions — as is often the case in other countries — competed rather than collaborated with each other for control of project resources. The third issue — generic in developing countries — involved management weaknesses in the energy authorities. The fourth problem was low compensation, leading to lack of incentives, for the personnel of key Dominican institutions.

Personnel problems in public sector institutions — including inadequate staffing, low compensation, low morale, and poor performance — are widespread in many A.I.D.-recipient countries. In Jamaica, the **Energy Sector Assistance Project** faltered in part because the wages of employees in the government's Energy Division were less than one-half those in the private sector. These problems may be exacerbated if energy and environmental activities are not accorded high priority by host-country governments — as may have been the case in Ecuador according to the evaluation of the **Alternative Energy Sources Project**.

A.I.D. institutional development efforts are often built around an assumption that American specialists will impart technical knowledge to counterparts provided by host-country institutions to which the specialists are assigned. The theory is that the counterparts will use this technical knowledge to continue project activities once the specialists have departed. The brown realm evaluations provide evidence to reinforce the conclusion drawn by other recent reviews that the so-called "expert-counterpart" relationship almost never works. Institutions rarely provide counterparts as such or, if they do, the

counterparts are provided late, are incompetent, are disinterested, or have competing agendas (beefing up their resumes to get a better job -- for example, in the private sector). Even if none of these problems obtains, expatriate specialists are not usually judged on how well they transfer knowledge but on what concrete results they produce; with these incentives, counterparts are often viewed as a hindrance or annoyance. Two projects in which counterpart problems were cited as specific issues were the **Science and Technology Development Project** in Tunisia and the **Energy Conservation and Resource Development Project** in the Dominican Republic.

The E/NR assessment should attempt to identify the most salient institutional issues affecting the outcomes and impact of E/NR projects. Focus groups could be used, for example, to examine the effectiveness of the "expert-counterpart" relationship and, possibly, to identify alternatives to it.

3.7 A.I.D. Management

Several brown realm evaluations mentioned A.I.D. management issues. When brown realm projects were relatively new, A.I.D. suffered, as noted in the **Energy Initiatives for Africa (EIA)** project, from an insufficient number of technically qualified environmental specialists who could be assigned to Missions. Perhaps this is why Mission monitoring and backstopping were found at times to be inadequate, as was the case with the **Energy Conservation and Resource Development Project** in the Dominican Republic.

Some centrally funded projects were found to suffer from problems related to the relationship between A.I.D./Washington and the Missions. In general, evaluators felt that Missions were less enthusiastic about brown realm environmental activities than was A.I.D./Washington and that A.I.D./Washington's attempts to "sell" environmental concerns to the Missions was not particularly effective. The evaluation of the **EPDAC** program, for example, found that A.I.D./Washington was not attuned to marketplace feedback and did not promote the program effectively either with Mission staff or within the country. When similar problems were noted with the **EIA** project, the evaluation recommended that regional projects not be managed from A.I.D./Washington.

The review also revealed four issues related to the various phases of A.I.D.'s project cycle that need to be addressed. First, greater care in planning is needed at the design stage. Second, some sense of the near-term budgetary and political climate in the United States needs to be adduced so that projects, once implemented, are not handicapped by budget cuts or penalized for objectives that have become less popular. Third, midterm evaluations should be a requirement for projects of four years' duration. Fourth, projects should not be redesigned in midstream without competent, disinterested advice.

The E/NR assessment should, therefore, examine three issues with respect to A.I.D. management. **First, to what extent is A.I.D.'s own institutional capability, especially with respect to staff technical competence and management of the project cycle, adequate for the management of E/NR programs? Second, to what extent can efficiency and effectiveness be enhanced by an improved definition of the roles of A.I.D.'s various management units -- A.I.D./Washington, Regional Offices, and Missions -- in the management of E/NR projects?**

3.8 Monitoring and Evaluation

Several evaluations cited the need for more effective monitoring and evaluation of E/NR brown realm projects. Evaluators frequently expressed frustration, as, for example, in the **Tunisia Science and**

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Technology Development or the Burundi Alternative Energy projects, at the projects' failures to collect data on output or impact indicators that would have helped project managers and evaluators gauge project effectiveness. The review indicated, for example, that energy policy projects were probably less successful than energy development and conservation projects but noted also that policy projects generally lacked independently verifiable standards that would permit effective evaluation of project results. Likewise, the results of the institution building components of some energy sector projects were seldom found to be measurable. It would be useful to test plausible proxy indicators of institutional strengthening for both the energy and industry sectors.

Evaluators also noted that several projects, even projects that lasted four years or more (for example, the EIA project) lacked a midproject evaluation, which may have allowed these projects to drift on in directions that should have been changed earlier.

The E/NR assessment should attempt to define and refine indicators and monitoring methods that can be used in future brown realm projects. Following is a list of some quantifiable measures that might serve as performance indicators for energy and industry projects:

Energy Sector

- Percentage of households using fuelwood from renewable sources;
- Acreage of community woodlots started by villages, or number of seedlings transferred from nurseries (along with data on seedling survival rates);
- Number of megawatts of electrical energy produced from environmentally sustainable sources;
- Number of persons utilizing electricity produced from new, environmentally sustainable technologies (for example, mini-hydro);
- Number of megawatts of energy saved in individual factories or industries through conservation and efficiency programs;
- Number of industries using technology transfer tools for energy management; and
- Number of industries that have implemented the recommendations of energy audits and achieved the desirable level of energy demand reductions.

Industry Sector

- Number of tons of sulfur dioxide, nitrogen oxide, or other air pollutants captured or treated by new pollution control equipment;
- Number of tons of hazardous waste treated and recycled;
- Average hourly exposure of workers to a toxic chemical reduced by 20 parts per million;
- Emissions from solid waste incinerator reduced by 30 percent;
- Percentage of municipal solid waste recycled;

- Number of tons of resources recovered from municipal or industrial waste stream;
- Amount of private sector investment in pollution control equipment; and
- Amount of money saved by the private sector through emissions management and process efficiency training.

4. RECOMMENDATIONS FOR FIELD STUDIES

Costa Rica. Costa Rica has been involved in a variety of brown realm projects including CETA, the Fuelwood/Alternative Energy Project and the Energy Policy project. As a result, the site would be an ideal location to assess the interaction between these three energy related efforts and to determine how they could be more effectively integrated. The Mission in Costa Rica gave a high priority to the CETA project, the significance of environmental issues in project design, and the importance of assisting the country in reducing dependence on imported fuels.

The importance of forestry and fuelwood issues combined with conventional energy use, management and conservation issues, makes Costa Rica an ideal site for issues that bridge the brown and green realms, and possibly the blue realm as well. Since the country's economy is relatively small, A.I.D.'s contribution to energy initiatives is relatively large and as such represents a potential site for assessing how recent and on-going energy activities have affected energy use, production and conservation in the country.

Egypt. A.I.D.'s investment in Egypt in both the energy and industry sectors has been extensive, and carried out over several decades. Furthermore, the Industrial Project evaluated in this report has clearly been highly contentious within the Agency itself, given the enormous differences in the estimations of accomplishments as put forward in the 1990 Audit, 1984 evaluation, and the Mission's 1990 response.

