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PREFACE

This discussion paper attempts to look at the problems of deforestation from a variety of perspectives and to draw together some ideas on how A.I.D. might better address them.

For readers already well versed in the growing literature on forestry and related issues, the opening review of problems linked with deforestation and natural resource degradation will be familiar. For readers just beginning to think about these problems, the paper attempts to:

- . develop a definition of "forestry issues"
- . underline the importance of forestry in the broader context of natural resource use
- . sketch out the dimensions of the development task ahead.

After a brief discussion of A.I.D. mandates to address deforestation and a short overview of current A.I.D. and other donor efforts in forestry, the paper turns to the subject of A.I.D. program development. Examples of past A.I.D. activities are incorporated into a general discussion of five program areas to illustrate experiences which may provide useful referents for program development in other countries.

Finally, elements which may be useful in developing an A.I.D. strategy for the 1980's are presented as starting points for a continuing dialogue among A.I.D./Washington, A.I.D. Missions, development intermediaries, and developing countries.

These elements formed the basis of the "Guidance on Forestry and Related Issues" which was transmitted to the field in December, 1979. This Guidance message is attached here as Annex A. The elements were identified in initial meetings of an ad hoc forestry subgroup of the Committee on Environment and Development (COED) and included in an earlier draft of this paper. During the subsequent review and preparation of the Guidance, ideas were further developed. These changes are incorporated in this draft. It is expected that as Missions and host governments consider possible approaches and the issues involved, further modifications will lead to a strategy - - or perhaps a whole array of country strategies - - which will be both workable and effective.

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I. Deforestation and Natural Resource Degradation

World-wide attention has been drawn to the critical fuelwood shortages and desertification in the Sahel region of Africa and to massive deterioration of the natural ecosystem in Haiti. Deforestation in Panama's watersheds threatens the operation of the Canal; excessive sedimentation reduces the capacity of the lakes needed to store the 1/2 million gallons of fresh water released with each ship's passage through the Canal. Seasonal flood losses of water through the spillway and low flows in the dry season are also accentuated as forests are burned for cultivation or pastureland. Asia's forest-covered areas are declining with unexpected rapidity.

The "Global 2000" Report to the President concludes, "Of all the environmental impacts of the study projections, deforestation probably poses the most serious problems for the world, particularly for the developing world."¹ The International Development Research Centre concurs and adds an urgent time dimension, " It has been predicted that within the next 25 to 30 years most of the humid tropical forest as we now know it, will be transformed into unproductive land, and the deterioration of the savanna into desert will continue at ever-increasing speed."² Accelerated deforestation is rapidly depriving the world of resources needed to meet basic human needs -- food, fuel, and shelter.

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1. As quoted in the November, 1979, draft of the U.S. Interagency Task Force Report to the President on the World's Tropical Forests: A U.S. Policy, Strategy, and Program, p. 2.
 2. J. G. Bene, et al., Trees, Food, and People: Land Management in the Tropics, IDRC-084c, p. 9.

Between 1950 and 1973, the earth's total forest area was reduced from nearly five billion hectares to just under three billion hectares. At the rate of deforestation implied by these figures, virtually all forest area would disappear in 27 years. Current estimates of present use rates diminish somewhat the spectre of a treeless future; forest area reduction is now considerably less, but still close to 20 million hectares annually -- mostly in the tropical regions of the world.³

Forested acreage is not evenly distributed or equally productive across continents, however, so such global estimates need to be applied with caution. In Latin America, 38 percent of the total land area is in closed forest⁴; in Africa, 8 percent; in Asia and the Pacific, 38 percent. In Latin America, closed forests are estimated to contain 136 cubic meters of growing stock per hectare; in Africa, 228 cubic meters; and in Asia-Pacific, only 89 cubic meters. Thus, Latin American closed forests contain about 55 percent of the world's tropical forest growing stock, with 0.2 percent of the volume of wood produced in these closed forests and woodlands⁵ removed every year. African closed forests and woodlands account for approximately 30 percent of the growing stock, with 0.5 percent of the wood removed each year.

3. As presented by G. Barney at the U.S. Strategy Conference on Tropical Deforestation, AID/State, June 12-14, 1978, pp. 16,17.

4. That is, those forests formed by trees at least five meters tall with their crowns interlocking (UNESCO classification).

5. "Woodlands" are defined as consisting of trees at least five meters tall, with crowns not usually touching, but with ground coverage of at least 40 percent.

For Asia, the comparable figures are 15 and 1.4 percent per year. Similar variations among countries, of course, lie behind these continental aggregates.⁶

Most indicative statistics focus on tree loss which is visible and can be evaluated in economic, usually commercial, terms. But other values are also lost as forests and woodlands are cut over. Forest resources not only provide direct products -- food, fuel, and forage -- but also play critical roles in soil stabilization and the maintenance of soil fertility, watersheds, and wildlife habitats. A variety of natural resource problems are thus inextricably linked to the process of tree removal.

The cumulative impact of these problems is so widely dispersed over space and time that complete quantification of the costs and benefits of forest loss is impossible. The protection of the headwaters of five major rivers by the forests of Madhya Pradesh in India, for example, affects the well-being of water users hundreds of miles from the source. Similarly, the value of protective forests as a store of genetic diversity may be realized by people over a hundred years from now.

6. Summarized from S.L. Pringle, "Quantity and Quality of the Tropical Forests," Conference on Improved Utilization of Tropical Forests, May 21-26, 1978, pp. 11-15.

Dr. Norman Myers of the Natural Resources Defense Council in Nairobi summarized the importance of tropical forests for temperate zone nations:

"First of all, there is the climatic question...far more light and heat are reflected from deforested areas than from areas where there is a large mass of vegetation to absorb light coming from the sun. There is also the particulate matter in the atmosphere resulting from large-scale burning...as a result of massive deforestation in the tropics, there could be a decline in precipitation in the grain-growing belt of the United States...(and) the United States might find itself with too little rather than too much food in an increasingly hungry world...(with) far-reaching implications...in the areas of foreign policy and national security...

Secondly, (there is)...the problem of disappearing species...It has been noted that the United States is dependent on germ plasm from tropical moist forests to maintain the productivity of its food crops...The National Cancer Institute at Beltsville, Maryland, has stated that if tropical forests are widely eliminated within the foreseeable future, this would cause a major setback to the anti-cancer campaign because so many new drugs are being developed from plants of tropical moist forests...

It is clear that "deforestation" is a development problem which extends far beyond the loss of tropical rainforests. Forests, woodlands, and grasslands provide essential food, forage, fuel, and shelter, a wide range of commercially valuable products, employment opportunities, and environmental benefits. These resources are also a vast reserve of resources for current and future generations -- a reserve that is being jeopardized in many parts of the world by the proliferation of unsustainable patterns of use and an allocation of

7. Speech at the U.S. Strategy Conference on Tropical Deforestation, AID/State, June, 1978, pp. 20, 21 in Proceedings.

scarce resources which is both inadequate and inappropriate to address the deep-rooted causes of deforestation.

