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**UNITED STATES
MAN AND THE BIOSPHERE
PROGRAM (MAB)**

PLAN FOR THE U.S. MAB PROGRAM

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MAB

THE U.S. MAN AND THE BIOSPHERE PROGRAM

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APPENDIX

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1. INTRODUCTION

Global population growth, coupled with increased per capita consumption and rising expectations have created a disturbing paradox. Exploitation of the earth's natural resources must increase even to maintain current living standards; but the earth's resource base is finite and accelerated exploitation poses serious threats to the future quality, and possibly the very existence, of human life. Societies cannot shrink from the task of improving the quality of food, shelter, and health care provided to their citizens. Still, as the pace of resource development increases, the list of potentially adverse impacts lengthens: depletion of energy resources, deforestation, desertification, soil erosion, destruction of wildlife and fisheries, and contamination of air, water, and the food chain. It is clear that strategies must be devised to maximize the yield from the resource base but not at the expense of impairing its capability to produce.

During the 1970s these resource management and environmental issues became widely recognized and the search for solutions accelerated both in the United States and abroad. Ambitious programs were launched, and considerable progress has been made on a variety of fronts: air and water pollution control, coastal zone management, conservation of forest resources, and more judicious use of pesticides, to name a few. Nevertheless, even as these successes were ~~were~~ achieved, the overall number and magnitude of problems, continued to grow, ~~grow~~.

The Global 2000 Report to the President - a major study of probable changes in the world's population, natural resources, and environment through the end of the century - underscored the growing urgency of attending to these issues. According to the report, released in July 1980, "If present trends continue, the world in the year 2000 will be more crowded, more polluted, less stable ecologically and more vulnerable to disruption than the world we live in now." By the end of this century, the study estimates, the number of people in the world will have increased to nearly six billion - 45 percent over 1975 levels and there will be considerably fewer natural resources to support this population. On a per capita basis, the amount of arable land worldwide will have decreased by 38 percent, petroleum resources by 50 percent, the growing stock of wood by 47 percent, and water supplies by at least 35 percent. For certain of the poorest, countries, per capita food consumption, already well below minimum requirements for adequate health and nutrition, will have decreased still further.

The global environment, furthermore, will have deteriorated. By the start of the twenty-first century, the report concludes, we will see a 20 percent expansion of the world's deserts, a substantial increase in soil erosion and salinization of irrigated land, greater damage to crops and marine life as a result of water pollution from salts, acid rain, pesticides, and toxic chemicals, accelerated changes in climate due to air pollution, especially from increased coal burning, and the possible extinction of 15 to 20 percent of all species now on earth.

These projections are not a worst-case scenario. They represent a set of most likely (and in some cases, optimistic) impacts based on the assumption that current resource management practices will continue unchanged during the next twenty years.

Although a great deal of progress has been made, both nationally and internationally, it is clear that we are losing ground. There are three impediments to reversing this trend. First, technical data are inadequate for decision making in this arena; without accurate and timely scientific information, administrators cannot make rational decisions. Second, resource management decisions are complex and far-reaching and frequently have unintended effects. Yet, because most planning is now sectoral (handled by government agencies with specific missions or even by specialized offices within agencies), too little attention is given to potential conflicts or impacts beyond their jurisdictions. Finally, there is too little public understanding of the inter-related ways human activities affect the environment, and consequently, little support for programs to address these problems.

What is needed is a program that can (1) "fill in between," drawing upon but not duplicating existing research programs (particularly when the research required is cross-disciplinary), (2) "interpret" research results for decision makers so technical information can be applied to concrete resource-management problems, and (3) foster increased public awareness of the interrelationships and interdependence between human beings and their environment.

The Man and the Biosphere* Program (MAB) is the only international program designed to meet precisely these needs. It is a research and information exchange program established to find practical solutions to resource management problems. Established in 1971 under the aegis of UNESCO, 96 nations have MAB Committees and participate in the program. MAB is unique within the U.N. system in that the field projects comprising the Program are developed and funded in and by the participating countries. Global coordination, project linkages, and some facilitative assistance is provided through a small permanent secretariat in UNESCO and by an International Coordinating Council composed of representatives from thirty nations. The United States Program is directed by a forty-member National Committee.

Five principal objectives guide the Man and the Biosphere Program:

- Development of a comprehensive scientific information base for use in assessing the impacts of human activities on the biosphere
- Provision and synthesis of scientific data required for environmental planning, long-term resource management, and resource policy formulation

* The biosphere is that portion of the earth's crust and lower atmosphere that contains life and serves as the planetary life-support system for all species.

- ° Provision of scientific information in a language and format useful to managers and decision makers, and transmittal of the information to the appropriate organizations and individuals.
- ° Enhancement of public understanding of the interrelationships and interdependence between man and the biosphere.
- ° Improvement of international cooperation and global resource management through joint projects with MAB organizations in nations throughout the world.

The remainder of this document describes how the U.S. MAB Program is working to achieve these objectives. Section 2 describes the organization and administration of MAB and underscores the need for this type of program. Section 3 describes the specific projects proposed for the next two years; projected budgets are specified as well. The Appendix lists a variety of MAB activities currently under way.

2. Organization and Administration

2.1 Organization

An innovative organizational framework has been designed to accomplish the specific objectives of the U.S. MAB Program. This framework maximizes the opportunities for scientists from widely diverse technical disciplines to work together with nontechnical professionals, with government administrators, and with those in the business and environmental communities. It also provides a mechanism for focusing MAB efforts on highest priority resource management and environmental problems.

There are three components of the MAB framework. The first consists of projects of the fourteen scientific directorates that are MAB's basic organizational units. Each directorate, or committee of experts, is concerned with a distinctive substantive area. Eight of the directorates focus on types of ecosystems, e.g. forests, grasslands, and islands. Five others are concerned with a particular set of processes that affect the biosphere, e.g. pesticide use pollution and large-scale engineering efforts; and one directorate is concerned with the monitoring and conservation of natural areas biosphere reserves. Each MAB directorate is made up of individuals representing a wide range of expertise, so that taken together, the fourteen directorates provide a rich and varied base of knowledge. In some instances MAB projects are undertaken jointly by several directorates. Such projects permit the use of expertise in a range of substantive areas to address problems beyond the capabilities of a single directorate.

The second component of MAB is international cooperation with counterpart organizations in other countries, especially in the MAB international priority areas. These are:

1. Ecological research and training related to management of humid tropical forests.
2. Ecological research and training related to arid and semi-arid lands.
3. Urban areas considered as ecological systems.
4. Development of an international network of biosphere reserves.

Regional pilot projects in these priority areas and interaction with counterpart MAB organizations in 96 countries form the global MAB network.

A proposed third component of the MAB Program, would consist of Cooperative Regional Demonstration Projects (CRDPs). These pilot projects, to be conducted in selected regions of the United States, would integrate the results of research into the economic and social setting of the region of interest. The goal would be to identify the best strategies for achieving optimal levels of development while conserving the region's resource base.

While each of four MAB components embodies a discrete set of activities, the brief discussions that follow describe how the different sets of activities build upon and interact to create a cohesive endeavor.

2.1.1 The MAB Directorate Activities

The fourteen MAB projects fall into three broad categories, research on natural ecosystems; conservation and monitoring; and on technological processes.