Egypt would also be a useful site for further evaluation because it is the only country where industrial efficiency has been a focus of A.I.D. activity. As such, Egypt may yield lessons for future work, especially in the rapidly growing eastern European program. In countries like Poland, Czechoslovakia, and Hungary, major problems of industrial pollution, energy efficiency, and procurement of environmental pollution control equipment are all major issues involved in economic development. The A.I.D. experience in Egypt, if carefully assessed, may shed light on problems and pitfalls to be avoided as the Agency develops its new programs in eastern Europe.

CETA. This project would be of particular interest because it focuses on the promotion of conventional energy sources. These are technologies for which the United States still maintains an industrial competitive advantage, and because much of the aging energy infrastructure in developing countries could benefit from retrofitting newer technologies. The need for advanced, innovative, and environmentally sound technologies and power systems related to conventional resources will be critical in A.I.D.'s traditional regions of Asia and Latin America, as well as the new regions of activity such as Eastern Europe and the republics of the former Soviet Union.

Dominican Republic. The Dominican Republic is recommended as a site for additional evaluation work because it combines energy conservation and development activities of A.I.D. in a number of programs. These include the ROCAP program, which looked at Industrial Energy Efficiency,

as well as the EPDAC program. This latter program looked at both energy policy and conservation services, including industrial efficiency, biological resources and the involvement of the private sector.

ROCAP's Regional Industrial Energy Efficiency Project. A more detailed evaluation of this project would be of considerable value because it appears to be an effective way in which A.I.D. can implement training and efficiency programs with the strong active participation of the private sector. The local business communities in Latin America have been so interested in the seminars and training courses given by the project, that portions of the project have generated significant revenues. While such revenue generation is clearly secondary, it is a strong indication that the project has been effectively implemented and presented to the intended beneficiaries, the industrial private sector in Latin America.

Eastern Europe. Because projects in Eastern Europe have only recently been initiated, this assessment did not include any A.I.D. activities in the region. However, the Agency is now focusing considerable resources in the "brown" realm in Poland, Czechoslovakia, the Baltic Republics, as well as the new states of the Confederation of Independent States.

Many of the most pressing environmental and economic issues in Eastern Europe revolve around the brown realm of industrial efficiency, pollution control, land and water remediation and environmentally benign energy production. Therefore, this might be the appropriate time to apply the lessons of A.I.D.'s experience elsewhere to the development and design of A.I.D.'s projects in Eastern Europe and the CIS.

ANNEX IV -- BLUE REALM**A.I.D. FISHERIES, AQUACULTURE, COASTAL RESOURCES, AND
WASTEWATER TREATMENT PROJECTS****1. PROJECTS REVIEWED****1.1 Defining the Blue Realm**

This annex assesses A.I.D. projects with an environmental or natural resources management (E/NRM) component in the fisheries, aquaculture (and mariculture), and coastal resources management (CRM) sectors — the "blue" realm — and in water quality/wastewater management — the "brown-blue" realm. The initial focus of the review was a 75-page printout of 127 evaluation documents for 91 projects generated by CDIE from the A.I.D. documentation center. The printout captured any project that had "water" as a key word in any of its many permutations, such as watershed, hydro, fish, fishery, aqua, aquaculture, mariculture, coast-shore-ocean-marine, and all their respective permutations. It also included all types of water features such as lakes, ponds, rivers, and streams and all types of wetland environments (swamps-marshes-mangroves). Based on the 127 documents and 91 projects reviewed, the following typology of blue projects was constructed:

Capture fisheries development

- Marine (22)
- Inland (3)
- Marine and inland (10)

Aquaculture/mariculture

- Aquaculture development (fresh water) (14)
- Fish ponds (7)
- Mariculture development (1)

Coastal Resources Management

- Integrated coastal zone or small islands management (4)
- Wetlands/mangroves management (2)
- Corals management (0)

Coastal Hazards Management (such as erosion or storms and floods) (0)

Impact Assessment of Coastal or Fresh Water Resources and/or Environments (2)

The number in parentheses is the number of projects of that type in the bibliography. Given this typology, there were 65 projects in the blue realm. However, there was some double counting of projects or programs that are both capture fisheries and aquaculture development. As one can see, there are no

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projects listed under coastal hazards management. This topic area is a gap in A.I.D.'s coverage of the blue realm — in comparison with what other donor institutions are doing.

Forty listings in the printout that dealt with the following project types were moved to the green realm:

- Watershed management or development (10)
- Access to land and water and natural resources (4)
- Soil and water management, erosion control (5)
- Natural resources development, management, utilization, conservation, or restoration (in which the main focus is terrestrial resources or environments) (19)
- Land use and productivity enhancement (1)
- Integrated rural development (1)

Seventeen listings in the printout that dealt with the following project types were moved to the brown realm:

- Water resources development or management (in general) (4)
- Surface water supply or development (5)
- Groundwater supply or development (3)
- Community or rural water supply and sanitation (5)

The following types of projects have been excluded from the entire assessment project because they were outside the boundary of environment/natural resources management:

- Farm water management
- Disaster reconstruction (for example the fishing industry, potable water)
- Water data or meteorology data collection and analysis
- Water supply development for agriculture
- Reproductive studies of species (such as aquaculture species)

The following projects and documents from the listing were reviewed:

Capture Fisheries

- Djibouti Fisheries Development Project - 1980 (603-0003)
 - Special evaluation, 1988.
- Fisheries stock assessment (936-4146)
 - Project evaluation summary and evaluation summary, 1989
- Oman Fisheries Development Project - 1983 (272-0101)
 - Final evaluation, 1990
 - Project completion Report, 1990

Fisheries and Aquaculture Development

Freshwater fish production in the Dominican Republic (517-0162)

Project assistance completion report, 1991

Project evaluation summary, 1986

Project evaluation summary, 1983

Coastal Resources Management

Coastal resources management project - 1985 (936-5518)

No evaluations were found in the CDIE system for the projects named below:

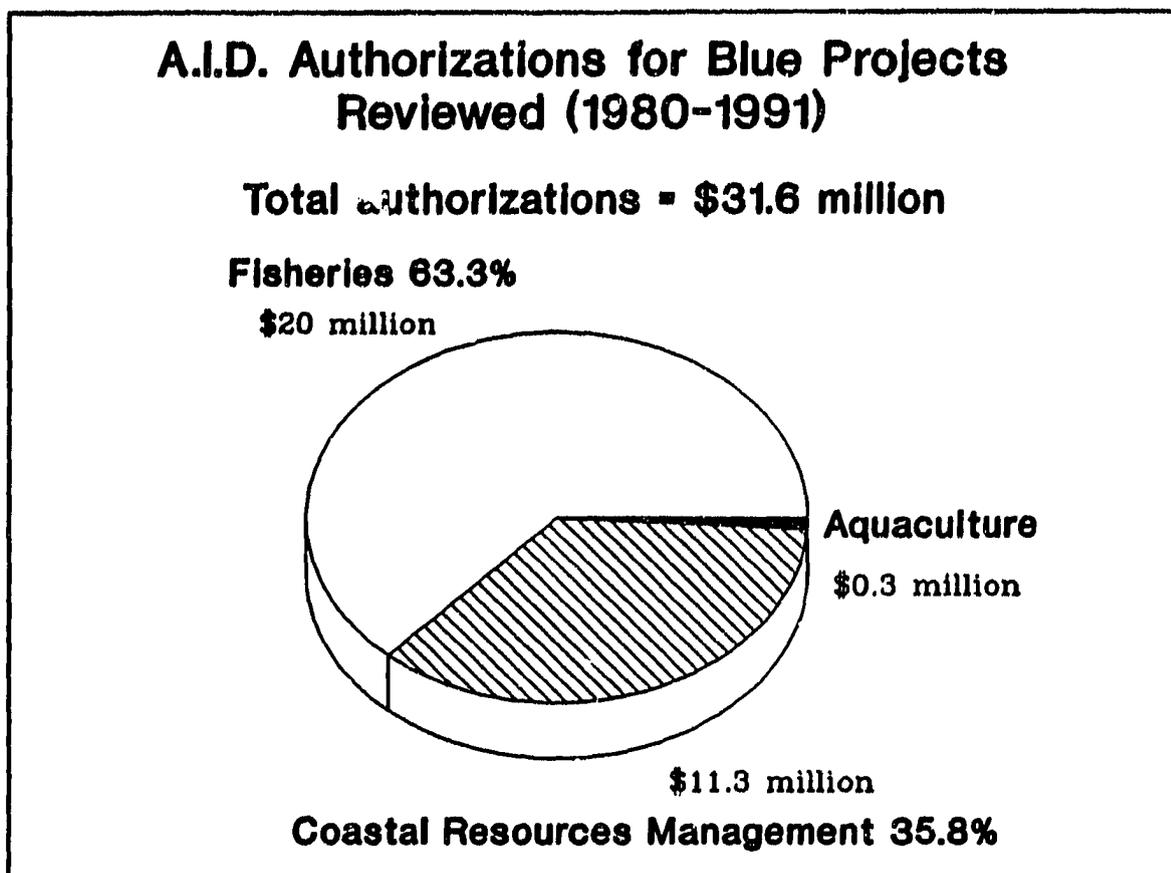
Fishery development support services - 1982 (936-4020);
Fisheries stock assessment - 1982 (936-4026);
Fisheries and aquaculture research and support - 1987 (936-4180);
Fisheries resource assessment in Senegal - 1981 (685-0254);
Pilot project for conch management in Haiti - 1985 (521-0182);
Sampling program for shrimp in Ecuador - 1986 (518-0000);
Fisheries research in Indonesia - 1986 (497-0352);
ASEAN Coastal Resources Management Project - 1985 (498-0286);
Pacific Island marine resources - 1989 (879-0020); and
Wetland management in Rwanda - 1989 (696-0129).

The last two projects are too recent to have evaluations performed. A final draft copy of the midterm evaluation of the Association of Southeast Asian Nations (ASEAN) Coastal Resource Management Project was obtained from a member of the evaluation team. Authorizations for fisheries, aquaculture, and CRM projects reviewed here are illustrated in Figure 1.

1.2 The Blue-Brown Realm

Twenty-six "blue-brown" projects dealing with surface or ground water supply, sanitation, or wastewater treatment were identified. These 26 projects are listed in Appendix 1. Microfiches of these transboundary project documents were reviewed at the CDIE library to determine which projects had both evaluation documents and one or more environment or natural resources management objectives. Most of the 26 projects have evaluations. However, except for the four projects comprising the Egypt Water/Wastewater Sector program, none of the projects with an evaluation has an objective about improving or maintaining the quality of the physical environment. The 22 listings are mostly Water and Sanitation for Health (WASH) projects through the Office of Health. The WASH projects were designed to have an impact on the human environment, primarily disease control. The recommendation was made not to include human environment within the orbit of the physical environment. At the meeting on February 14 it was agreed that given the size of the WASH effort and the many other A.I.D. sanitation and public health projects, this entire topic area merits its own portfolio review by people with appropriate expertise.

FIGURE 1



Source: Official A.I.D. Project Documents

2. PROJECT SUMMARIES

2.1 Capture Fisheries

The review of the fisheries area consisted of three projects: **Oman Fisheries Development**, **Djibouti Fisheries Development**, and the **Fisheries Stock Assessment CRSP**. The Oman Fisheries Development Project literature included a Project Completion Report and a report evaluating the stock assessment parts of the project. The evaluation of the Oman Fisheries Development Project is particularly interesting because it includes a lengthy response by the contractor who managed the six-year effort. The response notes that the evaluation contains inaccurate and unsubstantiated comments that overemphasize the negative and do not describe the positive aspects of the project. The evaluation annex also includes a response to the contractor's critique.

The Djibouti materials consist of an A.I.D. Evaluation Working Paper and an Evaluation Statement. The Fisheries Stock Assessment material consists of an Evaluation Summary and a Triennial Review done by an independent team of consultants.

In April 1988, BOSTID's Panel on Fisheries Development and Fisheries Research recommended that fisheries should be given substantially higher priority within A.I.D. They are much more important in the food supply of developing nations than is indicated by the present expenditure of approximately \$15 million out of a food and agriculture budget of \$450 million.

The fisheries unit in A.I.D. is uncertain about its future. There are presently three people in the fisheries unit (RD/AGR). The fisheries portfolio review of November 22, 1991, listed seven projects. Most of the effort is going to development support services for technical assistance and training at Auburn University (aquaculture), the University of Rhode Island (marine fisheries), and the International Center for Living Aquatic Resources (ICLARM). According to Lamarr Trott, the major current projects that are specifically Mission-funded for the fisheries sector are:

Oman - \$20 million over four years that started in 1991.