II. Causes of Deforestation and the Reduction of Forest Values

The vast majority of trees and woody shrubs are deliberately cut and removed by an increasing number of people for many reasons -- heating and cooking, fiber for textiles, house construction materials, sawnwood or wood chips for export, pulp for paper, or, most importantly, to gain space for planting crops and growing food. The shrub⁸ and savanna grasslands⁹ which characterize the "forests" of the semi-arid tropics are, it is true, severely affected by drought -- but evidence shows that people and their livestock often reduce the capacity of the grassland to regenerate when rains return. People -- acting in their own interests but within the constraints set by natural systems and economic patterns -- determine the rate and scope of deforestation and savanna deterioration through their use (and perhaps overuse and misuse) of trees, shrubs, and the lands on which they grow.

By bringing about various land use changes and establishing various land use patterns, people affect the way in which resource value trade-offs are made. Consideration of these three factors provides a framework for more in-depth discussion of the cause of tree loss and natural resource deterioration.

8. That is, with woody shrubs 0.5 to 5 meters tall, either open shrub land or closed thickets.

9. Treed savannas are those grasslands with 10-40 % cover of trees.

A. Land Use Changes

People's use of forest land ranges from the most extensive mode of utilization (hunting and gathering with little modification of the original tree and shrub cover) to very intensive uses (such as permanent agriculture and urban development). The most intensive uses of land so completely transform the original forest or vegetation cover that it bears no resemblance to the appearance of the original.

Neither the most intensive conversion of land from forest to non-forest uses nor the modification of surface vegetation to include non-forest as well as forest activities necessarily imply that such modification will lead to degradation and depletion of the natural resource base. The basic determinant is the type of ecosystem and the carrying capacity of that system. Some systems are more amenable to change than others; some can sustain intensive utilization, some cannot.

When people change the use of ecosystems in non-sustainable ways, i.e., by overstocking given areas of grassland, by applying modes of cultivation which accelerate soil erosion and water run-off, by harvesting fuelwood at rates greater than natural regeneration or replanting are taking place, and so forth, then the cycle of natural resource deterioration often associated with deforestation is set in motion.

B. Land Use Sustainability

Forests are often described as a "renewable resource." This appellation is given to forests in part because of their readily observable ability in temperate climates to regenerate themselves after being greatly modified by human use (as by timber harvesting) as well as because of their ability to "reappear" as if by magic through the natural process of plant succession even when they have been completely removed (as when old-field forest succession colonizes and takes over abandoned agricultural land).

Often, however, trees and woody shrubs are removed from marginal or fragile tropical lands which cannot be maintained in continuously productive - - sustainable - - use without substantial applications of social, institutional, administrative, and technological inputs. The combination of tropical soils, increasing populations, and the greater need for investments of all kinds acts together to make successful development of marginal and fragile lands for intensive human uses a difficult undertaking.

In many instances, basic knowledge for ecosystem regeneration is lacking and the substantial economic resources needed are not available. Thus, the tendency has been in natural resource and agricultural development efforts to direct most available resources to the most fertile and more reproductive areas about which there is greater knowledge rather than to these marginal lands. Yet, paradoxically, people with little social, cultural, or economic standing, and thus

least access to the needed resources, are most often forced to subsist on marginal and fragile lands. They cannot afford to maintain them and so further compound and exacerbate the problem begun when the original forest and vegetation cover is removed.

Four forest resource uses are often cited as initiating unsustainable use patterns: fuelwood collection, shifting cultivation, pasture and forage production and commercial timber harvesting.

(1). Fuelwood Collection

The fuelwood aspect of the deforestation process provides particularly dramatic insight into the depletion associated with unsustainable resource use patterns:

Fuelwood removals . . . make up more than 80 percent of all tropical wood utilization . . . Fuelwood, and even its common derivative, charcoal, is bulky relative to its value and thus expensive to transport. This, plus the fact that trees of almost any species are acceptable, has led to repeated removal of woody growth on lands near population centers. . . 10

When people continue to use woody vegetation for cooking fuel and population growth increases their demand for fuelwood beyond naturally regenerated supplies, fuelwood shortages are a likely, if not inevitable, consequence. The causes of the fuelwood situation can also be related to: (1) the manner in which harvesting is done; (2) the demand for fuel exceeding the productive capacity of the woodlands under a given form of management, with demand due perhaps to rapid population growth alone but perhaps due to other factors

10. November, 1979, draft of the U.S. Interagency Task Force Report on the World's Tropical Forests, pp. 26. 27.

as well - - inefficient cooking technologies, for example; or (3) the lack of available alternatives for increasing supply or switching to the use of fuel substitutes.

In any case, if soil deterioration begins to occur with depletion of the woodland fuelwood supply, soil deterioration may speed the further reduction of supply. This vicious cycle may lead ultimately to failure to meet cooking needs - - even at a minimum subsistence level, to cutting back on heating - - with adverse health consequences in low-temperature situations, and to switching from fuelwood and charcoal to crop residues and dried cow dung as alternative fuel sources - - with consequences for further declines in soil fertility and reductions in output of food crops. In short, unsustainable harvesting of fuelwood can make it difficult for the poor to meet their basic needs.

(2). Shifting Cultivation

Sustainable resource use patterns can prevent the sort of downward spiral illustrated from starting. Sustainability implies that a continuous stream of positive benefits is available to the users. Even shifting cultivation can be a sustainable agricultural system when land is abundant and periods of fallow are adequate. Under such conditions, farmers can allow a secondary forest community to be reestablished after cropping and thus to restore the nutrient status and structure of the soil.

Unsustainable shifting cultivation occurs when the fallow period is reduced or the length of the cropping cycle is over-extended. This may come about because of population pressure and people's needs for food and forage or perhaps simply as a result of poor management. Under such conditions, leaching causes removal of soil nutrients from the surface layers, soil structure begins to break down, reducing water infiltration capacity and increasing runoff and erosion, and tenacious weeds and crop pests and diseases become more intense, further decreasing crop yields. If this process of deterioration goes sufficiently far, the land will eventually become uncultivable and completely unproductive.

(3). Pasture and Forage Production

A soil depletion syndrome similar to that associated with shifting cultivation can also occur when livestock owners transform forest areas to pasture or forage production in areas where rainfall is high. Some of the signs of deterioration may not be so apparent, but experience is showing that tropical soil nutrient status cannot be maintained under continuous grazing or forage production without application of fertilizer or periodic return to fallow.

(4). Commercial Timber Harvesting

Commercial timber harvesting, when carried out under sustained yield management conditions, results in only a temporary local depletion

of standing timber volume. Planned regrowth and regeneration balance the loss overall. Commercial timber harvesting conducted in an unsustainable manner, however, can result not only in long-term depletion or reduction of standing timber volume but also in reduced timber quality and value.

