

Tropical Forestry Research at the USDA Forest Service's Institute of Pacific Islands Forestry¹

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Abstract: Deforestation during the last decade has grown at an alarming rate, giving rise to concern for its potential adverse effects on global climate. The impetus for focusing greater emphasis on tropical forestry management and research was provided by the International Forestry Cooperation Act enacted into law in 1990. The Act enables the Forest Service to intensify its efforts to develop sustainable uses of forest lands, and to provide greater emphasis to managing tropical forests for non-woody, and non-consumptive products. Field centers for this research are the Institute of Pacific Islands Forestry in Hawaii, the Institute of Tropical Forestry in Puerto Rico, and the U.S. Forest Products Laboratory in Madison, Wisc. The Institute of Pacific Islands Forestry is responsible for carrying out the Pacific Southwest Research Station's tropical forestry research program in the tropical Pacific. The Institute is also responsible for carrying out the Pacific Southwest Region's State and Private Forestry support program for tropical forestry in the Pacific basin.

The subject of this symposium session—Tropical Forestry—is particularly timely. People all over the world have become alerted to the array of issues associated with forestry and the environment. During the 1980's, as tropical deforestation increased at an alarming rate, concern for the future of tropical forests grew to unparalleled worldwide proportions.

Wholesale deforestation is widely recognized as having global repercussion, including potentially injurious effects on global climate. When a forest is cut and not properly regenerated, a valuable ecosystem is changed. A little bit less oxygen is produced. Where the forest was, the daily range of temperature is changed. The exposed soil is more subject to erosion from direct impact of rain and often infiltration of rainwater is slowed. When the rains come, flooding below the former forest will probably increase.

When the forest does not regenerate, non-forest plants with fewer deep roots may become dominant. Often the plants that replace forest species store less carbon, live shorter lives, and more rapidly release their stored carbon back into the atmosphere. Different micro-organisms, insects, birds, and animals take over the land. When large areas of forest are converted to short-lived ground cover, the effects can cause changes in the world ecosystem.

We know that the world's environment is changing. We do not know how fast the change is occurring, but in the extreme it could threaten our very existence. Even now large areas of tropical forests are being affected by rapid deforestation. About 18 million hectares a year are being converted from forests to other uses, and only about 1 to 2 million are being satisfactorily reforested. Many hectares of forest land are being turned into

farms and then abandoned because the land soon becomes degraded and unproductive.

Most people understand that the deforestation problem is not going to go away and that it will not be easily solved. Tropical forests are renewable, but often only with great difficulty. When former forest land is used for grazing and for growing vegetable crops, the soil can become degraded quickly. After the soil is degraded or lost, the land may not be capable of growing the forest that was once there.

In appraising tropical forestry management and research needs, managers face a full spectrum of questions: What specific research and management actions are needed? If forest ecosystem structure and functions are in balance, how can they be managed to provide for the needs of people and still maintain an acceptable balance? How can forests be managed to maintain their essential attributes? When forests are destroyed, how severe are the local and global effects? When forests are perturbed, what is their potential for restoration—to what degree of the pristine forest and at what costs?

This paper describes the roles of the U.S. Department of Agriculture's Forest Service and of its Pacific Southwest Research Station's program at the Institute of Pacific Islands Forestry for addressing the major questions and issues pertaining to tropical forestry research in the Pacific basin.

The Role of the Forest Service

For more than 70 years, the Forest Service has had a strong, active interest in tropical forestry. During the last dozen years, it has participated in studies that have led to a series of widely distributed reports on tropical forestry:

In 1980, the U.S. Interagency Task Force recommended to the President of the United States that the nation should "seek to protect and manage U.S. tropical forests in exemplary fashion" and "conduct a strong domestic research program...to help...protect, and manage tropical forests" (U.S. Interagency Task Force 1980).

In 1984, the U.S. Congress' Office of Technology Assessment discussed various technologies to manage, protect, and sustain tropical forests and related resources (U.S. Congress, Office of Technology Assessment 1984).