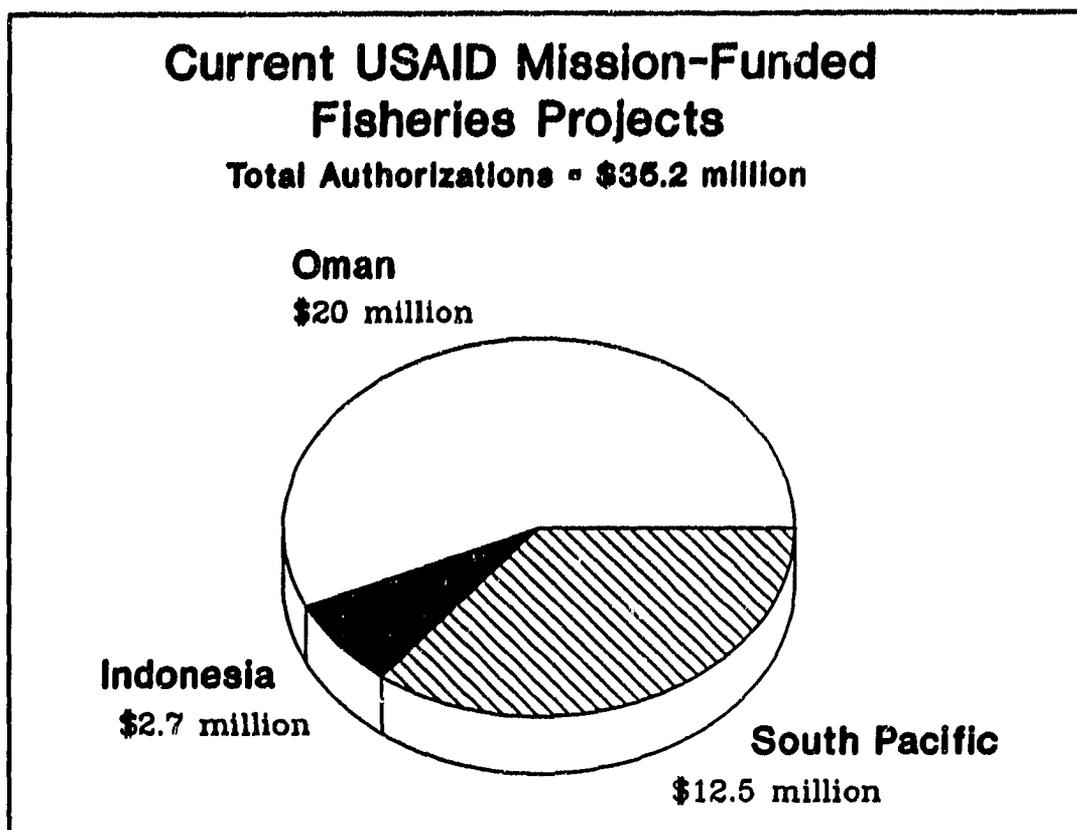
South Pacific (Cook Islands, Kiribati, Tonga, Tuvalu, and eventually Papua New Guinea) - \$12.5 million over five years that started in 1991.

Indonesia - \$2.7 million over five years that will end this year
(a contract may soon be issued to evaluate this project).

Figure 2 displays the authorizations for these fisheries projects by percentage of total.

Half the world's fishery yield is harvested from and by developing countries. Dependence on fish for animal protein reaches up to 80 percent in many developing countries. Over half the populations of developing countries obtain 40 percent or more of their total animal protein from fish. The Law of the Seas Convention provides for an exclusive economic zone (EEZ) of 200 nautical miles from a nation's shoreline. It gives nations jurisdiction over resources that they usually do not have the ability to assess or understand. Poor management of these resources inevitably leads to a rapid reduction in yield -- usually well below the level of maximum sustainable yield.

FIGURE 2



Source: Official A.I.D. Project Documents

2.2 Aquaculture

A.I.D.'s aquaculture efforts appear to divide into two clusters: (1) support of institutions involved in aquaculture research, education, technology, and training and (2) support for small-scale fish farming operations. Neither cluster of projects includes specific objectives for environmental or natural resource management.

Aquaculture could have an environmental management component for tertiary treatment of domestic wastewater. However, the one A.I.D. project that does combine aquaculture and tertiary treatment is a relatively new effort, and an evaluation has not been conducted.

A review was done of one fish farming project, the **Inland Fisheries Operating Program Grant (OPG)** in the Dominican Republic. This was a somewhat inadvertent selection. There was no microfiche on this project in the CDIE library to determine if there was an environmental or natural resource management objective. A paper copy was ordered. The document was reviewed, and a summary data

sheet was prepared. The effort was considered worthwhile to obtain a better understanding of small-scale fish farming because there have been so many projects of this type supported by A.I.D. and other international assistance organizations.

In general, aquaculture (and mariculture) projects — particularly large-scale operations — have some adverse impacts on the environment and natural resources. They do not support integrated environmental or natural resource management projects; more commonly, they work against them. The most pervasive impact usually is the conversion of wetland habitats into aquaculture ponds. The most common practice is the conversion of mangroves into shrimp ponds. This issue was the major impetus for the initiation of the A.I.D.-supported coastal resources management project in Ecuador (see next subsection). The two other major adverse environmental impacts of aquaculture-mariculture are (1) the degradation of estuary water quality by changes in circulation patterns and release of nutrients and biocides and (2) the diversion of postlarval stocks into the aquaculture ponds, which takes these stocks out of the population available to the capture fishery.

A summary evaluation of two A.I.D.-financed development projects for Inland Fishing in Jamaica noted several environmental concerns. One potential issue was the withdrawal of ground water to supply ponds in coastal locations. Such groundwater withdrawal could initiate or increase salt water intrusion into fresh water aquifers. Evapotranspiration was noted as another possible concern. This was not an issue in the high humidity and rainfall climate of Jamaica, but it would be an issue in arid nations. Although not suggested in the Jamaica evaluation, fish pond harvests, if they produce significant yields, might decrease the press on capture fisheries. However, this is unlikely to happen in any country until overexploitation of specific capture fisheries causes collapses and the only stock available is from aquaculture operations. Aquaculture might be able to support capture fisheries management by providing animal protein substitution to a nation or region, if the government must close down severely overexploited capture fisheries to rebuild stocks to desirable levels of sustainable yield.

2.3 Coastal Resources Management

In the most recent issue of *InterCoast*, the newsletter of international coastal management, a roster was compiled of integrated coastal resources management (CRM) projects and programs in the world. The roster listed 108 efforts all over the globe. Thirty-four CRM projects are located in 26 different developing countries. A.I.D.'s 2 CRM projects involve 8 countries — Brunei-Darussalam, Ecuador, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, and Thailand. A.I.D.-supported projects in the eight countries represent almost one-third all developing-country involvement in CRM. However, it is not possible to know how the approximately \$2.2 million A.I.D. has annually expended on CRM in these 8 countries compares to what other international assistance organizations are spending in the other 18 developing countries.

A.I.D. has initiated coastal resources management efforts to address several concerns:

- (1) The adverse impacts of development activities on coastal environments, natural resources, and socioeconomic conditions;

- (2) The impact of the natural environment — such as hurricanes or coastal erosion — on development (hazard issues);
- (3) Development needs — such as infrastructure for the attraction and development of tourist resort centers; and
- (4) Organizational process problems — such as inadequate data for decision making or jurisdictional conflicts among government institutions.

The two most common concerns are the pollution of estuaries, coastal waters, and recreational beaches and the overexploitation of fishery stocks and the resultant inability to maintain a high sustainable yield. The two concerns are connected in that pollution reduces fisheries directly through mortality (fish kills), and overexploitation reduces them indirectly through habitat degradation or destruction.