Even when commercial harvesting is badly done, it rarely results in the complete removal of vegetative cover from the land, as is often the case with shifting cultivation or pasture establishment. Logged-over forest lands, therefore, may support a much modified or less valuable timber stand, or, in some cases, a highly unproductive vegetation cover, but the excessive erosion and leaching associated with the agricultural uses may not be so great.

Construction of access roads and other transport systems into undeveloped forest areas, as for timber or mineral extraction, on the other hand, often leads to additional planned or unplanned agricultural and pastoral development. This is especially the case where population pressure on existing cropland is severe and the demand for expansion land is strong.

Much new development is carried out in an unsustainable manner, so critical soil and water resource damage and deterioration has resulted from such land uses after tree harvesting. People who initiate unsustainable land use patterns are often constrained by social, economic, and political forces -- particularly inequitable and insecure land

tenure arrangements, exacerbated by a general scarcity of other needed inputs. Such causal factors are difficult to analyze, but they determine whether the uses which are made of transformed or modified forest areas are sustainable in the long run or not.

C. Resource Value Trade-Offs

Planned and unplanned uses of forest, woodlands, scrub, and savannas always involve difficult trade-offs among the values which these natural resources have to offer. The gain of some immediate benefits - - timber, fuelwood, space for planting food crops - - must be balanced against the need to maintain a reserve for future needs - - soil fertility, genetic resources, water quality and quantity, ecological diversity, wildlife habitats, future commercial development, tourism and recreation.

The causes of deforestation and natural resource degradation must be analyzed within this framework of land use changes, land use sustainability, and resource value trade-offs. Underlying causes (need for fuel, timber, land for food and fodder) rather than symptoms of the problem (tree loss, erosion, declining soil fertility) must be understood if appropriate and effective solutions are to be devised. A careful assessment of empirical situations on a case-by-case basis will be essential to insure that no potential causal factor - - and

therefore, no potential remedy - - is a priori excluded from consideration.

III. The Development Task

A productive resource base will be maintained only by matching the demand with the supply. Through technical inputs, it is possible to increase supply to meet higher demand, but this creates disturbances within the ecosystem. For example, an increased use of fertilizer may cause eutrophication in streams and lakes which, in turn, may cause a decrease in fish population due to diminished oxygen in the water.

A productive natural resource base will probably be best maintained by a combination of approaches, among them:

- . protecting the forests and setting aside certain ecological areas for protection of plant and animal species
- . ensuring that all harvest of fuel and timber is carried out on a sustained yield basis - - either by planting, seeding, or natural regeneration in combination with soil fertility maintenance and water management
- . limiting but not stopping the clearing of forest cover for conversion of forest lands to other uses
- . seeking to reforest, afforest, or encourage natural regeneration of lands but currently supporting any forest cover - - to help balance conversion and transformation losses that will occur as forest lands are inevitably converted to other uses.

Few countries have either the requisite knowledge or resources to carry out such a wide-ranging program. Moreover, in designing program interventions, the Agency and host country government colleagues are going to be brought face to face with a number of hard political and economic decisions involving precisely those value trade-offs which

have been described above. Natural resource degradation proceeds because people, communities and nations follow the course of least resistance in meeting their needs; to change that course will require major, long-term efforts on the part of many donors and countries acting in concert.

IV. A.I.D.'s Role in Addressing the Problem

The Congress has given A.I.D. increasingly stronger mandates over the past several years for involvement in forestry as a legitimate aspect of its development assistance program. The 1979 amendments to the Foreign Assistance Act provide the most specific Agency mandate for forestry project assistance to date.

The 1979 amendments to Section 103(b) provide authorization for bilateral assistance to deal explicitly with forest resource depletion and associated soil and water resource deterioration:

The Congress recognizes that the accelerating loss of forests and tree cover in developing countries undermines and offsets efforts to improve agricultural production and nutrition and otherwise to meet the basic human needs of the poor. Deforestation results in increased flooding, reduction in water supply for agricultural capacity, loss of firewood and needed wood products, and loss of valuable plants and animals. In order to maintain and increase assistance under this section for forestry projects which are essential to fulfill the fundamental purposes of this section, emphasis shall be given to community woodlots, agroforestry, protection of watershed forests, and more effective forest management.

Moreover, A.I.D. is authorized in Sec. 119 to:

... include research, and the development, demonstration, and application of suitable energy technologies (including use of wood); analysis of energy use, needs and resources; training and institutional development; and scientific interchange.

The President directed in his Environmental Message of August, 1979, that A.I.D. "...give high priority to programs which would advance these objectives:

- . necessary preservation of natural forest ecosystems and their rich complex of plant and animal life;
- . multiple uses of highly diverse tropical forests, including management of natural stands, development of sociologically sound forest plantations, and combined agriculture and forestry;
- . increasing yields in family-scale tropical agriculture to relieve pressures on forest lands that are not suitable for cultivation;
- . developing integrated projects for reforestation, more efficient fuelwood use, and alternative energy sources."

A.I.D. has already begun to play a more positive role in dealing with forestry and related natural resource issues along the lines advocated by the President and Congress. The 1978 U.S. Strategy Conference on Tropical Deforestation, which A.I.D. co-sponsored with the State Department, was a first step. The Africa Bureau's 1978 conference on fuelwood generated additional dialogue and furthered thinking and planning on the key issues. Other conferences carried the process further: the Africa Bureau's energy conference in Paris in November, 1979, the Asia Bureau's conference on energy, forestry, and the environment in Manila in November, 1979, and an A.I.D.-supported meeting in Costa Rica on forest sciences in tropical areas, held in October, 1979, are some of the recent activities. A Peace Corps/A.I.D. conference on community forestry was held in Upper Volta in February, 1980.

Two communications within A.I.D. have begun the intra-agency dialogue necessary to formulate a reasoned policy and realistic program guidelines.

- . In September, 1979, the Assistant Administrator for Program and Policy Coordination sent an airgram to all Missions on "The Preservation of Forests." The airgram included a copy of the Presidential directive noted above and an excerpt from the report of the House Appropriations Committee.
- . The Committee report urged the Agency to increase funding, planning and staffing for assistance in addressing the environmental and natural resource problems they face. It asked all Missions to undertake "environmental profiling" - - a process involving the gathering of information about resource problems and trends, the initiation of a dialogue with host government officials, and the formulation of strategies and projects to respond to specific environmental and natural resource problems.
- . In late December, a memorandum outlining "Guidance on Forestry and Related Issues" was sent from AID/W to the Missions. The guidance memorandum "constitutes one more step towards the formation of a clear strategy. It outlines opportunities for Missions to examine the extent to which deforestation and the loss of vegetative cover constitutes an impediment to development, as well as the commitment of the country to alleviating the causes and effects. (It is) a request to Missions to start a dialogue with host governments and other donors where this has not been done and to build on and expand activities which have already been initiated."