Category I (Research on Natural Ecosystems)

Tropical Forests

Temperate and Mediterranean Forests

Grazing Lands

Arid and Semi-Arid Zones

Inland and Coastal Waters

Mountains and Tundra

Islands

Category II (Conservation and Monitoring)

Biosphere Reserves

Category III (Technological Processes)

Pesticides and Fertilizers

Engineering Works

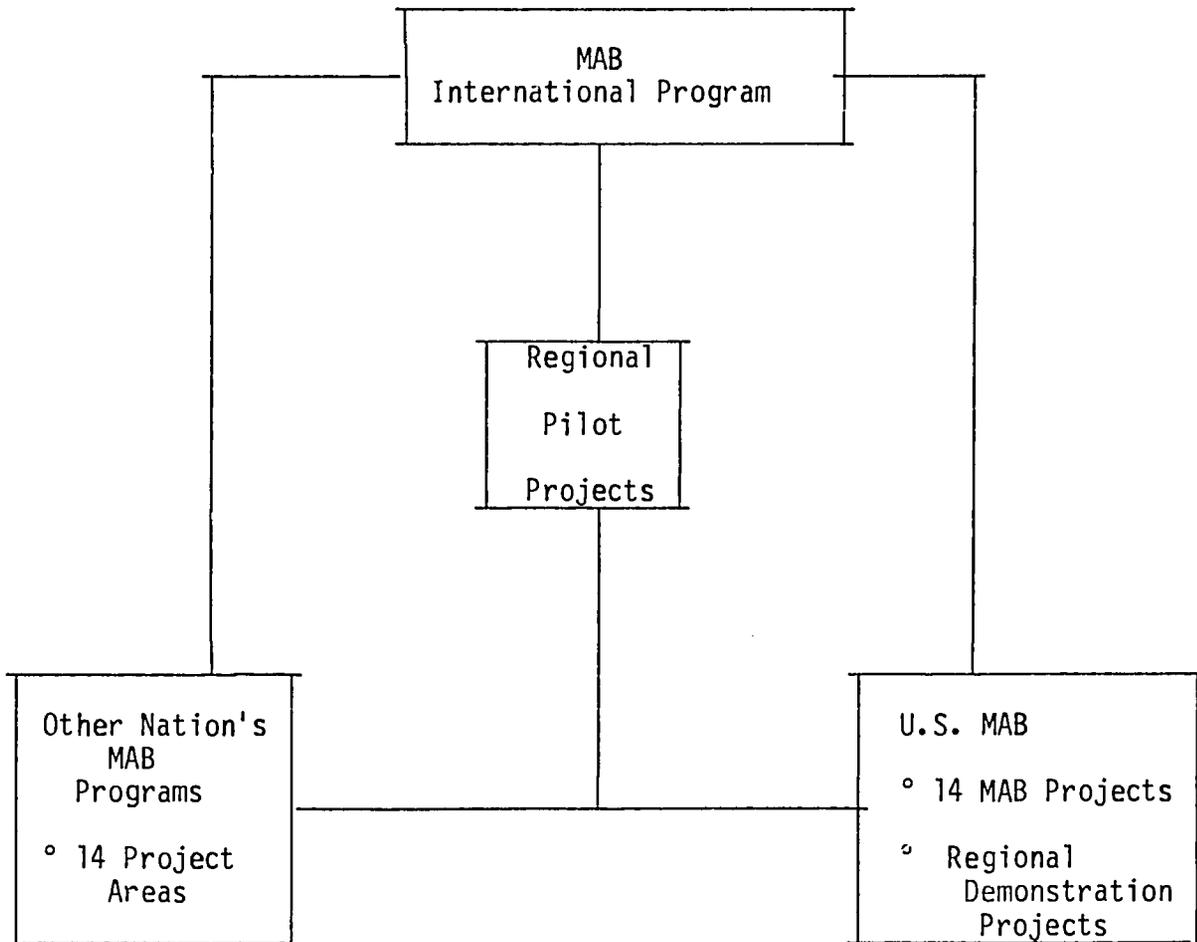
Urban Systems

Demographic Change

Environmental Perception

Environmental Pollution

Organization of the Man and The Biosphere Program



Each directorate consists of a group of eight to twelve top professionals in the field who conduct projects under the policy direction of the MAB National Committee. These projects include collecting, analyzing, synthesizing, interpreting, and disseminating information relevant to human impacts upon ecosystem types. These projects serve a vital function: they generate pieces of knowledge that ultimately are essential for making decisions about critical problems of food production, energy supply, resource use and environmental protection.

For example, a project of the Directorate on Grazing Lands focuses on the contribution of grazing lands to food production, the expected trends in this area, and methods to determine the variability of yield due to climatic fluctuations. The Directorate on Inland and Coastal Waters is conducting an assessment of the biological mechanisms for self-rejuvenation of the Apalachicola River in Florida. Internationally, the Tropical Forests Directorate is conducting a project in Venezuela to determine ways in which forest removal and conversion to agriculture and pasture land affect the cycling of essential nutrients and hence the fertility of the soil and the productivity of the vegetation. That directorate is also involved in a cooperative project with Costa Rica to study the implications of reducing native forests to a less diverse state.

The directorates focused on technological processes are concerned with the consequences of specific human activities rather than ecosystems. However, their guiding principle is similar: each project aims toward better detection, understanding, and resolution of the problems resulting from the impact of human activities on the biosphere. For example, the Directorate on Pesticides and Fertilizers recently co-sponsored a U.S. Strategy Conference on Pesticide Management involving the participation of 100 scientists, academicians, industrialists, government administrators, and environmentalists from five continents. The conferees developed a series of recommendations aimed at global reduction of the adverse environmental impacts of pesticide use. As a direct consequence, significant follow-up measures were initiated jointly by the U.S. Department of State, the Agency for International Development, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, and various industry groups. To cite another example, the Directorate on Environmental Perception initiated a research project to analyze how the risks associated with the geometric increase in the number of synthetic chemicals in the environment are perceived by individuals. The results have been used to increase public sophistication and capability to evaluate the risks and benefits of chemical use.

The Biosphere Reserve Project entails the development of an international network of permanently protected ecosystems which can be used for research and monitoring of both natural and man-caused change. One hundred seventy-seven reserves have been established in most of the major biogeographical regions of the world. They have a dual function; as resource areas for MAB research and

and training, and for the conservation of genetic materials. In the U.S., thirtythree biosphere reserves have been designated; they are listed in Table 2-1. Whenever possible, undisturbed reserves are paired with experimental tracts that have similar biological and physical characteristics.* This arrangement facilitates comparative research on undisturbed ecosystems and ones where experimental modifications are performed.

Considerable progress has been made under this program including:

- ° Sponsorship of a series of five regional workshops attended by resource managers, scientists, and government officials.
- ° Preparation by the U.S. Geological Survey of guidelines and computer listings of aerial imagery available for each reserve.
- ° Sponsorship of an international workshop on the long-term monitoring of biosphere reserves and the resultant publication of a series of monitoring guidelines.
- ° Publication of a volume describing the first twenty-seven U.S. biosphere reserves, indicating completed research and research needs within each.
- ° The establishment of complementary biosphere reserve activities between the U.S. and the Soviet Union.
- ° Establishment of several baseline monitoring programs, including acid rain investigations in several biosphere reserves and a full-scale cooperative research effort with Mexico.**

* For example, the Great Smoky Mountains National Park biosphere reserve is paired with a reserve at Coweeta Experimental Forest in the Southern Appalachian Mountains.

** Pursuant to an agreement between the MAB National Committees in the United States and Mexico, scientists have exchanged valuable information on research methodologies and management practices related to the Beaver Creek Biosphere Reserve in Arizona and the La Michilia Biosphere Reserve in Durango, Mexico.