The Coastal Resources Management Project used slightly different approaches in the three countries with the pilot programs. In Ecuador, initial efforts were directed at establishing an inter-ministerial arrangement to design a national program and to provide assistance in resolving the issue of converting mangrove ecosystems to shrimp aquaculture ponds. The project then profiled all the major issues confronting the management of coastal resources and environments and assisted in selecting and designing plans for six special management areas. In Sri Lanka, the project assisted the existing institution in the preparation of the national coastal zone plan (as mandated by Sri Lankan law prior to the initiation of the A.I.D. pilot project). The major areas of assistance were in analysis to resolve the coral mining issue and in the identification and protection of coastal habitats and cultural heritage areas. In Thailand, the project focused on a planning and management program for Phuket Island. Within less than 10 years Phuket has changed from an almost pristine piece of paradise to an international tourism magnet. Another major effort of the Thailand pilot project was to assist in the preparation of a national program for the protection of coral reef ecosystems.

The ASEAN Coastal Resources Management Project involves six countries. In all six, the project contains four components:

- (1) Coastal resources assessments, planning, and research activities;
- (2) Training;
- (3) Information dissemination; and
- (4) Regional coordination and cooperation in CRM.

The project is to achieve its stated objectives by funding pilot case studies in Indonesia, Malaysia, the Philippines, Singapore, and Thailand. In Brunei-Darussalam, given the size of the country, the pilot case study will be national in scope. The project intends to devise strategies, policies, and guidelines for achieving sustainable and multiple use of coastal resources in the study area.

The evaluations of both CRM projects were midterm assessments. Consequently, the expected outputs and outcomes (or impacts) had not been realized. According to the respective evaluations, both projects were doing reasonably well in establishing or strengthening institutional arrangements necessary to prepare integrated coastal resources management plans. Eight developing nations are involved in

preparing and implementing CRM plans. Based on the experience of the many other nations that have been involved in CRM, the most challenging phase lies ahead. This phase will be the adoption and implementation of the plans that resolve the issues that originally motivated the program. These issues are listed in Table 2.

The CRM efforts supported by A.I.D. in Brunei-Darussalam, Ecuador, and Sri Lanka are nationwide. The projects in the other five nations are regional pilot programs or demonstration case studies for one or two areas.

Both evaluations done of the CRM projects were midterm assessments. Both evaluations are comparatively brief and not very informative on the issues that motivated the eight nations to initiate CRM projects. Project reports and evaluations on fisheries, aquaculture, and to a much lesser extent wastewater discharge to coastal waters commonly recommend that their efforts be integrated into a national or regional coastal resources management program if — in the long term — the projects are to achieve and sustain their desired impacts (outcomes).

2.4 Water Supply and Wastewater Treatment

Between 1978 and 1985, A.I.D. authorized over \$1 billion in support of projects to rehabilitate and expand existing water supply and wastewater systems in the Cairo, Alexandria, and Canal cities area. This project is different from the many other water supply and sewage projects A.I.D. has supported. There was concern expressed about reducing or eliminating pollution into receiving waters — the Nile River, the Gulf of Suez, and the coastal waters of Alexandria. The major expressed objective of all other water supply and sanitation projects reviewed has been to reduce or eliminate the incidence of disease, notably diarrhea, typhoid, and cholera from water supplies and bilharzia from contact with polluted receiving waters (such as agriculture canals). The controversy surrounding the disposal of wastewater from the Alexandria treatment system — land use versus an outfall into coastal waters — should be explored because it would provide a good example of the necessity of linking environmental planning, particularly CRM, with the planning and development of wastewater treatment systems.

The major issue in this sector is disease prevention and improving the quality of human life. The four projects constituting the Egypt Water/Wastewater Program were the only ones of the 27 in this sector that addressed pollution as a major issue. For these four projects, the topic of water supply pollution was not mentioned. The focus was on the pollution of receiving waters from the effluents of wastewater treatment plants.

3. ISSUES

This review of A.I.D.'s projects reveals that the environment and natural resource (E/NR) problems that can or should be addressed through "blue" and "blue-brown" projects were, in general, clearly identified in project documents. Principal problems include the following:

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- Fish stock management (over- or underexploitation) through capture fisheries;
- Destruction of wetlands, saltwater intrusion, and the degradation of estuary water in aquaculture and mariculture activities;
- Erosion, pollution, and overall destruction of coastal resources through infrastructure development, tourism, and natural disasters; and
- Water quality and health problems associated with inadequate or aging water supply and wastewater treatment facilities.

The issues that need to be addressed in CDIE's E/NR assessment are not, therefore, issues of problem identification. Rather, they are issues revolving around the strategies and tactics that have been, or should have been, utilized to help developing countries resolve these problems. The evaluations reviewed suggest that several recurring issues merit study. These issues can be divided into two categories:

- Program Strategy
- Project Design and Implementation

3.1 Program Strategy

In addressing E/NR problems in the "blue" and "blue-brown" realms, program designers have had to make several strategic decisions.

Definition of Objectives and Identification of Beneficiaries. Although substantive E/NR problems have, as mentioned above, been fairly well identified, the precise definition of project objectives and the tradeoff between various objectives have not always been as well treated. In capture fisheries projects, for example, it is not always clear to what extent the goal is increased yields or stock management. In aquaculture and mariculture projects, it is not always clear, either from the project designs or the evaluations, what the tradeoffs, if any, are between such objectives as improved nutrition (through increased domestic consumption of fish), economic growth (through increased marketing and export of fish products), and environmental protection (of coastal resources, for example). With respect to beneficiaries, it is not always clear whether the intended beneficiaries are the general public, fishermen, tourists (by protecting beaches, for example), or other groups. None of the evaluations had anything to say about gender concerns — whether women benefited or were disadvantaged by project activities.

National versus Regional Strategies. Some E/NR problems in the "blue" and "blue-brown" realms are common to several countries. Examples are stock management for capture fisheries and coastal resources management. In these cases project designers have had to decide whether to channel resources through national or regional organizations. One issue, then, that should be addressed in the E/NR assessment is under what circumstances effectiveness and sustainability are promoted through

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working with just one country or with working with more than one country simultaneously, either through similar national institutions or through regional organizations.

Public Sector versus Private Sector Strategies. Few if any of the E/NR projects in the "blue" and "blue-brown" realms have adopted an exclusively private sector strategy, although some projects such as the Djibouti Fisheries Development Project have worked with fish marketing cooperatives. Because A.I.D. is placing greater emphasis on private sector strategies, an issue arises as to whether substantive E/NR goals in such sectors as aquaculture and wastewater treatment, as well as such objectives as efficiency and sustainability, might not in some circumstances be better promoted by working more directly with the private sector (including NGOs), rather than, or in addition to, governmental institutions.

Timing. E/NR objectives are, by nature, seldom achieved in short periods of time. In the "blue" and "blue-brown" realms, the time needed for planning, capacity building, infrastructure development, and the implementation of concrete activities may be measured more accurately in decades than in years. Although individual projects can be designed around discrete activities (for example, planning and technology transfer), lasting impact is not attained until all the activities that constitute an E/NR program are implemented. An issue that should be investigated, then, is under what circumstances A.I.D. needs to adopt a longer time perspective in providing assistance to developing countries in the "blue" and "blue-brown" realms.