A.I.D. has, of course, not been alone in assuming a more positive stance in addressing the worldwide problems of deforestation and natural resource degradation. The FAO has traditionally played a leading role in the provision of technical assistance for forestry and continues to do so, with over 300 persons providing forest-related skills to developing countries. The World Bank has put forth a strong Sector Policy Paper on Forestry and followed up with increased lending to social forestry projects, including a recent IDA loan to India for nearly \$30 million. Canada's CIDA and IDRC have published policy and background papers which support an increased level of funding for "trees and people." The Swedish International Development Authority supports several projects at FAO and has numerous bilateral projects

as well. The United Kingdom also provides forestry expertise; the Commonwealth Forestry Bureau at Oxford provides a principal source of tropical forestry information in Forestry Abstracts. Other European donors are also widely involved in forestry projects and tropical forestry research. Most importantly, developing countries themselves are expressing increased concern with deforestation and natural resource degradation and are actively seeking ideas and funding to address the problems head-on. The Djakarta Conference on Forestry was a recent forum for such issues.

Both governmental and private organizations in the U.S. have encouraged A.I.D. to assume this positive role in dealing with forestry and related problems and promise active collaboration and support of future A.I.D. activities in developing countries. For example, increased Peace Corps involvement with forestry efforts - - community woodlots, testing of more fuel-efficient technologies - - provides an opportunity for A.I.D. to collaborate in forestry at the "grass roots." Firm plans for collaboration in some country activities are already moving ahead. The potential complementarity with the Institute for Scientific and Technological Cooperation should also be noted. It proposes a program of research on social forestry, adaptive research in fast-growing species and tropical ecosystems management.

In short, A.I.D. has a wide-ranging mandate to provide substantial support for forestry and natural resource-related initiatives in developing countries in order to assist those countries to meet the basic human needs of their populations. A.I.D. will have to overcome the constraints common to new initiatives (funds, personnel, experience,

and relevant technology) in order to play this expanded role in the forestry area effectively. The Agency will be able to draw upon its own experiences with prior forestry-related efforts as well as those of other donors and voluntary agencies, such as CARE and the Peace Corps, although much ground-breaking work still remains to be done. In the next section, some of the possible program activities and approaches which may be useful in taking the next steps are suggested. It should be recognized that since energy, forestry and environmental components of projects cannot be clearly separated, the pursuit of many activities identified will be consistent with the high priority that the Agency is also placing upon energy programs.

V. Program Development in Forestry and Natural Resources

Although A.I.D.'s experience has been scattered, there are a substantial number of relevant projects for reference in planning and programming forestry-related initiatives. Review of project impacts is still needed to prepare the Agency adequately for more effective multi-donor and multi-national efforts as well as to meet needs for planning bilateral assistance efforts in the 1980's. It is clear, however, that local involvement and local investment will be essential if serious efforts are contemplated. A.I.D. programs in forestry and natural resource management, to be cost-effective, will have to provide for substantial participation by the people who currently use the trees - - assisting them to contribute to the solutions of the

problems which they now cause. The term coined by the FAO - - "forestry for local community development"⁹ - - and the concepts of "social forestry" are likely to be increasingly useful in shaping A.I.D.'s efforts to address the socio-economic and community aspects of the problems of deforestation.

Because of the diversity of problems, resources, awareness, and commitments among developing countries, any one of several areas of activity may be appropriate starting points for program development:

- . Analysis, planning and policy formulation (including natural resource inventories and land-use assessments, land capability classification, evaluation of tenure law and its applications)
- . Institution-building for natural resource management and conservation (including training, management systems, and establishment of service support institutions)
- . Incorporation of forestry activities into agricultural and rural development programs
- . Afforestation or reforestation, and protection of natural and induced vegetation
- . Appropriate and alternative energy.

Some of the ideas and experiences which may be relevant to each of these program areas are discussed briefly below. It should be kept in mind that there are a number of means by which A.I.D. can provide such program assistance:

- . Collaboration with other bilateral or multilateral donors
- . Provision of technical assistance directly to host countries - - with an emphasis on multidisciplinary teams

9. Marilyn Hoskins' paper for AID on "Women in Forestry for Local Community Development" provides practical guidance for using this approach. The concept of FLCD and social forestry are also discussed in more detail below, p. 33.

- . Cooperation with the Peace Corps and private voluntary organizations or other intermediaries
- . Participation in consortia capable of sponsoring regional approaches to natural resource management and development
- . Provision of PL 480, Title II (Food for Work) and Title III support.

Some implementation modes may be better-suited to certain areas of activity; only further experience is likely to indicate which are most cost-effective.

A. Analysis, Planning, and Policy Formulation

The artificial bounds often set in the process of project development and design may already have contributed to the magnitude of the problems of deforestation and may well be too restrictive to permit A.I.D. and host governments to implement effectively the kind of wide-ranging and farsighted strategies needed to address them. By thinking of development as a series of discrete events - - "projects" rather than as a continuous process, planners are often led to ignore the competition for scarce natural resources engendered by even the most developmentally-oriented projects. The expansion of Nepal's timber industry, for example, may have exacerbated that country's soil erosion problem. In Brazil, the ecological balance of the Amazon Basin has been undermined by the Trans-Amazon highway construction and associated resettlement and range development projects - - and no single project can now be designed to restore that balance. Broader analysis and improved planning are a prerequisite to overcoming project competition likely to result in natural resource depletion. By developing "country programs" and "sectoral strategies," a broader analytical framework can be set up to consider resource value trade-offs explicitly.

A.I.D.'s approach to forestry problems can begin such conscious efforts to surmount project bounds with analytical horizons expanded to suit the longterm and ultimately large-scale processes of natural resource development. The three-to-five year project planning frame must be widened to take into account likely conditions ten or even twenty years in the future. Knowing the rate of deforestation is essential¹⁰ - - but it is not enough. What is also needed is information on the carrying capacity of national systems, population growth, land use, food needs, energy alternatives, economic and fiscal health of the country or area and a host of other variables. Sound scientific knowledge is basic to the process of effective policy and program formulation regarding natural resource development. Sound understanding of the political, cultural and socio-economic conditions regarding use of and access to natural resources is fundamental to acting on the basis of the scientific knowledge.¹¹

A recently initiated project in Costa Rica illustrates an approach to addressing natural resource problems by combining planning and analysis tasks with institutional strengthening activities. The purpose of the Natural Resources Conservation project (No.515-0145) is to strengthen the institutional mechanisms through which Costa Rica manages renewable natural resources. The components of this \$9.8 million loan project will be:

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10. And the opportunities to use remote sensing technologies to measure and monitor rates of deforestation are growing. FAO has already taken steps; AID has several projects in remote sensing for agriculture which are also relevant.
 11. See the recent Devres report for AID on "Socio-Economic Considerations in Fuelwood Use".

- . policy analysis and research
- . pilot micro-watershed management
- . reforestation and cattle management improvement pilot project
- . forestry production pilot scheme
- . resource management plans for five priority regions
- . development of conservation education in a national park.