In 1985, the United Nations' Food and Agriculture Organization (FAO) outlined steps to conserve and develop tropical forest resources on a long-term sustainable basis (United Nations Food and Agric. Orgn. 1985).

In 1989, the Forest Service demonstrated its commitment to the FAO plan by proposing an expanded and strengthened tropical forestry research and development program (U.S. Dep. Agric., Forest Serv. 1989).

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Perhaps what might be termed the capstone of these efforts was the enactment into law of the International Forestry Cooperation Act of 1990, which provides for a greater role for the Forest Service in international forest conservation—a program especially targeted at tropical forestry. The Act...

- Allows the Forest Service to respond more fully to requests for technical expertise in sustainable tropical forest development. Although the Forest Service has for many years participated in forestry projects of the U.S. Agency for International Development and the U.S. Department of Agriculture's Office of International Cooperation and Development, the law now authorizes the agency to provide direct forestry assistance to countries not now receiving aid.
- Directs the Secretary of Agriculture to establish an Office of International Forestry in the Forest Service under a new official—the Deputy Chief—International Forestry—at agency headquarters in Washington, D.C.
- Specifies that funds to be spent on Forest Service international cooperation and assistance be identified in the President's budget submitted to the Congress of the United States.
- Directs the Secretary of Agriculture to establish an Institute of Tropical Forestry in Puerto Rico, and an Institute of Pacific Islands Forestry in Hawaii, to conduct research on tropical forestry management. This provision statutorily designates the Institute in Hawaii that had been established by the Secretary's order in 1967.

The Forest Service's field centers for research on tropical forestry are, therefore, the Institute of Pacific Islands Forestry, the Institute of Tropical Forestry, and the national U.S. Forest Products Laboratory at Madison, Wisc. The International Forestry Cooperation Act of 1990 enables the three field units to intensify their efforts to develop technology for sustainable uses of tropical forest lands. More emphasis will be given to managing tropical forests for non-woody and non-consumptive products. Such products include extractive reserves of natural rubber, oils, fruits, and nuts. Non-consumptive uses include environmental amenities that may not be compatible with intensive timber management and hardwood extraction. Particular attention will be given to avoiding land degradation and promoting sustainable development patterns that relieve pressure on remaining natural forests.

Role of the Institute of Pacific Islands Forestry

The Pacific Southwest Research Station research program at the Institute of Pacific Islands Forestry in Honolulu is carried out by two research work units. One is "Restoration of Tropical Island Forest Ecosystems" and the other is "American/Pacific Island Forestry Research." The two work units are headquartered in Honolulu but have personnel stationed in Hilo, Hawaii and on Yap island in the Federated States of Micronesia.

Direction for the Institute's tropical forestry research efforts is provided by the Forest Service's Tropical Forestry National

Research Program and by the Station's long-range Strategic Plan that focuses on tropical forestry as one of the six major areas of research in the 1990's and beyond.

The Institute's research program uses a multi-disciplinary approach and calls upon the specialized skills of universities, cooperating agencies, and other organizations. Station scientists have become known for conducting research in Central and South America as well as in the tropical Pacific islands. Among the scientific disciplines needed are entomology, fire science, forest ecology, genetics, mensuration, meteorology, plant and insect pathology, range science, silviculture, social sciences, soil science, wildlife biology, and wood technology.

Cooperative Research

Experience in doing cooperative research provides the Pacific Southwest Station with the background needed to coordinate work among scientists. Within the agency, the Station links its work on tropical forestry with the Southern Station's Institute of Tropical Forestry and with the U.S. Forest Products Laboratory. The Institute's major land management cooperator in Hawaii is the Division of Forestry and Wildlife. The Division provides office and laboratory space as well as much of the forest land for carrying out research. Hawaii is the only State that is responsible for managing tropical forests.