Cooperation with Other Donors. Closely linked to the "timing" issue is the question of cooperation with other donors. Ideally, "blue" and "blue-brown" programs should not be donor-specific, but should be initiated and managed by the developing countries themselves with individual donors contributing to specific activities (projects) within the context of the program. The issue is the extent to which A.I.D. has been or should be actively seeking to leverage its resources against those of other donors to achieve program goals. Various phases and components of the Djibouti Fisheries Program have been funded by other donors as well as by A.I.D., but the evaluations reviewed did not address the strategic question of how well cooperation and coordination was planned and implemented.

3.2 Project Design and Implementation

Several issues arise under this heading. To what extent have the components included in E/NR projects in the "blue" and "blue-brown" realms been most appropriate to address the problems at hand? When projects have included several different activities (components), has the balance and coordination among the resources been appropriate? Also, have the components, once selected, been well designed and implemented?

Components of "blue" and "blue-brown" projects include the following:

- Information and awareness;
- Policy formulation;
- Institutional development;
- Technology Development and Transfer;
- Access;

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- Ownership and Participation;
- Project management and Implementation; and
- Measurement and monitoring.

Information and Awareness. It is by now commonplace that successful E/NR strategies must include public activities designed to make the general public or targeted segments of the public (fishermen, for example) aware of environmental problems and of the need for resource management. With the exception of the ASEAN Coastal Resources Management Project, none of the projects reviewed contained an explicit information/awareness component although the Djibouti Fisheries Development Project evaluation reported greater government awareness as one of the successes of the project. With respect to the ASEAN project, the evaluation reported that impact on regional cooperation had received a setback through a reduction in the public awareness program. The issue should be raised as to whether information and awareness activities have been neglected (relative to other activities) and, if so, if this neglect has compromised the impact of otherwise effective activities in "blue" and "blue-brown" E/NR projects.

Policy Formulation. Over the past decade, there has been increasing recognition that sound economic and other public policies are essential for effective development.

In the "blue" and "blue-brown" sectors, policies are needed on such matters as sustainable capture fisheries yields, coastal land use, and wastewater disposal. In many developing countries there is a very large population directly or indirectly engaged in small-scale or artisanal fisheries. Because of both their sheer number and their role in society, this population is often a very influential interest group in the formulation and implementation of fishery and coastal resource management policies. It is surprising to find, in this regard, that none of the "blue" and "blue-brown" projects reviewed featured policy reform or policy formulation activities.

The evaluation of the ASEAN Coastal Resources Management Project reports that the government of Brunei and the local authorities in the Philippines are interested in incorporating the master plans drawn up by the projects into their development plans, but this is not quite the same thing as policy formulation. The Fisheries Stock Assessment CRSP produced research, manuals, and professional journal articles, but no mention occurs in the evaluations of whether the results of these activities were transformed into improved public policies or regulations. Similarly, the billion-dollar Egypt water supply and wastewater treatment program has concentrated its efforts mainly on construction activities with comparatively little attention being paid to the strengthening policies and regulations in this sector. The evaluation of the Egypt program found that one policy question that needed urgently to be resolved concerned the question of land use versus sea outfall with respect to the disposal of wastewater from the city of Alexandria.

Another policy issue that arises in virtually all public utility projects involves cost recovery and user charges. The evaluation of the Djibouti Fisheries Project cited subsidies to the marketing cooperative as a potential constraint to the sustainability of the project. The issue that needs to be investigated in the E/NR "blue" and "blue-brown" realms assessment, therefore, is the extent to which the apparent neglect of policy formulation activities may have compromised the impact of other project activities.

Institutional Development. Most of the projects in the "blue" and "blue-brown" realms contained, though not all featured, some type of institutional development (ID) activity. The ASEAN Coastal Resource Management projects apparently achieved considerable success in promoting ID. In the Oman fisheries project, ID consisting of capacity building in research, extension, and statistics was the project centerpiece; the evaluation of this project, however, reported that concrete ID results were "minimal." The Egypt water supply and wastewater program financed mainly engineering studies and subsequent construction, providing little in the way of ID assistance; yet the evaluation of the Egypt program found that the key constraint in developing wastewater systems was the weakness of institutions responsible for construction, operations, and maintenance; the evaluation concluded that the problem was one of institutional development, not engineering.

Three issues are raised here. One is whether ID activities merit a relatively greater share of resources in E/NR "blue" and "blue-brown" projects. Second, what accounts for the success of ID activities in some projects and the lack thereof in others? Third, how can ID activities be designed to be more effective? Recent research, for example, has found that the traditional mode of assigning long-term expatriate advisors to work with host-country counterparts has rarely been effective in promoting ID. The evaluation of the Djibouti Fisheries Development Project, for example, cited the lack of counterparts as contributing to the lack of systematic diffusion of the project's technological package. Similarly, the Egypt project noted that little counterpart training had occurred.

Technology Development and Transfer. Technology development or technology transfer was featured in three of the "blue" and "blue-brown" projects reviewed. The evaluations raise two issues. One concerns the appropriateness and effectiveness of the technologies themselves. The other concerns whether the continued use and impact of the technologies may be negatively affected by lack of attention to ID or policy formulation activities.

Regarding the question of appropriateness, the evaluation of the \$1 billion water supply and wastewater effort in Egypt assessed the costs and benefits of alternative treatment technologies and concluded:

The proposals involve expensive and relatively complex facilities for the treatment or reclamation and reuse of wastewater. These proposals represent a quantum leap beyond current conditions and capabilities and raise questions about the need and wisdom of trying to bridge that distance in a single leap. A strong case should be made for consideration of alternative treatment technologies which would be less expensive to construct and to operate, at least on an interim basis.

However, one of the major benefits of more expensive secondary and tertiary treatment is reducing the pollution impacts on the receiving waters — the Nile, the Gulf of Suez, and the coastal waters off Alexandria. The 202-page Final Report (1985), "Egypt - Water and Wastewater Sector Assessment," does not address — much less calculate — the benefits that might be derived, such as reduced incidence of diseases, increased fisheries, and increased recreation and tourism potential from pollution abatement in any of the receiving waters. Nor do the reports or evaluations address the natural resource and physical environmental benefits derived from water pollution control.

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The Fisheries Stock Assessment Project provides an example of solid research that is yielding new technologies and practices that should be applicable and useful to ongoing and planned fisheries activities in tropical areas. However, there appears to be no clear plan either for coordination of the results of the eight projects being managed by seven universities or for the systematic application of research results to the implementation or monitoring activities of fisheries projects.

The Djibouti Fisheries Project evaluation reported that the fish processing plant has served as a model for other processing plants; on the other hand, the evaluation found that the introduction of fiberglass technologies did not lead to an increase in the size of the fishing fleet. Also, as reported above, the neglect of ID and the failure of the project's counterpart training components have limited the spread effect of the technologies. The evaluation of the Inland Fisheries Project in the Dominican Republic reported that the introduction of fish pond technology was successful but raised a question about whether fluctuations in costs and prices would compromise farmers' incentives to properly maintain and utilize the ponds. A more general issue is that if farm pond aquaculture expands significantly it could create the same habitat conversion and pollution issues that have arisen from the conversion of coastal wetlands to mariculture ponds. The size and number, design, location, and management of farm ponds are all factors in whether these issues will or have emerged.