This project is an interesting mixture of planning and program development or analysis with field work (in the form of pilot projects). It is supported by strong public commitment of the Costa Rican government to the conservation of natural resources and the environment.

A.I.D.'s experience in Tunisia with a Watershed Planning and Marginal Lands Project (No.644-11-120-018), carried out between 1959 and 1967, illustrates the limitations which are posed when the commitment of the host country government to implementing scientific plans developed is not secured. Twenty-nine person-years of technical assistance were provided between 1963 and 1967. Soils and range surveys were carried out and conservation plans for the 157,000 hectare Oued Marguelli watershed in central Tunisia drawn up. Yet the single achievement of the project appears to have been a series of soil maps and an unimplemented watershed management plan.

B. Institution-Building

Building and strengthening national and community institutions will be as critical in addressing the problems of deforestation as it has been in A.I.D.'s more traditional sectors. National forestry

institutions are generally charged with managing forest resources and both supporting and regulating commercial forestry activities. Foresters prepare maps and surveys of forested areas to locate commercial timber resources and draw up exploitation plans for removal of salable timber, construct roads, manage concessions, and improve extraction and processing methods. Their tasks include efforts to achieve more homogeneous regrowth of cut-over land with a greater volume of valuable species than occurs in natural forests and the development of technologies and markets to achieve more complete utilization of a wide variety of species. The growing dimensions of tropical deforestation indicate that currently institutionalized efforts have been insufficient if not unsuccessful.

The capacity of most traditional forestry institutions to address the particular problems of fuelwood can, moreover, certainly be questioned. Only a few countries have radically reorganized their forestry efforts to deal specifically with such community-level use. Government foresters, charged with protecting state forest reserves and supervising the commercial concessions in most countries, continue, more often than not, to end up as enemies of the rural communities and populations. Rural households have thus continued to meet their needs for fuelwood while foresters have not succeeded in protecting trees from fuelwood seekers - - with the consequent expansion of unsustainable wood use patterns. Reversing this trend will not only be a matter of increased police action, but participation of the fuelwood user groups will be needed as well. It is likely that the current establishment of foresters will need a radical reorientation in ap-

proaches to their current tasks - - encouraging community participation in regeneration efforts instead of simply policing government plantation, for example - - as well as expansions in their numbers to permit them to take on the additional responsibilities implied. It may be, too, that the administrative divisions between forestry, agriculture, livestock and natural resources will need to be reconsidered if such reorientation is to be successful.

Assisting developing countries to strengthen institutions for planning, research, extension, and public education activities is also important. This may require inputs of economists, sociologists, educators, extension personnel and media-specialists - - a whole range of traditionally "non-forestry" expertise. The involvement of the Peace Corps, private voluntary organizations, and scattered community development and agricultural extension personnel in community level forestry activities should continue to provide a useful fund of experience and insight for institution-building at this level.

In the longer term, staff development in A.I.D. itself will have to reflect the wide range and special characteristics of institution-building tasks regarding natural resource development - - balancing the formation of scientific research and communication management entities with the development of increased extension and communication mechanisms to enhance local participation in addressing the problems of deforestation. Continuity of administrative and technical effort - - in the form of project monitoring and evaluation, as

well as research and program development - - will be essential to efficient and intelligent use of resources for forestry assistance.

The Integrated Rural Development project in Haiti (No.521-0078) as well as the Costa Rica project already described, provides an example of an institution building approach to natural resource conservation. The purpose of the Haiti project is to develop and test an institutional system and capacity to deliver resources and services to small farmers inhabiting four critical watersheds. This \$12 million project was initiated in 1977, but was redesigned after further review in late 1979. The original project assumed a greater existing institutional capacity to absorb the project than was in fact the case, and the revision will involve a scaling-down.

The Niger Forestry and Land Use Planning project (No.683-0230) illustrates a major institutional building emphasis. The project's outputs will include the creation of a central technical planning unit in the National Forest and Water Service, the conduct of a natural resources inventory and yearly vegetation monitoring program, and an education campaign on deforestation and forest conservation (for government and the public alike) as well as the preparation of a 20-year plan for rehabilitating the nation's natural resource base.

Educational support for the development of a national cadre of foresters is included in the Upper Volta Forestry Education and Development project (No.686-0235). The \$5.9 million grant project will seek to train 40 students per class in a two-year lower level forestry

agent training center by involving them in trials of forest management alternatives on 4,500 hectares of natural forests growing on shallow lateritic soils in the Dinderosso Forest. This work will also provide a training opportunity in the interaction with herders and farmers in the area.

C. Integrated Agroforestry and Rural Development

The simultaneous or sequential growing of trees with agricultural crops is called agroforestry (or agrisilviculture). The techniques of agroforestry were developed through the attempts of foresters in Asia to grow greater concentrations of commercial timber than occurred in the natural forest. Cut-over or depleted natural forests were cleared and seedlings of teak or other valuable species were planted. Local cultivators supplied the labor and were allowed to farm the land until the canopy closed - - two or three years - - in return for planting and caring for the seedlings. This was the taungya system, devised to reconcile the interests of foresters and shifting cultivators.¹²

The emphasis in agroforestry has recently shifted from the production of valuable hardwood species in combination with controlled crop cultivation to the intensification and stabilization of agricultural land use under cultivation by enriching the fallow with the use of leguminous species such as Leucaena.¹³ This shift in emphasis

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12. Shifting cultivators, under normal conditions, of course, practice a sort of agroforestry by pollarding - that is, cutting off side limbs to reduce shade - - rather than cutting certain trees and by stimulating the growth of other species through burning in preparation for cultivation.
 13. Two publications funded by AID are particularly useful: Leucaena: Promising Forage and Tree Crop for the Tropics (NAS, 1977) and Tropical Legumes: Resources for the Future (NAS, 1979).

to the development of sustainable land use management reflects a concern for the subsistence needs of small farmers under increasing population pressures. Many new types of trees, additional values of trees (nitrogen fixation, for example) and permanent combinations of trees and food crops are now considered so that increased yields of food, fuel, fodder for livestock, and materials for shelter essential to meet basic human needs are possible.

Given the cultural variety and wide range of ecological conditions of developing countries, however, diversity will continue to be the hallmark of agroforestry. The likelihood of a replicable panacea - - such as a particular combination of trees and crops - - is low. It is probably neither realistic nor useful to aspire to one or two "optimum" agroforestry combinations or to harbor expectations of the kinds of universal innovations achieved in the development of high yield varieties of corn, wheat, and rice.. Agroforestry poses a major challenge to applied research in both the agricultural and silvicultural fields. Until recently research has emphasized the manipulation of genetic material or ecological factors in order to overcome the limitations of particular crops in achieving high-output and sustainable systems of production. But the improvement of unique traditional patterns of local crop and tree cultivation - - possibly representing the most efficient and ecologically sound use of resources - - will require site-specific trials with exotic as well as local species.