Table 2-1

Officially Designated U.S. Biosphere Reserves

Aleutian Islands National Wildlife Refuge	Alaska
Beaver Creek Experimental Watershed	Arizona
Big Bend National Park	Texas
Cascade Head Experimental Forest and Scenic Research Area	Oregon
Central Plains Experimental Range	Colorado
Channel Islands National Monument	California
Coram Experimental Forest	Montana
Coweeta Hydrological Laboratory and Experimental Forest	North Carolina
Desert Experimental Range	Utah
Everglades National Park	Florida
Fraser Experimental Forest	Colorado
Glacier National Park	Montana
Great Smoky Mountains National Park	Tennessee, North Carolina
H.J. Andrews Experimental Forest	Oregon
Hubbard Brook Experimental Forest	New Hampshire
Jornada Experimental Range	New Mexico
Konza Prairie Research Natural Area	Kansas
Luquillo Experimental Forest	Puerto Rico
Mount McKinley National Park	Alaska
Niwot Ridge	Colorado
Noatak National Arctic Range	Alaska

Table 2-1 (Continued)

Olympic National Park	Washington
Organ Pipe Cactus National Monument	Arizona
Rocky Mountain National Park	Colorado
San Dimas Experimental Forest	California
San Joaquin Experimental Range	California
Sequoia-Kings Canyon National Parks	California
Stanislaus Experimental Forest	California
Three Sisters Wilderness	Oregon
University of Michigan Biological Station	Michigan
Virgin Islands National Park	Virgin Islands
Virginia Coast Reserve	Virginia
Yellowstone National Park	Wyoming, Idaho, Montana

2.1.2 International Activities

MAB Committees are currently operating in 96 countries. To date, the MAB countries together have sponsored approximately 1000 field projects and have designated more than 177 biosphere reserves in 46 nations. Projects have included such diverse efforts as a study of the relationship between human activities and desertification in Tunisia, and an assessment of the impact of oil and gas development on coastal regions surrounding Campeche, Mexico.

A subset of MAB international activities is supported by the U.S. Agency for International Development. These activities, known collectively as the AID/MAB Project, include research studies, training sessions, conferences, and workshops in AID mission nations. Each activity contributes to the formation of a solid foundation of new knowledge and to the establishment of networks for scientific communication, thereby facilitating implementation of AID's congressional mandate to help the less developed countries improve their capability to protect their environment and conserve and improve the management of their natural resources.

One multinational AID/MAB effort has entailed the development of "Country Environmental Profiles" in thirty-one developing nations. These profiles, which are compilations of existing environmental information for each target country, serve as source books for foreign government planners, scientists, and AID mission personnel. Other AID/MAB projects in individual countries have included a watershed management training program in the Philippines, a study of the status of endangered species in Thailand, and the development of guidelines for projects involving clearance of tropical forest areas in the Amazon Basin. These international activities are similar to domestic MAB programs. They fill gaps in research not covered by other programs, the research is multidisciplinary, and the activities are problem oriented. (Major international activities within the AID/MAB Project are listed in the Appendix.)

The benefits accruing to the United States from this component of MAB are threefold. Principally, well-coordinated international projects can produce results more quickly and prevent duplication of effort. The United States gets the benefit of work done elsewhere. International projects can also provide U.S. scientists with valuable information that cannot be obtained from domestic studies. For example, unintended impacts in foreign countries such as those caused by an accidental oil spill or an incident of pesticide poisoning - provide opportunities to collect extremely useful data that ordinarily are not available in the United States. Even under less exceptional circumstances, the study of diverse human impacts on similar ecosystems throughout the world provides a rich source of comparative information.

A second major benefit of this component is its significant contribution to U.S. foreign policy objectives. To date, the thrust of the MAB international program has been one of scientific cooperation; political issues have not intruded. Thus, the United States has improved its image by utilizing its expertise to help solve practical problems in developing countries. The MAB international effort is not an assistance program; it is unique in its main thrust, in that all nations support their own research contributions. Consequently, it sets a tone of cooperation and promotes better relations among participating countries.

Finally, as indicated in the Global 2000 Report, it is clear that the future resource needs of any nation, including the United States, cannot be fulfilled entirely through domestic production. It has been estimated, for example, that if the current rate of tropical forest exploitation continues, 25 to 40 percent of the world's existing tropical forests will be destroyed by the year 2000. To the extent that nations cooperate in efforts to enhance the management and conservation of their own resources, future global and domestic shortages may be reduced.

2.1.3 Cooperative Regional Demonstration Projects

It has become increasingly clear that the topsy-like patterns that have often characterized developments in this country in the past are no longer adequate to meet future needs. A good share of the problem has arisen because institutions in the U.S. have been, and continue to be, organized along sectoral lines. Consequently, programs often are narrowly defined, and resources treated as isolated entities. Conflicting demands on water resources are a good example of this problem.

It is increasingly apparent the various sectoral interests must be brought together so that the trade-off benefits of resource development options can be weighed adequately. To achieve this objective, it will be necessary first to identify proposed activities in each sector for particular regions, then to identify and develop the additional information needed to integrate them, and ultimately to present options for the decision makers.

This is the task that MAB proposes to attempt on a pilot scale under its Cooperative Regional Demonstration Projects. The goal of the projects will be to assist with resolving specific resource-management problems in a clearly defined geographical region such as the Lake Champlain Basin, the Southern Appalachian Region, the Lower Colorado River Basin, or an urban area. Under this concept, the integrative skills and scientific expertise of the Man and the Biosphere Program would be employed as an organizational tool to assist in providing the basis for logically and economically sound resource-management decisions within a region.

Once agreement has been reached for a CRDP, MAB would provide a forum for the following activities to be initiated:

- ° Identification of anticipated major activities, agencies and private interests involved in the area.
- ° Identification of gaps in the technical information available to decision makers; design and implementation of a research program to fill the gaps.
- ° Assistance in organizing, integrating, interpreting, and disseminating data.
- ° Presentation of options for achieving goals through the sponsorship of workshops, symposia, and planning sessions.

Scientists, government administrators, and outside interest groups in many regions of the U.S. have expressed interest in this approach. It has been suggested that CRDPs will represent a valuable complement to the existing resource management planning infrastructure.

2.2 Administration

The United States Man and the Biosphere Committee was established in 1972 under the U.S. National Commission for UNESCO. This forty-member National Committee comprised of directorate chairmen as well as other leading resource management and environmental-planning authorities from government, academia, and private industry directs and guides policy, planning, and program development for the MAB Program. The Chairman of the Committee serves on the International Coordinating Council of MAB. A six-person Executive Committee advises the Chairman concerning policy and policy issues that may arise between annual meetings.

A small secretariat located in the Department of State, in Washington, D.C., is charged with responsibility for daily administration of the U.S. MAB Program. The secretariat coordinates the activities of MAB, monitors ongoing projects, and provides all necessary service functions including accounting, conference organization, and document preparation and dissemination. The secretariat also provides a link with the international secretariat of MAB and the National Committees of other MAB participating countries. Headed by an Executive Director, who is a senior foreign service officer assigned by the Department of State, the secretariat also includes high-level professionals on special assignment from the Department of the Interior, the Department of Agriculture, and other domestic agencies.

The scientific activities that make up the MAB Program are initiated in two ways (1) directly by members of the fourteen directorates or, (2) by independent scientists and professionals whose research projects are funded through the MAB Consortium for the Study of Man's Relationship with the Global Environment. In the first case, specific projects are planned jointly by directorate members in conjunction with the MAB National Committee and submitted to funding agencies, such as the Departments of the Interior and Agriculture and the National Science Foundation. In the second case, field research projects are submitted to the Consortium for the Study of Man's Relationship with the Global Environment. The Consortium - an interagency body currently funded jointly by the U.S. Forest Service, the National Park Service, the Fish and Wildlife Service, and the Heritage Conservation and Recreation Service - was organized in 1979 to sponsor research projects complementing both the missions of the member agencies and the work of individual MAB directorates. Projects sponsored by the MAB Consortium are selected by a process of competitive peer review; only a small percentage of the proposals are funded. In order to receive support, projects must conform to a carefully designed set of criteria established to ensure that each project reflects the overall purpose and objectives of the Man and the Biosphere Program.

The Consortium has supported a wide variety of research studies. (See the Appendix for a list of projects funded during the last two years.) For example, in one project scientists are studying strategies for the regeneration

of Brosimum alicastrum, a tree widely distributed throughout the moist tropical forests of Mexico. Although the seeds and the leaves of this tree are exceptionally rich in protein and essential amino acids, they remain a resource that has been largely untapped. It is anticipated that further basic research will lead to better utilization of this species for increasing food production, slowing conversion of tropical forests to pasture, and improving the welfare of rural populations.