National Programs

The national strategic plan for Forest Service Research calls for using our organizational strength to develop partnership teams. Universities, Federal and State agencies, private companies, and public organizations will be important members of these teams. The Plan directs more research toward problems related to environmental changes, multiple resource uses, and human valuation of natural resources. These are issues that are of paramount importance in dealing with the multiple aspects of tropical forestry.

Another national program—the Resources Program Assessment also highlights a global concern for the environment. The need is for greater attention to be directed toward conserving resource values for global benefit. The RPA focuses on National Forests and also recognizes a major Forest Service role in supporting the tropical forestry needs of our neighbors.

Agencies and Private Organizations

Private sector organizations as well as Federal and State agencies are important cooperators and supporters. Land owners such as farmers, ranchers, and foresters provide places to do critical research. The U.S. Department of the Interior's Fish and Wildlife Service is one of the important cooperators in Hawaii and other U.S. affiliated island nations and territories in the Pacific basin. The Service identifies and proposes the listing of threatened species as endangered. The roles of the Institute of Pacific Islands Forestry are to do appropriate forestry research and assist with developing recovery plans.

The Institute's project on biological control of forest weeds depends on the quarantine facility provided by the National Park Service at Hawaii Volcanoes National Park. Research on biological control of forest weeds has also received strong support from the States of Hawaii and Oregon. The new mangrove research in Pohnpei, Federated States of Micronesia, includes an Institute scientist and others from Oregon State University and the College of Micronesia. C. Brewer Co. Ltd., the U.S. Department of Energy, the State of Hawaii, and governments of other Pacific Islands have been cooperators with Forest Service scientists in research on growing biomass for fuel. The University of Hawaii, Hawaii Department of Land and Natural Resources, and the Weyerhaeuser Company have provided funds and other resources for research on field comparisons of tissue cultures of loblolly pine with seedling loblolly and Caribbean pine. This team has also done research comparing varieties of Hawaiian koa.

Need for Cooperative Research

Current and future research is based on interrelated components that have application in multiple ecosystems. Research on each of the components requires major effort by certain disciplines. If we are going to achieve success in providing the technical support needed to restore tropical forests, we must develop widespread commitments from the scientific community. Therefore, the need for cooperative research is urgent.

Even with the commitment of all Forest Service scientists, the research that is needed would still require even more scientists. Outside the Forest Service are current research projects in all phases of tropical forest ecosystems. Pacific Southwest Research Station scientists need to take part in these cooperative research efforts.

For the augmented program in tropical forestry research, many scientists at the Pacific Southwest and other Forest Service research stations will be needed. Most of them are interested, but other current and continuing research commitments limit the amount of time they can devote to tropical forestry. We need new scientists involved in the program. Science cooperators should come from universities, colleges, and government agen-

cies everywhere. These science partnerships may be most important for achieving the best solutions to tropical forestry problems. Tropical forestry in the Pacific should receive special attention from scientists in the Pacific Basin. Scientists in developing countries, especially in those where tropical forests are found, should be key partners in the commitment for tropical forests.

To get more scientists involved, perhaps we should consider a **competitive cooperative grant program** that would be open to the best scientists regardless of affiliation. For example, a Forest Service scientist could cooperate with an appropriate outside scientist and enhance the products of both. This approach would enlarge the scientific community's commitment to achieving problem solutions. The urgency to begin delivering the needed technology from new research should be recognized in developing each cooperative grant. Competitive cooperative grant research on specific projects would be done over a period of a few months to a few years. The research would continue to be focused on the highest priority projects.

A strength of Forest Service research is our long-term work on forest ecosystems. Such research can sometimes cover decades and is crucial for testing and refining hypotheses that deal with organisms that live hundreds of years. We must build on our strengths as members of the scientific community. Forest Service scientists should provide long term continuity. Scientists from other organizations would provide critical knowledge when it is most needed. With these partnerships, solutions for the difficult problems in tropical forestry can be achieved in a timely manner.

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