Since agroforestry merges the disciplines of ecology, agronomy,

and forestry with sociology, anthropology, economics and development administration, and because its advance will require investments in small-scale field experimentation, unique problems are posed for development assistance work. To date, A.I.D. has little experience in agroforestry per se. A wide range of rural development and agricultural project experience, however, is both relevant and useful. In particular, the farming systems perspective currently being developed in agricultural research systems around the world is likely to provide valuable insight for agroforestry applications.

Although the A.I.D.-sponsored and CARE-implemented *Acacia albida* tree planting project in Chad (677-0008) is often cited as a reforestation project, it is likely that its agroforestry characteristics have contributed to its success. In the drier areas of Africa in Sahel, the *Acacia albida* epitomizes a tree that provides multiple benefits to rural welfare and development: soil enrichment through nitrogen fixation, dry season browse and pods for cattle feed, dry season shade but leaflessness in the growing season - - due to its deciduous nature during the rainy months. It is thus an ideal tree for millet and sorghum fields, and much esteemed by local farmers, who know its value.

D. Afforestation and Reforestation

Planting trees or shrubs in locations where tree cover has been removed (reforestation) or in areas which have never been forested (afforestation) can be done in large-scale plots with top-down planning and management and a paid labor force, in small-scale efforts (fruit trees around a houseyard) by individuals working on their own

time, or at any scale in-between. Tree-planting activities are probably those which spring to mind as a "forestry project." It should, however, be emphasized that reforestation and afforestation are only one possible approach to addressing the problem of deforestation.

Large-scale plantations are often established over extensive surfaces of government-owned lands and administered by forest service personnel. This is not invariably the pattern; in Brazil, over one million hectares of eucalyptus have been planted on private lands with the stimulus of government subsidies.

There is a considerable body of information and experience in plantation silviculture in developing countries, although it has been accumulated mostly for climates with monsoonal rainfall regimes or a marked dry season (India, Burma, subSaharan Africa). The economics of plantation tree farming are amenable to conventional project analysis, although environmental benefits or losses are still relatively difficult to evaluate. Still, there are fewer unknowns in large-scale forestation than any other type of activity considered in this paper.

Large plantations are viewed by some as the only way that developing countries will be able to meet future wood needs on a predictable and sustainable basis, even in regions that now have relatively abundant natural forests. This view derives from the relatively high productivity of plantations in suitable agro-climatic situations. Fast-growing species are planted and all the trees are utilized so that plantations are up to forty times more productive than natural

forests.

- . The Asian Development Bank, for example, estimates that reforestation in Asia must be expanded at a rate of 10 million hectares per year at an annual cost of \$400-800 million in order to satisfy future needs and avoid a wood deficit in 1990 on the order of 170 million cubic meters.
- . In the African Sahel, where there is already a critical wood deficit, plantations should be established at the rate of 300,000 hectares per year to meet future needs. Currently, however, costs far outrun available resources.

A.I.D.'s experience in Jamaica illustrates a large-scale forestry approach. Six thousand hectares of fast-growing Caribbean pine (P. caribea) were planted during 1974-77 period on government land as a major part of a \$4.4 million Forestry Development loan. The project was preceded by seven years of forestry assistance from Canada and the U.K. as well as a UNDP/FAO project on Forestry Development and Watershed Management in the Upland Regions. The FAO project yielded 38 studies that helped to justify the A.I.D. project and identify the critical areas for reforestation. This background, together with a high level of government commitment and the relative ease with which the Caribbean pine is grown, resulted in a successful project.

A recently designed \$1.6 million grant project for Gambia will establish 1,300 hectares of Gmelina on government land. The selection of Gmelina was backed by 30 years of trials begun by British foresters with various species, including teak, eucalyptus, and Khaya spp. The plantation is projected to average 15 to 20 cubic

meters per hectare of annual wood production and will help to supply the urban fuelwood needs. Other project components are training scholarships, village woodlots, and feasibility study for mangrove exploitation.

Barring innovative solutions to the problems of collective management, experience indicates that the benefits of large-scale plantations in general are likely to be limited to: employment in the plantations, a general increase in the availability of wood for urban markets, decreased cutting pressures on natural forests, and some measure of planned security as far as future wood needs are concerned. Experience also indicates that problems of policing are enormous, especially where land pressure and demand for firewood are great, and that direct costs may, at least in the short run, outweigh the direct benefits.

Small-scale forestation includes trees planted by communities or individuals and grown as a crop in small plantations of a few hectares, in small groups or along the sides of roads, fences, houses, and irrigation boundaries. In general, there are no inherent or insurmountable technical obstacles to small-scale forestation. Species, planting techniques, nursery design and the like are well tested and tried.

The benefits of small-scale efforts are substantial: local self-sufficiency in fuelwood, the multiple benefits from plantings, income-savings from not having to purchase fuel, and time-savings from not having to gather fuelwood at locations far removed from the community. The difficulties of small-scale forestation are equally

numerous: land may be in short supply or legally constrained, working out protection mechanisms may be complex, those doing the planting and protecting may not receive the benefits, and those with knowledge of improved tree varieties and techniques of planting may not be able to communicate effectively with individuals and communities. The need for involvement of people with skills other than those traditionally provided by foresters is very clear.

Small-scale village or community plantations have been most notably successful in the People's Republic of China, South Korea, and Gujarat State in India. The Chinese and Korean examples lose some demonstration value in nations without strong, not to say totalitarian, governments. The Gujarat State experience, however, holds several lessons for small-scale forestry interventions. Repeated failures to protect forests and to get large-scale plantations going led in 1969 to the idea of "extension forestry" and a group was started in the state forestry department. First, trees were planted on state lands along roads and irrigation canals. Villagers were allowed to cut grass between the trees in return for caring for the trees. Next, free seedlings and advice were given to individuals. Bigger farmers responded well, although small farmers did not. (Subsidies are now being considered to foster plantings on eroded marginal portions of small farms.) Third, village plantations were promoted, through dialogues between state forestry representatives and village councils. The elements were:

- . four hectares of land set aside by the village for planting
- . seedlings provided by the state with wages for laborers

- . villagers' agreement to protect trees from pilfering and grazing in return for harvesting of grass and fruits
- . on harvesting, equal division of trees between the state and village council, with price controls applied to the products, keeping them well below the market price and increasing accessibility to the poor.

The FAO's elaboration of a "forestry for local community development" approach generalizes on the Gujarat experience.¹⁴ FAO notes¹⁵ that several elements appear to be relevant to the success of small-scale forestry with community participation:

- . sustained technical support system
- . full range of development services, especially if part of a watershed management effort
- . obvious and tangible benefits for the participating community
- . appropriate community organization for planning, work, benefit allocation, and conflict resolution
- . strong commitment at higher government levels as well as at the community level
- . perhaps profound changes in community attitudes and behavior regarding trees and forests
- . perhaps profound changes in the attitudes of foresters regarding people, and a radical reorientation of forest institutions, from policy to technical functions.