Management of the international component is coordinated by the U.S. Department of State. Linkages to the MAB international programs are facilitated through the vice president of the Executive Board of the MAB International Coordinating Council (the chief governing body of MAB International), who is also a ranking State Department official and Chairman of the U.S. National Committee. Furthermore, since members of the fourteen directorates regularly participate in international projects, close coordination between the domestic and international programs of MAB is assured.

The proposed Cooperative Regional Demonstration Projects would be managed in a variety of ways. In some instances, a single MAB directorate would assume responsibility for program development and guidance. In others, that responsibility could be taken by a member of the MAB secretariat, a representative from a local agency, or an outside consultant designated by the MAB secretariat. In all circumstances, however, MAB would promote the establishment of a regional steering committee, composed of representatives from the pertinent regional agencies and institutions, to work cooperatively with MAB personnel. MAB would seek the initial financial support for these efforts and also help ensure that, to the maximum extent possible, monetary and human resources from appropriate local, state, and national organizations would be channeled into the programs.

3. Proposed Program

Officials from the major natural resources and environmental management agencies, under the leadership of the Departments of Interior, Agriculture, and State participate in or work closely with the MAB National Committee and the Directorates in planning the National MAB Program. This on-going process of active collaboration between the academic and governmental sectors helps to insure that U.S. MAB deals with realistic and significant issues. The following section describes those high priority activities that MAB proposes to conduct during the next two years. Some of these are in the initial stages of planning while others are partially funded projects which are currently underway. Detailed information is available from the U.S. MAB Secretariat Department of State (IO/UCS) Washington, D.C, 20520.

3.1 Projects of the MAB Directorates: emphasis and proposed tasks.

1. Tropical Forests: ecological effects of increasing human activities on tropical and subtropical forest ecosystems.

emphasis: to assist in integrating and developing U. S. research and training programs, to solve the socioeconomic and environmental problems associated with the accelerating loss of tropical forests in accordance with the President's directives to Government Agencies on The World's Tropical Forests: A policy, Strategy, and Program for the United States. (July 1980)

proposed tasks: described in Section 3.4.1 International Activities.

2. Temperate Forests: ecological effects of different land uses and management practices on temperate and mediterranean forest types.

emphasis: baseline environmental monitoring projects and analyses of changing environmental conditions in temperate and mediterranean forest types to develop alternative management and multiple use strategies. Particular attention given to quantifying the social, economic and environmental consequences of each option.

proposed tasks:

- o Assessment of the Potential to Utilize Non-Commercial Forest Resources for Energy Production

This project will help determine the optimal role that five diverse non-commercial forest types can play in meeting the nation's future energy requirements. For each type selected (pinyon-juniper in the Southwest, chaparral scrub in California, aspen woodlands in the Lake States, scrub oak in the Southeast and non-commercial tree species in the Northeast) there will be a determination of the quantity of standing biomass, the rate at which it accumulates, the potential regional markets for forest products, and the locality's

alternative prospects for energy supply. Within each forest region studied, a series of alternative long-range extraction plans will be designed; and, for each option, the social, environmental, and economic consequences will be quantified. This study will complement previous investigations of the energy potential of commercial forest types.

° Analysis of the Nutrient-Cycle Impacts of Forest-Management Practices

Three intensive forest-management practices - sites preparation, monoculture forestry, and whole tree harvesting - will be studied. For each, the magnitude of disruptive impacts on the nutrient cycle will be investigated and thoroughly documented.

Evaluation of the Effects of Various Land-Use Planning Approaches in Several Forest Areas

The first step will be to inventory current land-use strategies in selected forest regions. Investigators will chronicle the impacts on wildlife habitats, watersheds, recreational activities, and aesthetics, as well as the levels of forest productivity and growth. Simulation techniques will then be used to predict variations in impacts under different sets of land-use strategies in different forest regions.

3. Grazing Lands: impact of human activities and land use practices on grazing lands from temperate to arid areas.

emphasis: Over one billion acres of land in the U.S. provide grazing for livestock and grazing and browse for wild herbivores. Emphasis is on research to assure sustained yield from these grazing lands which are important for production of beef, lamb, wool, wildlife, water and for recreational opportunity. This U.S. MAB effort is part of a large international project.

proposed tasks:

° Prediction of Grazing-Land Productivity Under Meteorological Variables

This project is described under Section 3.4 International Activities.

° Evaluation of Range-Management Strategies in the Southeastern United States

The objective of this study is to design and promote optimal management of the nation's southern rangelands and, in the process, help increase livestock production. Four different types of environmental and live-

stock-management techniques* will be implemented and tested on National Forest system land in Texas, Louisiana, Mississippi, and Florida. The biological, physical, economic, and social impacts of each technique will be evaluated, and the findings will be widely disseminated to regional decision makers and administrators.

4. Arid and Semi-Arid Zones: impact of human activities on the dynamics of arid and semi-arid ecosystems.

emphasis: Casual relationships in arid land degradation will be analyzed with the view toward development of long range strategies for arid land development consistent with carrying capacities.

proposed tasks: The principal activities planned by this directorate are in cooperation with other countries and are described in Section 3.2.1.

5. Inland and Coastal Waters: ecological effects of human activities on the value and resources of lakes, marshes, rivers, deltas, estuaries, and coastal zones.

emphasis: Research, education, and training activities to develop management strategies that provide maximum sustainable yield from these resources.

proposed tasks:

- ° Assessment and Comparison of Existing Conditions and Management Techniques in Selected Estuaries on the Gulf of Mexico

The project will investigate how specific human practices and natural conditions have interactively affected the quality of four representative Gulf Coast estuaries.** A principal area of inquiry will concern the impact on conventional fisheries production on such diverse factors as land use in surrounding areas, existing levels of air and water pollution, the incidence of offshore oil and gas development, and physical oceanographics. One major result of the project will be a plan to maximize the yield from commercial fisheries while permitting necessary levels of energy development and recreational use in inland waters.

* The four techniques are environmental management without livestock management; extensive management of environment and livestock without seasonal grazing; extensive management of environment and livestock with seasonal grazing; and intensive management of environment and livestock.

** The four estuaries include: Apalachicola Bay, Florida; Barataria Basin, Louisiana, Laguna Madre, Texas; and Laguna de Terminos, Mexico.

° Development of a Handbook on Estuarine Management

The objective is to produce a practical, usable book on the basic principles of effective estuary management that have widespread applicability.

6. Mountains and Tundra: impacts of human activities on mountains and tundra ecosystems.*

emphasis: Develop techniques for prediction of carrying capacity of mountain ecosystems for multiple use, including tourism. The ecological and socio-economic impacts of tourism, industrial development, and resource exploitation will be examined in mountains and tundra areas.

proposed tasks:

° A principal activity planned by this directorate is the leadership of a multi-directorate project in the Colorado Rockies described in Section 3.2.2.

° The four primary foci of proposed research of the MAB Alaska group are:

1) grazing ecology with emphasis on caribou/reindeer (ongoing project).

2) socio-economic and cultural impacts of tourism and recreation.

3) industrial and transportation system development especially associated with North Slope energy resources.

4) problems associated with human settlements in mountain and tundra systems.

7. Islands: ecology and rational use of island ecosystems.

emphasis: Environmental and socio-economic changes associated with tourism and industrial development are being examined to develop better strategies to manage and conserve the resources of these fragile ecosystems consistent with human needs.

* A MAB group has been established under Project 6 to deal with high latitudes - Alaska. Its function is to assist in integration and development of MAB activities in this important region of the United States.

proposed tasks:

- ° The principal activities planned by this directorate are conducted in the Small Islands of the Caribbean and are described in the international component, Section 3.3.3. Similar activities should be developed in the U.S. Trust Territories and a planning workshop should be conducted in 1981.

8. Biosphere Reserves: conservation of natural areas and of the genetic material they contain.

emphasis: Development of the United States' component of an international network of biosphere reserves, and long-term ecological research, monitoring, training, and demonstration activities in these areas.

proposed tasks:

(Most of basic research and monitoring activities are programmed and funded by the organizations that administer the reserves. The activities listed below are high priority tasks that cross the missions of individual agencies.)