Access. One means of improving efficiency in a marine fishery is by ocean ranching or pond mariculture. Ocean ranching is a major point of controversy with salmon fisheries in the Pacific Northwest. Little has been written on the potential for ocean ranching in tropical waters. In Ecuador, the argument was made that it is more efficient to grow out the postlarval shrimp in ponds than to chase after the adults in coastal waters. This issue raises access and equity questions. Who should have the right of access to the postlarval shrimp, and what should be the allocations?

A similar issue was raised in the Jamaica Inland Fisheries Project, which was originally designed as a smallholder project. The evaluation found that many of the aquaculture facilities developed under the project were, in fact, owned or managed by urban entrepreneurs or corporations.

Project Ownership and Participation. The evaluations of E/NR projects in the "blue" and "blue-brown" realms actually had little to say on these issues, but some inferences can, nevertheless, be drawn from the documents about potential problems. It is by now well documented that "participation" of beneficiaries and other host-country personnel in the design and implementation of projects bears a positive relationship to project effectiveness and sustainability. Recent literature goes, in fact, a step farther by emphasizing that projects should be "owned" (not just participated in) by developing country personnel. Concretely, to the extent that donor personnel assume most of the responsibility for project management and implementation, host-country interest and commitment will be diminished. The evaluation documents imply that donor dominance may have been behind problems, for example, with the projects in Oman and Djibouti. The Djibouti project also presents an opportunity to investigate the principles and practices governing the ownership and management of the fishing cooperative.

One of the major efforts of the Coastal Resources Management Project has been to identify, profile, and rank all the issues that are thought to have a bearing on the management of coastal resources and environments. This endeavor was carried out in each country with widespread public participation. Involving all stakeholders in the identification and profiling of issues not only ensured that significant

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issues would be missed but also helped build a constituency for the preparation, adoption, and implementation of specific coastal management plans. Review of the many documents issued by the ASEAN CRM project — including its newsletter, *Tropical Coastal Area Management* — indicates the project identified a full spectrum of issues. However, until a review is done of the CRM plans for each of the pilot projects, it will not be possible to determine which issues have been identified as priority and which issues have been deferred.

Project Management and Implementation. Soundly designed projects still need to be managed and implemented well in order to succeed. One implementation issue concerns flexibility in project management. If, during project implementation, a project needs to be redesigned or resources need to be increased or shifted from one component to another, project management must recognize this, and A.I.D. management must exercise the flexibility to accommodate these changes. The unwieldy and complex institutional arrangements in the Fisheries Stock Assessment CRSP, involving eight projects and seven universities, resulted in a significant slowing down of the pace of disbursements. Some thought should perhaps have been given to streamlining these institutional arrangements.

Incorporating flexibility also implies a need to design into all projects, and provide the resources for, sound monitoring and evaluation systems. It also implies a willingness on the part of project managers to utilize the results of midcourse evaluations. The Oman Fisheries Development Project is an example of the influence that evaluations may or may not have on subsequent actions. The final evaluation report observes that the managers of the Oman project generally ignored the recommendations of the midterm evaluation. The literature on the project includes a project completion report, a full-scale evaluation, a critique of the evaluation, and a response to the critique. In 1991, another fisheries development project was authorized for Oman. Twenty million dollars is to be expended over four years. It is not clear that the results of the two evaluations were carefully considered in the design of the new project.

3.3 Blue and Blue-Brown Realm Indicators

The purpose of A.I.D. evaluations is frequently stated as "determining accomplishments that were achieved and evaluating the project's success in accomplishing the original goals and objectives as described in the project paper." Stating the purpose of an evaluation in this way raises three problems. The first is that project objectives often change or evolve. The second is that a purpose statement of this kind fails to distinguish between outputs and outcomes (impact). The third is that it fails to take into account problems of attribution and causality.

Evolving Objectives. With respect to the first problem, it is common for projects, once under way, to realize that the original objectives were to varying degrees misguided. But in reviewing fisheries and CRM evaluations, it was often difficult to determine if and how objectives had changed over the life of the evaluation period.

One example comes from the Oman Fisheries Project, the evaluation of which made the statement that "it is difficult to establish any direct link between project activities and reported increases in catch." The consulting group responsible for the management of the project, RDA, noted two examples where the

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project did have a direct impact on catch increases. The group's response also stated that "nowhere does it state as a goal that the project should lead to catch increases.... The project should lead to establishment of statistics, extension, and marketing programs." Yet RDA's project completion report proclaims as a measure of achievement that fish landings in Oman increased from 80,000 metric tons (\$41.5 million value) in 1983 to 117,000 metric tons (\$71 million value) in 1989. For RDA to claim that this was an achievement of the project, catch increases either was or should have been a project objective. To pursue matters further, RDA's response to the evaluation also observed that an increase in fish production may not be a good objective in a fisheries development project. RDA notes that in some Omani fisheries, notably lobster, there should be a reduction in catch in order to sustain the resource. RDA also notes that in an artisanal fishery increased catch may or may not be a goal. Reducing total labor expended for the same size catch through the introduction of more efficient fishing methods may be of more help than increasing the size of the catch.

With respect to the second problem, two basic types of evaluation should be distinguished. One type focuses on interim achievements (such as the number of permits issued); the other focuses on eventual outcomes (such as decrease in coastal pollution or tonnage of fish landed).

Outputs and Outcomes. Output or process evaluations examine the means by which goals and objectives are achieved. Process indicators include the clarity of goal statements and legislative mandates, measures of the rationality of organizational structures, the quality and flow of information, the adequacy of yearly budget allocations, the number of permits issued, and the number of agreements executed to promote interagency cooperation. Table 3 presents output and outcome indicators that have been used to evaluate CRM programs. Table 4 presents a set of outcome indicators that could be used to evaluate projects that seek to develop fisheries or coastal tourism or manage coastal hazards.

One of the principal objectives of the 3 fishery projects and the 2 coastal resources management projects was institution building or strengthening. Process indicators such as government staff trained or plans produced are used to measure institution building and strengthening. It is no surprise that there are so few output indicators used in the fishery and CRM evaluations. A country cannot adequately manage its environment or natural resources without an adequate institutional arrangement in place. However, the institutions that fund projects for environment and natural resource management, such as the U.S. Congress, much prefer to read and see outcome indicators, such as cleaner water or larger and healthier populations of protected/managed species, than to read bureaucracy building numbers provided by output indicators.

Attribution and Causality. The problem of attribution is recurrent in almost all the evaluations dealing with environment or natural resources in the "blue" and "blue-brown" realms. Relating increases in Omani fisheries production to the A.I.D. project is an example. An analysis of federal responsibilities in state coastal programs by the U.S. Department of Commerce, Office of the Inspector General (1983), documents a tendency by NOAA to attribute all improvements in coastal environmental quality to programs administered by NOAA, even though many other agencies have programs that directly or indirectly improve coastal environmental and socioeconomic conditions. The EPA, for instance, may be the key actor in cleaning up water pollution, despite similar efforts of the national and state coastal management program. Determination of causality usually requires a control situation for comparative analysis. To what extent would Omani fisheries have increased without the A.I.D. project?