A.I.D. has also undertaken small-scale forestry projects - - so far only in conjunction with larger plantation projects. In Jamaica, this effort was not successful as the government was unable to recruit an "extension forester." The Gambian project is just getting

14. The Hoskins paper for AID gives other examples of forestry for local community development approaches.

15. In the 1978 publication, Forestry for Local Community Development, FAO Forestry Paper No. 7, Rome.

started, but there will be a component which will seek to establish five ten-hectare village fuelwood plantations of Gmelina and Azadirachta. Cashews, mangoes, and citrus trees will also be offered. Motivation of the villagers to establish the plantations is somewhat in doubt, as the expressed priority need was agricultural improvement, but a process to elicit the interest and involvement of the villages has been built into the project.

E. Alternative Energy Sources

Fuelwood is the major source of domestic energy in most developing countries and accounts for the vast majority of wood harvested. Rural households tend to use wood itself while more urban households rely on mixtures of charcoal and wood. The expanding circle of deforestation around Ouagadougou in Upper Volta is perhaps the most dramatic and well-known indicator of the urban demand for fuel.

The "renewability" of trees has often been mentioned as a key advantage of forestry as a source of energy. The time needed for renewal is, however, a major consideration in undertaking any interventions involving the planting of trees for fuelwood. Only exceptional trees on exceptional sites, such as the Albizzia plantations in the Philippines which grow seven meters in one year, will produce benefits of such immediacy that they can be adopted without major subsidies, guarantees, or coercion. Measures with longer time delays are almost certain to require either some form of subsidy - especially to cover the opportunity cost of the land removed from cropping - or a companion development activity that compensates for the time delay.

Thus the need to conserve current woodstock while beginning reforestation and afforestation efforts along the lines described above suggests that attempts to improve the technology of alternative energy sources and to develop alternative technologies for using traditional energy sources more efficiently may be justified. The three-stone stove is an inefficient user of firewood; alternative stove designs (e.g., the "Lorena" of Central America) are felt to provide major firewood and charcoal savings potential. Few, however, have been spontaneously adopted or become commercial successes even where fuelwood is perceived to be in short supply.

Solar, hydroelectric, wind and biogas generation are other potential sources of alternative energy. Wider use of these technologies will depend on the success of the further testing, adapting, and redesign necessary before they can be more broadly considered as low-cost energy-saving alternatives to fuelwood. A.I.D. has a number of programs just starting in this area, particularly in the Sahel. Most will be research/pilot efforts and lessons learned are expected to provide valuable guidance in the future.

VI. An A.I.D. Strategy for the 1980's

This discussion paper has focussed thus far on building the analytical underpinnings for an A.I.D. strategy on forestry and other natural resource issues. In sum - - -

- . The problem of deforestation is a serious one, needing urgent attention.
- . Both technical and financial assistance are needed for developing countries to undertake long-term and innovative steps to address this problem.

- . A.I.D. has a broad mandate to provide such assistance, a base of experience in natural resource management and development, and a growing sense of approaches which could be useful.

The impact of deforestation and natural resource degradation will fall exceptionally hard upon the poor as fuelwood shortages threaten their abilities to cook food and heat their homes. Further, the future for increased agricultural productivity is jeopardized if continued impoverishment of the natural resource base is unchecked in the next decade.

A.I.D.'s vision for the 1980's must encompass program and policy options well beyond the narrow boundaries of tree planting. In this section, the process of delineating an A.I.D. strategy which can effectively deal with the broad range of problems associated with deforestation is begun. The identification of appropriate timeframes, and the marshalling of resources to carry it out are the tasks immediately facing the Agency.

A. Objectives

The nature of deforestation and related resource problems suggests that a wide range of objectives and initiatives may be appropriate in different circumstances. The process of goal specification in any given country may be usefully considered by Missions as part of the ongoing CDSS process or as separate element of an "environmental profile." Based on discussions above, five likely program objectives are suggested here and associated with several possible program initiatives for purposes of illustration. Some initiatives could support

several of the listed objectives, of course. The rough classification here reflects the usual goal-purpose distinction of the logical framework and is intended to demonstrate activities providing indirect as well as direct support.

Missions will also be able to define other objectives and initiatives based on assessment of country circumstance and needs. The objectives suggested here include: (1) raising the level of developing country awareness, (2) supporting direct forest development activities; (3) reducing pressures causing deforestation and natural resource degradation; (4) increasing the efficiency of forest resource utilization; and (5) improving institutional capabilities to manage natural resources.

1. Objective: To raise host government awareness of and commitment to the problem of deforestation and natural resource degradation.

- . Help assess actual loss rates and analyze causes of deforestation to determine the magnitude and types of efforts needed.
- . Develop a comprehensive capability to survey forest resources and to monitor forest cover changes through both ground and remote-sensing technologies.
- . Assess with the host government, the economic consequences of existing forestry related practices and land-use patterns, including the associated indirect costs of deforestation, e.g., flooding, soil loss,

siltation, disruption of agricultural cycles, rising costs of fuelwood and other forest products, and loss of medicinal trees, bushes and wildlife.

- . Help develop a country strategy to deal systematically with deforestation and associated forest land and resource use problems.

2. Objective: To provide support for protection, regeneration, production and restoration efforts.

- . Help identify, protect and manage critical catchments and watersheds, areas which contain representative genetic materials, and unique or fragile environments.
- . Develop planting materials and technologies and train people for a variety of forestry activities which can be locally initiated and controlled: tree plantations, agroforestry, woodlots, and private holding tree planting.
- . Assist in developing income generating programs for the rural poor based upon managing and marketing forest products (plant and animal) on a sustainable basis so that there is a local stake in maintaining natural and planted forests.
- . Support efforts to learn and record local knowledge of plants and animals and the scientific basis for indigenous resource practices.
- . Initiate, support and expand existing programs of applied research in agroforestry to identify, screen and evaluate trees and plants which may be useful in solv-

ing problems of the rural poor. This will include those species which are fast-growing, regerate by coppicing, and have multiple purposes (wood, forage, fertilizer and soil fertility improvements) and complement food crops, as well as those which provide other economic and environmental benefits.

- . Consider Food for Work (Title II) and Food for Development (Title III) to provide some of the commodity support and local currencies needed to finance the substantial amounts of labor that might be needed in any large-scale efforts to restore degraded lands and watersheds.
- . Encourage governments to implement necessary socio-economic and administrative changes, such as land tenure security, so that greater local participation will be forthcoming.

3. Objective: To ease pressures on current use of forests and other vegetation by developing renewable and laternative sources of energy and appropriate, sustainable cropping systems for the rural poor.

- . Support village woodlots or urban tree plantations where there is an active pattern of communal landholding or communal oversight of activities. The necessity for involving the women of the community (who usually gather and utilize the fuelwood) in

the identification, design, and implementation of such projects cannot be over-stressed.