- ° Completion of the network of U.S. Biosphere Reserves

Using criteria already developed for the selection of biosphere reserves, scientists familiar with the biogeographical regions of the U.S. will identify appropriate sites in regions not adequately represented in the present network, devoting particular attention to coastal ecosystems.

- ° Develop pilot projects in the reserves as part of the UNEP Global Environmental Monitoring System (GEMS)

Detailed plans have been prepared and two U.S. pilot projects have been initiated to monitor selected pollutants. Three or four additional sites will be developed in the United States according to guidelines already developed by U.S., UNESCO and UNEP.

- ° Research on the design and size of areas required for conservation of ecosystems and selected species of plants and animals

A major research effort is needed on the problem of attrition of species from fragments of their original habitat.

- ° Preparation of an Ecosystem Conservation Atlas

A U.S. MAB contribution to the World Conservation Strategy would be the preparation of an atlas that would assist decision makers in this and other nations to readily identify internationally significant areas identified primarily from the standpoint of biological and ecological diversity.

° Conduct of Training Institutes in Biosphere Reserves

Group training workshops each of approximately two weeks' duration will be conducted for different groups of policy makers, scientists, and the general public in selected biosphere reserves. On-site research and monitoring demonstrations will be used in the courses.

° Establishment of a Permanent, Easily Accessed Data System

This would be done with organizations that administer biosphere reserves and would utilize existing data systems. As information from a biosphere reserve is collected, it will be put into a format that is comparable with data gathered in other reserves. A means of accessing needed information and ensuring that it can be readily disseminated to and understood by the appropriate user communities will also be developed. This will be done in conjunction with the MAB international information system developed by UNESCO.

Other biosphere reserve tasks are described under multi-directorate and international activities.

9. Pesticides and Fertilizers: ecological assessment of pest management and fertilizer use on terrestrial and aquatic ecosystems.

emphasis: Studies of methods of transport; behavior and reactions of specific compounds in water and terrestrial environments as related to their physical properties; protective clothing; specific formulation of pesticides to reduce environmental contamination; and disposal of contaminants.

proposed tasks:

° Analysis of the Persistence and Transport of Pesticides in the Environment

In this project directorate members will conduct a series of field studies. One set of controlled experiments will serve to determine the influence of such factors as temperature, moisture, intensity of sunlight, and soil type on the persistence of organophosphate and organochlorine pesticides in the soil. Another will serve to identify the effects of wind and water erosion on the transport of pesticides through the environment. The first series of experiments will be conducted in Ithaca, New York, and Corvallis, Oregon. Findings from these preliminary studies will help in devising better strategies for the use of different pesticides under a variety of physical conditions.

° Impact of Pesticide Regulations on Research and Development (R&D)

This project will examine previous studies on the impacts of pesticide legislation and regulation on research, development and production of pesticides. The project will address issues such as:

Time and cost of pesticide development.

Risks for the pesticide developer.

Allocation of R & D resources to the defense of existing product lines.

Increased emphasis on the development of products for foreign markets.

Decrease in the number of new pesticide products entering the market.

This project will assess the results of previous studies dealing with these issues to determine if new government initiatives should be developed to stimulate further R & D in the industry.

10. Engineering Works: effects on man and his environment of major engineering works.

(Plans have not been developed at this time for U.S. MAB activities in this project.)

11. Urban Systems : ecological aspects of urban systems.

emphasis: innovative approaches to modeling urban systems.

proposed task:

° Modeling Metropolitan Areas as Complex Systems

The proposed task, representing the principal effort of this MAB directorate, will focus on developing an innovative approach to modeling two urban systems, Philadelphia and Seattle. Since policy decisions in urban areas are influenced by many interrelated variables, a realistic simulation of the impact of policy scenarios will be immensely helpful to local and regional decision makers. Once a credible urban model has been developed for a single city, it should be transferable to a very large number of urban areas of different sizes and in different states of development.

This effort is intended to overcome the major deficiencies of previous related modeling efforts. Rather than relying on a single, highly specific, large-scale model, project personnel will integrate the output from a large number of relatively simple submodels. Emphasis will not be on modeling the individual components of the urban system with a high degree of precision, but rather upon modeling total system behavior and the complex interactions subsystems.

Examples of types of submodels used will include:

- ° Transportation models (tree-tracing, trip generation, model split and assignment with capacity restraints).
- ° Location models (residential choice, retail trade and services, the partially disaggregated Harris-Penn Jersey model, an industrial location model).
- ° Development, redevelopment, and supply-side land-use models (demand models, stock of structures, epidemic-type models of housing abandonment and neighborhood change).
- ° Demographic and migration models.
- ° Energy models (based on transportation uses, space heating policies, utility policies, and new forms of energy production).
- ° Pollution models (point source, area source, and transportation source models for air pollution, as well as selected solid waste, runoff, and water pollution models).

In most cases, existing models will be used; in some, however, new models will be constructed. At the outset, researchers will test the sensitivity of the system as a whole to the choice of the models, the selection of parameters, and assumptions regarding external influences.

12. Human population changes: investigation of the adaptive, demographic and genetic structure of human populations in relation to environmental change.

emphasis: The current focus of this project is to assist other MAB Projects to more clearly assert the human component in their MAB activities. No specific tasks are proposed at this time.

13. Environmental Perception: analysis of the ways people perceive their environments and specific environmental problems.

emphasis: Human perceptions of environmental hazards, environmental change, and environmental quality.

proposed tasks:

- ° Development of Perceived Environmental Quality Indices

This project will help develop an understanding of which factors create positive or negative public perceptions of the environment in order to assist administrators in environmental planning and decision making. A methodology will be developed for assigning values to particular geographic areas on the basis of indices representing such factors as aesthetics, health, and visual appeal. One important use for the indices of perceived environmental quality will be to help determine the extent to which contemplated administrative actions aimed at controlling environmental degradation are consistent with public wishes and perceptions.

° Assessment of Perceptions of Responses to Environmental Change in Urban Settings

In urban settings, both deterioration and rapid growth and development create large-scale environmental changes. In this project researchers will focus on the populations of selected urban areas in which these environmental shifts have occurred. Initially, residents of Worcester, Massachusetts, a relatively established northeastern city experiencing typical problems of urban decay, loss of population, and a diminishing tax base, will be compared with residents of Tucson, Arizona, a growing metropolitan area in the sun belt. A better understanding of the public awareness of and response to environmental change will enhance the ability of urban planners to predict and take into account future shifts in population patterns.

° Evaluation of Environmental Attitudes in Relation to Political and Social Institutions

The purpose of this project is to gauge the relationship between attitudes toward the environment and the attitudes expressed by legislators and public administrators. Project personnel will select a single high-priority issue - such as the development and use of coal resources and the management of associated environmental problems - and compare various components of the public perception of those articulated by lawmakers and environmental planners.

14. Environmental Pollution: (This Directorate's basic activity at this time is participation in the environmental monitoring activities in Biosphere Reserves.)

3.2 Examples of Cross-Directorate Activities

Several of the tasks described in the fourteen projects above involve the cooperation of more than one directorate. The two activities described below, however, are examples of cooperation among several directorates.

proposed tasks:

° Analysis of the Impacts of a Declining Water Supply for Irrigation Agriculture

The overall objective of this project is to develop a better understanding of the type and magnitude of impacts that may result from a declining water supply for irrigation agriculture - an increasingly likely prospect as scarce water resources are diverted to energy development. The project, which will consist of a major national conference and a series of follow-up implementation activities, will be coordinated by the Directorate on Arid and Semi-Arid Zones, with contributions from the Directorates on Grazing Lands, Biosphere Reserves, Urban Ecosystems, and Environmental Perception. It will also involve collaborations with a number of universities, state and federal agencies, industry organizations, and professional associations.