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Catch per unit effort, for example, is one of the standard measures of fishery management performance. Both the Djibouti and the Oman fishery development projects mention catch per unit effort as an indicator, but neither provides any information on how measurements of change in this indicator will be calculated or how the projects, as compared to other factors, will influence this important indicator.

Another example of the causality problem is provided by the Egypt Water/Wastewater Sector Program. The project report observes:

It is extremely demanding and expensive to relate improvements in the operations of the current water and wastewater systems — measured in increased quantity and improved quality of water or reduction of wastewater flooding — and health status. The epidemiologic linkage is very difficult to establish.

TABLE 1

**EXAMPLES OF OUTPUT (PROCESS) INDICATORS AND OUTCOME INDICATORS
FOR EVALUATING COASTAL RESOURCES MANAGEMENT PROJECTS*****Output Indicators**

- Budget allocation per year
- Number of permits issued, denied, conditional
- Consistency of law dealing with coastal management
- Number of agreements or memoranda executed for interagency cooperation
- Availability of appropriately trained and educated staff
- Number of local programs initiated or approved
- Quality of information used in program development

Outcome Indicators

- Water quality (dissolved oxygen, nutrient levels)
- Fishery yields
- Protein component of diet derived from coastal fisheries
- Number and linear distance of access ways
- Kilometers of coast in public ownership
- Number of recreation user days
- Number of coastal species on the International Union for the Conservation of Nature and Natural Resources (IUCN) endangered species list
- Acreage of wetlands protected or restricted
- Number of housing units provided within the coastal zone
- Tonnage and value of commodities handled in ports
- Employment derived from fisheries, ports, and tourism sectors
- Reduction in natural hazard impacts — lives lost, property damaged

* Most evaluations of government projects — particularly the ones reviewed for A.I.D.'s blue projects — concentrate on process, a simpler evaluation than focusing on outcome. Measuring input and output is almost always easier than measuring outcome.

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TABLE 2

INFORMATION NEEDED TO ASSESS A NATION'S COASTAL RESOURCES AND HAZARDS TO DEVELOPMENT**Coastal Fisheries Data Needs**

- Linear kilometers of coastline or square kilometers of coastal zone known to function as nurseries for finfish and shellfish
- Number of harbors for fishing fleets
- Number of existing mariculture facilities
- Number of potential sites for mariculture
- Estimated stock of commercial fin and shell fisheries that are biologically dependent upon the nation's coastal zone
- Catch (in tons) of commercial finfish and shellfish that are biologically dependent upon the nation's coastal zone
- Dollar value of total catch
- Dollar value of internal consumption
- Dollar value of export harvest
- Tax revenues generated by fisheries
- Relative contribution of fisheries to total GNP
- Number of fish-processing plants
- Dollar value added by processing plants
- Number of nationals employed directly or indirectly by fisheries sector
- Relative proportion of nationals employed as a function of the total work force
- Relative contribution of fisheries as a fraction of total worker earnings
- Commitment to development of fishery sector indicated by (a) creation of a ministry; (b) legislative mandate or executive order; (c) preparation of sectoral plans; and (d) capital investment

(NOTE: Data on the value of coastal fisheries are difficult to collect. First, the coastal dependency of a species may not be well studied. Second, species have transboundary habits that make it difficult to attribute a standing stock to a single nation. Finally, the possibility of foreign ownership of some portion of the fishing fleet or fish-processing facilities complicates assessment of the actual contribution of the fishery sector to a national economy.)

Coastal Tourism Data Needs

- Number of linear miles of coast allocated to coastal tourism development
- Presence of swimmable beaches with excellent offshore water quality
- Presence of coral reefs, bird rookeries, reserves, sanctuaries, and other wildlife-oriented areas
- Extent of public relations effort for coastal tourism

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- Number of facilities built within 1,000 meters of the coast
- Infrastructure devoted to coastal tourist development
- Dollars earned by coastal tourist-serving development
- Tax revenues derived from coastal tourism
- Relative contribution of coastal facilities to GNP
- Number of nationals employed directly or indirectly by coastal tourism sector
- Relative proportion of nationals employed as a fraction of the total work force
- Relative contribution of tourism as a fraction of total worker earnings

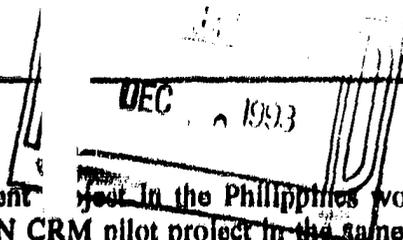
Hazards Data Needs

- Geographic extent of hazard-prone areas
- Frequency of major disastrous events
- Frequency of events causing major damage to lives or property
- Number of lives lost
- Number of injuries
- Number of structures damaged
- Dollar costs of reconstruction and relocation
- Dollar costs of service disruptions
- Insurance rate increases as a function of hazards
- Type and extent of architectural/engineering standards for development in hazard-prone areas
- Type and extent of standards for locating structures in hazard-prone areas
- Number and dollar value of structures built in hazard-prone areas
- Amount of vacant/uncommitted land available in hazard-prone areas
- Amount of vacant/uncommitted land available in non-hazard-prone areas
- Commitment to intervention in hazard sector indicated by (a) creation of a ministry; (b) legislative mandate or executive order; (c) preparation of hazard guidelines for locating new development; and (d) preparation of architectural/engineering standards for development in hazard-prone areas.

4. RECOMMENDATIONS FOR FIELD STUDIES

4.1 Oman

The Oman Fisheries Development Project is a good candidate for a case study of capture fisheries. It is the only capture fisheries project with both a project completion report and a full evaluation. Also the evaluation contains two appendices of interest — a lengthy criticism of the evaluation by the consulting firm that managed the project and a rebuttal from the consulting firm that did the evaluation. A follow-on project has been funded. Are fishery management plans being prepared? Will there be fishery resource impact achievements that can be attributed to the two projects? To what extent were the recommendations of the evaluation report well founded, feasible, and worthy of implementation? To what extent and why were the recommendations implemented or not implemented?



4.2 Philippines

The fisheries stock assessment ~~project~~ in the Philippines would be of interest because of the potential connection with the ASEAN CRM pilot project in the same country. The pilot CRM project in the Philippines has a fisheries management emphasis.

4.3 Thailand

Thailand would be a logical selection for a CRM case study because both the University of Rhode Island (URI) and ASEAN projects are in the country. If the degree of success is one of the criteria for case study selection, then the URI pilot project in Ecuador would be a good candidate. The Tamil insurrection in Sri Lanka and the government coup in Thailand have had adverse impacts on program achievements in those countries.

4.4 Egypt

The Alexandria wastewater treatment project (263-0100) should provide good substance for a case study of alternative technologies. At issue are the technology options of treatment for irrigation use — at greater cost — or the construction of an ocean outfall system. Both options have significant environmental management dimensions.

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