- . Increase productivity of currently cultivated land to reduce the pressure of expanding populations to use forest, savannas and marginal lands for agricultural expansion. This approach needs to be initiated with caution, looking at both the intrinsic capability of the land to support intensified agricultural production and the energy requirements (including fertilizers and pesticides) to sustain it.
- . Develop possible alternatives, especially those based on renewable energy sources, as substitutes for wood fuel and charcoal. Also consider the field testing of solar devices with potential for drying grain, fish, and tobacco as well as more efficient low-cost and socially-acceptable stoves and improved kilns for charcoal production.
- . Utilize the concept of agroforestry for the simultaneous and stabilized production of food, forage, and fuelwood especially in areas where shifting cultivation is practiced.
- . Evaluate possibilities for short-term subsidy programs for alternative fuels, especially for poor consumers. Such programs are, however, expensive and difficult to terminate.

- . Consider, if agro-forestry is not appropriate, short-term supplementary financing of commodity support to compensate owners for the loss of productive assets. The timescale of forestry efforts means that land which is replanted to trees is withdrawn from other forms of cultivation for long periods of time.

4. Objective: To increase utilization efficiency of forest and other natural resources through (1) technological improvements - - in production, extraction, processing and end use, - - and (2) more effective means of controlling the use rates of existing resources.

- . Develop local capability to formulate solutions which are specific to particular environments through long-term training at professional levels.
- . Provide short-term training programs in tree planting, propagation and harvesting. A.I.D.'s policies focus on community level training and support of community level efforts through extension services for forestry and soil/water conservation.
- . Support public education on resource conservation to provide stimuli for effective community or individual participation in natural resource use through Forestry for Local Community Development (FLCD) approaches and school or backyard tree nurseries.
- . Consider small-scale or cottage industry development to utilize "noncommercial" species of trees remaining

after selective harvesting for commercial purposes. This approach is limited and must be coupled with appropriate reforestation and environmental controls to ensure that such intensive use of the forest does not create environmental problems of its own.

5. Objective: To assist governments to strengthen their institutional capability to manage natural resources through improved planning and regulation of lands for agriculture, energy and other uses at the farm, community and regional levels.

- . Upgrade the effectiveness of host country forestry personnel to manage existing reserves by providing appropriate training and equipment.
- . Provide technical assistance to host country agencies in analysis, planning, legislation and policy formulation, and environmental assessment activities.
- . Encourage host governments to initiate regenerative programs for lands which have deteriorated because of misuse.
- . Encourage and assist host governments to develop paraprofessional personnel able to advise small and marginal farmers on maintenance of existing tree crops and integration of tree and other crops in economically viable cropping patterns.
- . Encourage and assist host governments to develop and utilize local institutions to build community involvement and capacity for improved resource planning and management.

- . Encourage and assist host governments to develop and utilize regional institutions to strengthen planning and management of natural resource systems (e.g. river basins or catchment areas).

While these objectives and initiatives focus on activities that might be undertaken in recognition of an identified need, many traditional development activities can lead to deforestation. Missions must, therefore, ensure that A.I.D. activities do not cause unnecessary deforestation. The environmental examination should carefully evaluate whether cleared lands will sustain the intended uses. The activity should go forward only if resource regeneration, or other sustainable use components, are incorporated into the project.

B. Priorities

A.I.D. places its highest priority on assisting the poor in developing countries to achieve their basic needs in a self-sustaining way. Where the food and fuel needs of the poor are being threatened by deforestation and natural resource degradation, interventions are needed which will alleviate this threat. Where the poor in rural areas are clearly using resources in unsustainable ways, interventions are needed which will increase their capacity to implement sustainable modes of use (of land, trees, soil and water).

By examining all ongoing and proposed major projects (e.g., integrated rural/agricultural development, irrigation, rural water supply,

fish pond development, range management in arid areas), A.I.D. Missions should be able to ensure that appropriate forestry elements, such as erosion controls (windbreaks and vegetative plantings), woodlots, watershed protection, nurseries and training of personnel, are fully incorporated. This will reduce the competition for funds - - and the priority designation - - which many Missions already heavily committed to a wide range of development efforts are likely to perceive.

While the causes and magnitudes of deforestation and devegetation are different enough to require country by country determination of priority in operational terms, it should be noted that no country is immune to the problem of expanding populations placing increasing stress on natural systems. Few are immune to the concerns of rising energy costs which so directly affect the demand for fuelwood. By the time the deforestation problem is so evident that the urgency for action is apparent to all, it may be too late.

C. Appropriate Timeframes

It should be recognized that the economic and social benefits of projects in natural resource conservation, preservation, and development may not be realized over the short term. Although some objectives or initiatives can be accomplished relatively quickly (assessment of resources, use rates, causes of deforestation), the development of programs to meet other objectives (training of people, controlling use rates) may require a minimum of a decade before success can be expected, much less achieved. This should not deter Missions

from proposing such activities. Although normally funded over a three-to-five year project span, such programs of assistance will have to consider timescale problems in a more explicit and extended way than is normally done.

It may even be that follow-on project support should be planned for individual cases where the long range nature of the problem, and the need to sustain and support an equivalent long term commitment by the host country indicate second stage projects are needed. Again, some countries and some regions within countries have already moved further toward the meeting of various forestry objectives than have other countries. The array of short-term objectives in these countries will thus differ considerably from those in countries just beginning to think about concerted efforts to conserve or develop forest resources.

D. Resources

A.I.D. continues to face constraints of funds, skilled manpower, and relevant technology. A.I.D. can begin to marshal existing resources in ways which will help to address the problems of deforestation by:

- . exploring opportunities for piggybacking forestry-related interventions in rural development sector efforts
- . expanding in-house ability through extensive use of collaborative modes of programming
- . undertaking forestry-specific initiatives where conditions are most urgent.

The interdisciplinary mode of intervention, which has already been mentioned as an important requisite to effective action in the forestry

area, will pose some challenges in implementation.

In addition to the resources normally available from their regional bureaus, Missions can tap skills and expertise of Development Support Bureau personnel, programs, and projects. These include:

- . Six newly-arranged IQC contractors in Environment and Natural Resources can provide some expertise in forestry. The list of IQC firms was attached to AIRGRAM-210. IQC's and ongoing projects in other related subject areas such as Agriculture, Energy, and Rural Development can also provide needed expertise.
- . A number of DSB personnel and IDIs with formal training in forestry can be made available for support of Mission needs. The AID/W Forest Resources Group has been set up to serve as a key point of contact on forestry matters. Other personnel having knowledge of related fields such as remote sensing, environment, hydrology, agronomy, soils management, energy, land use planning, land tenure, local organizations, and community participation can also be made available in response to specific Mission requests.
- . For some of the identified initiatives, personnel from the Peace Corps and other agencies, as well as private and voluntary organizations, might be available.

By stressing project complementarity in achieving forestry-related assistance objectives, and by exercising the initiative in developing collaborative modes of implementing such projects, A.I.D. should be able to marshal the resources needed to address the problems of deforestation effectively and extensively over the coming decade.