The national conference will bring together such diverse groups as farmers, agricultural manufacturers, bankers, labor leaders, representatives of the transportation industry, attorneys, and commodity market traders. Major generic issues as well as region-specific problems will be highlighted. For example, the likelihood and probable implications of specific changes in irrigation practices, crop selection, development of and investment in water conservation equipment, land prices, the economic viability of small farms, and overall agricultural output will be investigated. At a more regional level, experts will consider such issues as depletion of the Ogallala groundwater basin which currently supplies water to six western states. By helping government administrators and industry managers identify pertinent trends and problems, and by providing them with needed scientific and technical data, this project will contribute to an understanding of the adverse consequences that result from a decrease in the quantity of water available to the agriculture sector.

o Technical Support for Resources Management and Environmental Planning in the Colorado Rockies

In this project, led by the Directorate on Mountains and Tundra, researchers will identify and address the critical and closely inter-related problems of future energy development, decreasing water quantity and quality, increasing natural hazards (such as avalanches), use and management of mountain wilderness areas, and environmental degradation in U.S. highland areas. The San Juan, Front Range, and West Slope regions of the Colorado Rockies will be the initial areas of focus. It is expected that the research team will provide scientific and technical information of value in addressing such issues as:

How to apportion water for oil shale and coal development in Western Colorado at a time when local Colorado River water is almost entirely committed to the urban areas in the eastern part of the state.

How to identify and minimize the expected adverse impacts on surrounding ecosystems of growth in eastern Colorado.

Whether winter cloud seeding to fortify the local snowpack and increase the quantity of Colorado River water should be continued, or even accelerated, notwithstanding suspected deleterious impacts on the neighboring wilderness areas and an attendant increase in the incidence of avalanche.

How to manage mountain wilderness areas, determine visitor impact and perception of impact, and resolve conflicts between different user groups.

Whether actions should be initiated to identify the sources and reduce the incidence of local acid rain, which increased 100 percent between 1977 and 1980.

Along with the Directorate for Mountains and Tundra, the Directorates for Inland and Coastal Waters, Biosphere Reserves, Urban Ecosystems, Environmental Perception, and Environmental Pollution will be participants in these assessments.

The first phase of the project will culminate in a series of state-of-knowledge volumes putting the scientific information into a policy format directly helpful to regional decision makers.

3.3 International Activities

Under the Man and the Biosphere Program there are approximately 1,000 projects underway in 70 different nations. The majority of these projects have a national focus; however, some have involved substantial international cooperation. A major goal of this component is to promote parallel studies in different nations in order to compare ecosystem dynamics and the effectiveness of resource-management strategies. Through these joint endeavors, described below, participating scientists will gain information and insights not available through research exclusively within their own countries. These projects also will expand public awareness of how human activities affect the natural environment.

3.3.1 Tropical Forest Studies in Latin America

This project will consist of three distinct tasks, each aimed at improving the management of forest resources in the tropics.

proposed tasks:

- ° Analysis of selected forest management techniques. The project team will investigate agro-forestry, forest farming, mini-scale harvest, and other techniques aimed at optimizing production while still conserving the resources. Many of the management techniques currently used in Latin America are designed for short-term gain and involve destruction of flora and fauna, at times with irreversible effects. It is anticipated that this research effort will lead to the implementation of methods for maintaining long-term productivity.
- ° Studies of the tropical dry forest and methods to maintain it. Dry forests represent about one half of all tropical forest areas and are far less resilient than humid forests. They are now under heavy pressure due to fuel wood shortages, fire, and agricultural and grazing demands. Since the impacts of these pressures have not been well studied, this project will investigate techniques to maintain dry forests in a productive, healthy state and to avoid desertification.
- ° Renovation of degraded tropical forest sites. There are large forest areas in the tropics that have been so poorly managed that they are no longer able to recover within an acceptable time frame. Productivity is near zero. This project will investigate methods to restore these forests to a productive state and hence relieve the pressure on the remaining primary forest resource.

3.3.2 Cooperative U.S.-Mexico Project to Improve the Management of Arid and Semi-Arid Lands

In both the United States and Mexico there are large areas of grazing land in relatively poor condition as a result of overuse by man and occasionally severe climatic stress. This desertification has resulted in reduced productivity. In a cooperative effort to mitigate the problem, the two nations have pledged to work together in giving the highest priority to matters of soil and water conservation on agricultural lands, rangelands, and forests.

proposed task:

° Restoration of Desertified Lands:

Together, the United States and Mexico will focus on methods of restoring productivity to the desertified lands in the most ecologically sound manner. Both nations have confronted these problems before on a smaller scale and have attempted a variety of solutions, some more successful than others. In this project techniques such as alternative grazing systems, water harvesting, and native plant production will be studied. Where scientists find that a technique may be feasible for a given region, efforts will be made to encourage implementation. (The plans for this project resulted from the U.S. - Mexico meeting in Saltillo, Mexico, summer 1980.)

3.3.3 Cooperative Activities in the Caribbean

proposed tasks:

° Management of the Natural Resources of Small Islands in the Caribbean

The nearly twenty Caribbean islands and island systems support human populations with differing languages, affiliations, cultures, economic status, and natural resources. Some of the lands are independent, others are dependent, and some are loosely affiliated with a mainland nation. Some, such as Puerto Rico, are becoming industrialized; while others, such as Dominica and Grenada, are not. Despite these differences, the islands have many common problems: land and beach erosion, threats of oil spill, inadequate foreign exchange, the need for employment of their populations, and the need for prudent environmental protection, to name just a few.

The objective of this project is to derive general principles and guidelines for managing the natural resources of the smaller islands. As a first step, case studies will be conducted for two very different island ecosystems, Bermuda and the U.S. Virgin Islands. Bermuda, on the one hand, has maintained relatively strict environmental controls, while the Virgin Islands has permitted a greater level of development, including offshore oil exploration. Project personnel will conduct

thorough ecological, economic, and cultural assessments of these islands in order to develop a better understanding of their capacity to accommodate increased development. Results of the project will help local decision makers determine the probable impacts of proposed new industrial developments and increased tourism on these and other islands.

° Regional Workshop and Conference on Solid Waste Management in the Caribbean

Smaller developing tropical islands have limited options and face unique environmental constraints in dealing effectively with the disposal or recycling of solid waste. Several Eastern Caribbean islands (notably the British Virgin Islands, St. Vincent, Barbados, and St. Kitts) have expressed interest in a regional meeting on insular waste management to be held in the U.S. Virgin Islands. The meeting will involve both a workshop and a conference.

Funding, participation, and/or co-sponsorship are expected from the U.S. Virgin Island government, the Pan American Health Organization, the Agency for International Development, and the United Nations Environment Program. The Island Resources Foundation will take the lead on behalf of MAB in planning and conducting the meeting.

Development of an Oil Spill Contingency Plan for the Caribbean

The Caribbean Islands Directorate will help coordinate the efforts of the U.S. Agency for International Development, the Organization of American States, the United Nations Environment Program, and the International Maritime Consultative Organization to design and implement an oil spill contingency plan for the sixteen Caribbean islands and island systems. Activities will include:

Obtaining from each government a commitment to participate in the program.

Developing an administrative structure for the plan.

Developing a series of reliable technological procedures, within a sound institutional framework, which would be triggered in the event of a spill of oil or any other hazardous material.

Compiling a country-by-country inventory of resources available to support and implement the plan.

Coordinating the purchase of all necessary equipment and materials.

Partial funding for this project has been secured, and a planning meeting of the smaller Caribbean islands has been held.

° Study of the Impacts of the Perceptual-Attitudinal Aspects of Tourism in the Caribbean

Tourism offers an important means of improving relationships with Latin and South American nations. It is also an activity that can have profound impacts on the environment of the host country. In this project researchers will investigate the multiple interactions between tourists and the indigenous population and the perceptions each group holds of the other.

The investigation will include a study of the respective perceptions of the environment held by the tourists and the natives and an analysis of the discrepancies between them. These perceptions and discrepancies affect both the tourists' experiences and the impact of the tourists on the environment and culture of the host community.

The increased understanding to emerge from this study should lead to better planning and management of tourism activities and their accommodating environments.

3.3.4 International Cooperation in Pesticide Management

proposed tasks:

° Assessment of Domestic Regulatory Programs for Pesticide Use in the ASEAN Nations

This project is intended to help certain less developed countries (LDCs) regulate their use of pesticides and hazardous chemicals. The nations to be assisted will include the less developed countries (LDCs) of the Association of Southeast Asian Nations (ASEAN). Steps will include:

Convening of a multi-country conference at which officials from the ASEAN governments will describe their domestic systems for pesticide regulation and enumerate their countries' needs.

Analysis of the political and institutional framework for regulating pesticides in the participating nations.

Assessment of the feasibility and desirability of establishing regional pesticide research laboratories to (a) test chemical substances submitted by participating nations and (b) train individuals not only in the interpretation of test results, but also in the design and implementation of regulatory programs appropriate to their particular countries.

Preparation of a report on the status of pesticide regulatory systems within each country, enumerating each country's available resources for, and major obstacles to, implementing a regulatory framework and recommending any potentially useful avenues for U.S. assistance.

As appropriate, MAB personnel will participate in the coordination of follow-up assistance and training programs in which U.S. agencies will help other nations design and implement suitable frameworks for pesticide regulation.

° Promotion of Integrated Pest Management

The ultimate goal of this collaborative effort between the Directorate on Pesticides and Fertilizers and the Directorate on Environmental Perception will be to promote the greater use globally of integrated pest management - i.e., pest-control systems that emphasize biological and cultural practices and thus discourage the overuse or misuse of potentially dangerous pesticides.

A critical step in achieving the goal will be to determine how local pest managers, pesticide manufacturers, and regulatory officials are influenced in their decisions by their perceptions of the natural environment and of the legislative and technical environments in which they operate. Misunderstanding and inadequate communication often characterize the relationships between those responsible for producing pest-control substances and techniques (chemical manufacturers and biologists), those who assess the safety of such products and processes (regulatory officials), and those who advise pest managers (extension workers and public health workers.) Each group may differ considerably from the others in its perceptions of pest problems and pest-control measures. Failure to recognize this can lead to unnecessary expense, human hardship, environmental damage, and decline in the ultimate ability to control pests. The pressing need to understand how the decisions of the relevant groups are reached, and particularly what role their perceptions play in these decisions, will be addressed in the various components of this project.

The work will involve six major efforts:

Pest Managers Study. This study, to be conducted in several developing nations, will involve an inventory of current pesticide use and pest-control practices by farmers and an examination of the farmers' perceptions of available pest-control options. A multidisciplinary team of specialists will conduct the assessment. Candidate countries for the study include Columbia, Venezuela, Thailand, the Philippines, Malaysia, Sudan, Senegal, Lesoto, and Kenya.

Pesticide Flow Study. Specific pesticides will be monitored as they move from manufacturers in developed nations through export regulatory-screening procedures, importing wholesalers, retailers, and ultimately to the farmers in developing nations. The research will provide needed data on ways in which pesticides are transferred, used, and misused, as well as on the biological and social implications of misapplication.

National Profiles of Pest Management. A series of profiles will be prepared for particular countries, surveying each country's current state of pest biology, pest-caused crop losses, pest-con-

trol measures, biological damage, and institutional arrangements for controlling pesticide use. The research will provide a comprehensive picture of laws, regulations, pest-control practices, and advisory and enforcement procedures based on information gleaned from research station officers, university researchers, and others collaborating with government officials and farmers.

Case Studies of Integrated Pest Management. A series of case studies will be made of the successful application of integrated pest management in those nations where such cases can be identified. The case studies will then be scrutinized for a set of common factors explaining their success. If a set of common factors can indeed be identified, its delineation will help in the future implementation of additional integrated pest-control systems.

Bibliography and Literature Search. Researchers will prepare and regularly update an annotated bibliography covering the socioeconomic, political and legislative aspects of pest control.

Final, Integrated Report. Results of the five preceding components will be fully integrated into a final report, intended to promote the more judicious use of pesticides globally.

3.3.5 Cooperation with other Nations in developing the International Network of Biosphere Reserves.

(The following activities will contribute to the World Conservation Strategy announced this year in Washington, D.C. and other nation's capitals.)

proposed tasks:

- ° Cooperation with Central American Countries. Several Central American nations have requested the United States and Mexico to cooperate in designing and developing a network of biosphere reserves in Central America.

Initially, Central American and Caribbean nations will be invited to participate in a planning conference at which the purpose and design of the biosphere reserve program will be explained. Criteria for reserve selection will be discussed, and candidate reserve sites in Central American countries will be identified. Follow-up programs will include assistance in the establishment of reserves, the training of reserve managers, and the design and implementation of a series of initial conservation, research, and monitoring activities.

- ° Cooperative Studies on Reserve Design and Minimum Size

A World Wildlife Fund MAB project is recently underway by U.S. and Brazilian scientists in forests in Brazil. This project is developing valuable baseline data in different sized forest reserve areas. Results will be used in determining the minimum critical size of reserves needed for conservation of ecosystems and the species they contain.

° Exchange with the U.S.S.R. in Research and Monitoring in Selected Biosphere Reserves

As part of the UNEP Global Environmental Monitoring System (GEMS) the two countries will develop several pilot projects for monitoring of ecosystems and of selected pollutants. The results of these pilot efforts will be discussed at the first International Conference on Biosphere Reserves which will be conducted in Minsk, Byelorussian SSR in 1982.

3.3.6 Cooperation with Other Nations in Grazing Lands Assessments

proposed task:

° Prediction of Grazing-Land Productivity under Meteorological Variables

In this project scientists are cooperating internationally to:

- compile and evaluate data on vegetative productivity, livestock production, livestock numbers, and meteorology;
- determine the geographic limits of each area and map them;
- compare and evaluate the use of range and pasture forage versus concentrates as feed inputs for livestock;
- review and develop mathematical models to predict grazingland productivity as a function of meteorological influences.

This research will provide decision makers with scientifically defensible information on the contribution of grazing lands to world food production. It will also provide a means for determining the variability of yield due to meteorological fluctuations.

(Approximately 30 percent of the U.S. project has already been funded by the National Science Foundation.)

3.4 Cooperative Regional Demonstration Projects

The Cooperative Regional Demonstration Projects (CRDPs) focus the scientific and institutional expertise of the Man and the Biosphere Program on resource management problems in discrete geographic areas. Three regions have been discussed as outstanding candidates for pilot projects -- the Southern Appalachian Region, the Lower Colorado River Basin, and the Lake Champlain Basin. Each one has major resource management problems that are representative of pressing issues increasingly confronted by administrators at all levels of government throughout the United States, and in many other countries.

The ambitious objectives of the CRDP to integrate MAB themes and make some efficient use of available expertise, data, and tools of research within a specific region requires extensive planning with regional and local administrators and with representatives of affected local groups.

In the next year select groups of MAB scientists and government officials will do feasibility studies to develop one or two regional projects.

The following describes some of the interrelated resource management and environmental planning issues in each of the candidate CRDP areas listed above.

The Southern Appalachian Region

The Southern Appalachian Region is a varied cultural and geographic entity consisting of those portions of six states, North Carolina, South Carolina, Virginia, Kentucky, Tennessee, and Georgia - in which are included some of the best examples of Eastern Forest types. The region contains a great variety of cultural and natural resources. It also has large holdings of public lands.

In the past decade the region has experienced rapid development of industry and tourism, coal mining and production, timber exploitation and the complex attendant problems of air pollution (acid rain, hydrocarbon pollutants, etc.), water quality and quantity changes, and depletion of renewable resources and minerals. There have also been physical, social, and economic impacts from greatly increased tourism in the Great Smoky Mountains area.

A wide diversity of research is underway in the region, but for the most part it is directed toward the sectoral issues of individual agencies, institutions or industries, and there is urgent need to integrate these efforts toward sustained development of the natural resources of the region. The advantages of developing a CRDP in this region include:

- Various government agencies, state and local institutions are already participating in the MAB Program, These include the Departments of the Interior, Agriculture, Energy, the Tennessee Valley Authority, the Universities of Tennessee and Western Carolina and the Oak Ridge National Laboratory.
- Active MAB Biosphere Reserves are established in the region (Great Smoky Mountains National Park in Tennessee and Coweeta Hydrological Laboratory in North Carolina), in association with the Oak Ridge National Environmental Research Park, Tennessee, and the National Forests in both states. These reserves represent the major types of ecosystems within which people live in the region. They individually and collectively contain a rich diversity of species and undisturbed habitats which represent some of the best remaining in the Eastern United States. The lessons being learned in managing these resources provide a model opportunity for MAB demonstrations and training activities. (One such activity already underway is a MAB project conducted by the University of Tennessee in the Great Smoky Mountains where, in the summer of 1980, officials from 9 countries participated in seminars on resource inventories and monitoring. MAB has also developed a pilot project for the UNEP Global Environmental Monitoring. (GEMS) Program in this area.
- Millions of dollars are already being committed to research, monitoring and resource management activities in this region. MAB can be a mechanism for integrating these efforts to focus on regional problems.

The following are examples of some of the critical issues that this project will address:

- Environmental Degradation. As a result of increased exploitation of coal and timber resources along with growth of the local textile industry, the region has experienced a serious climb in its levels of air and water pollution and soil erosion. In addition, the unprecedented expansion in worldwide coal demand has created a new round of environmental conflicts.
- Forest Management. Within the Southern Appalachian Region there are large tracts of national forest lands, predominantly in second growth stands but with some remaining virgin forests. The long-range impacts of various courses of action are being studied, and the CRDP will serve as a means to improve understanding of these impacts.
- Development and Management of Tourism. During the past few years the number of persons using the Southern Appalachian area for recreational purposes has increased dramatically. Use of the area for second homes has increased rapidly. This increased use has damaged the region's natural ecosystems and has caused a sharp rise in land prices, thus fueling real estate speculation and accelerating development.
- Background Patterns of Communities and Changes within Life Zones.

Baseline information is being developed to determine directions and rates of natural change (e.g. succession) so as to evaluate the effects of man-caused environmental alteration. Permanent plots have been established and models developed to predict, for example, long term climatic shifts due to increasing carbon dioxide in the atmosphere. Records from the borders of the spruce-fir life zone on the tops of the Southern Appalachian mountains may provide useful indicators and early warning of trends in industrial modification of atmospheric properties as well as global and national climatic changes.

3.5 Proposed Budget

In the past, funding for the U.S. Man and the Biosphere Program has come principally from the Departments of State, Interior, and Agriculture. The budget in 1980 was approximately one million dollars. As MAB program areas have expanded, the organization continues to grow. Consequently, supplemental funding is now required.

In addition to funds required for the specific tasks proposed in the MAB Projects, funds are also required for independent multi-institutional and multidisciplinary research which will be carried out under the interagency body the Consortium for the Study of Man's Relationship with the Global Environment.

Table 3-1 is an itemization of the costs needed for the priority projects and administrative framework outlined in this program. It is anticipated that the proposed projects and associated levels of funding will cover a two-year period.

Table 3-1

Projected Two-Year Budget for the Man and the Biosphere Program
(1980 Dollars)

<u>Projects of the MAB Directorates</u>	
Temperate Forests	\$ 130,000
Grazing Lands; Arid and Semi-Arid Lands	300,000
Inland and Coastal Waters	150,000
Mountains and Tundra (including Alaska MAB Activities)	350,000
Urban Ecosystems	80,000
Biosphere Reserves	350,000
Environmental Perception	50,000
Multi-directorate Projects - Southwestern U.S. and Colorado Rockies	<u>300,000</u>
Sub-total	1,710,000
<u>International Activities</u>	
Tropical Forest Studies in Latin America	150,000
U.S. - Mexico Project to Improve Management of Arid and Semi- Arid Lands	90,000
Management of Natural Resources in the Caribbean	180,000
Studies to Promote Integrated Pesticide Management	110,000
Cooperative Research in Biosphere Reserves	140,000
Grazing Lands Assessments	<u>40,000</u>
Sub-total	710,000
<u>Cooperative Regional Demonstration Projects - Planning Phase</u>	<u>220,000</u>
Sub-total	220,000
<u>Consortium for the Study of Man's Relationship with the Global Environment</u>	<u>3,000,000</u>
Sub-total	3,000,000
Coordination, Development and Administration of MAB	<u>840,000</u>
TOTAL	<u>\$6,480,000</u>

PROJECTS SUPPORTED BY THE MAB CONSORTIUM
FOR THE STUDY OF MAN'S RELATIONSHIP
WITH THE GLOBAL ENVIRONMENT

1979

Comparison of Wood Productivity between Second Growth Forests and Plantation Forests in Costa Rica

Interactions between People and Forests in East Kalimantan, Indonesia

Present and Potential Utilization of a Tropical Palm Forest

A Forester's Manual on the Moraceous Trees of Sarawak, East Malaysia

A Study of the Bornean Intensive Agricultural System as a Model for Development

Regenerative and Growth Strategies of Brosimum alicastrum in the Moist Tropical Forests of Mexico

Biosphere Inventory of Mangrove Forest Lands: Current Status, Managing Institutions and Research Initiatives

1980

Comparative Study of Interrelationships Between Range Management and Forest Management Activities in Forest Ecosystems of La Michilia and Beaver Creek Biosphere Reserves

Ecology of Amazonian Forest Trees: Baseline Data for Forestry and Reserve Design

Dynamics of Tropical Tree Plantations in a MAB Biosphere Reserve

Re-establishment and Maintenance of Fire-Dependent Ecosystems in the Glacier Park Biosphere Reserve, Northwestern Montana

The Impacts of Intensive Harvest on Poor Soils

Fire as a Management Tool in the Western Aspen Ecosystem

Composition, Structure and Distribution of the Ecosystems of the Three Sisters Biosphere Reserve and their Relationships to Patterns of Disturbance

Quantification and Comparison of the Impacts of Intensive Biomass Harvest on Forest Ecosystems

Conflict of Human Interest in the Ituri Forest of Zaire: Implications for Forest Survival

A Study of Relationships between Mbuti Hunting Systems and Faunal Resources in the Ituri Forest of Zaire: Significance for Management

Development of the Economic Theory and Methodology for Evaluating Non-market Values of Tropical Moist Forests

Present Utilization and Potential Regeneration of the Pinaceae in the Highlands of Tropical Mexico and Guatemala

The Role of Epiphytes in the Nutrient Dynamics of Two Rainforest Ecosystems

Tree Growth as a Guide to Management of Secondary Tropical Forests

Structure, Diversity and Function of Soil Nematodes in an Annual Grassland Ecosystem

Nitrogen Dynamics of Forest Ecosystems in the Great Smoky Mountains National Park

PRINCIPAL ACTIVITIES OF THE AID/MAB PROJECT

Country environmental profiles in AID mission nations

Watershed management training in the Philippines

Directory of environmental and natural resources study programs in the U.S.

World conference on sea turtle conservation

U.S. strategy conference on tropical deforestation

Tropical forest newsletter

Policy-level seminar in Mexico on multiple-use natural resource policies

Report on the status of endangered species in Thailand

Environmental guidelines for projects involving clearance of tropical forest areas in the Amazon Basin

Environmental guidelines for the design of large- and small-scale irrigation projects .

Training program on techniques for gathering and monitoring environmental base-line data

Support for Indonesian MAB rural ecology training program at Mulawarman University in Kalimantan on the "The Relationships between People and Forests"

Training sessions on environmental mutagens and carcinogens in Latin America

Location and inventory of audio-visual materials on the environment

Training at College of African Wildlife in Mweka, Tanzania

Adaptive environmental assessment for Indonesia