

Forestry Research in Asia and Pacific¹

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Abstract: Much research has been done in Asia and the Pacific that might help Pacific Island countries produce more biomass and better manage their natural resources. National forestry research institutes throughout the region have examined many important aspects of forestry. Not all research findings are directly transferable between countries, but research methods and results can help guide research and policy decisions. Trends in forestry research priorities over the previous decade are examined. National research findings are identified that may affect Pacific Island forestry. Research not affected by environmental conditions are included, and several mechanisms for accessing this information are examined.

Over the last decade, a large amount of resources, financial and human, have been expended on identifying and setting priorities for forestry research needs. Many meetings, studies, and reports have espoused the need to increase support for forestry research and develop the infrastructure to communicate research findings between countries. To begin to understand the complexities of the organization of research in this vast and culturally diverse region, it is necessary to review the major events affecting research policy and the research priorities of professionals in the region.

This paper reviews a sampling of major forestry research to illustrate the potential for research from continental and island Asia to address these research priorities, and suggests mechanisms to improve access to some forestry research. The examples given are only the "tip of the iceberg," but illustrate the infrastructure available to share information and improve national forestry research programs.

Trends Affecting Forestry Research

The major events affecting forestry research in Asia and the Pacific Islands during the decade of the 1980's were:

- 1981—World Bank and United Nations Food and Agriculture Organization issues their report on "Forestry Research Needs: Time for Appraisal."
- 1982—Directors of Forestry Research hold their first meeting, at East-West Center, Honolulu, Hawaii.
- 1982—Australia establishes its Centre for International Agricultural Research.
- 1983—International Union of Forestry Research Organizations sponsors regional workshop at Kandy, Sri Lanka.

- 1985—International Task Force on Forestry Research, made up of private and public sector members, proposes a Tropical Forestry Action Plan.
- 1986—Directors of Forestry Research hold their second meeting, at East-West Center, Honolulu, Hawaii.
- 1987—World Bank, FAO, and other organizations meet at Bellagio, Italy and organize a task force on tropical forestry research.
- 1988—World Bank, FAO, and other organizations meet again at Bellagio, and propose options to expand and coordinate forestry research.
- 1989—Asia and Pacific Regional Office of FAO convenes meetings of forestry research directors.
- 1989—Consultative Group of International Agricultural Research Board declares the need for a forestry institute.
- 1990—Asia-Pacific Forestry Commission holds its fourteenth meeting in Manila, Philippines.
- 1991—Institute of Pacific Islands Forestry, Pacific Southwest Research Station, USDA Forest Service, sponsors Forestry Research and Management Meeting in Honolulu, Hawaii.

The 1981 World Bank and United Nations Food and Agriculture Organization (FAO) report asserted the need to examine the forestry research needs of developing countries and to refocus resources to address new and prominent issues. The study acknowledged a shift in forestry programs to meet the basic needs of rural populations and attack the decline of natural ecosystems. It concluded that more resources and consideration should focus on three issues: rural development forestry, maximizing biomass production to meet expanding energy demands, and conservation of natural ecosystems (World Bank/FAO 1981).

The East-West Center organized two meetings of Directors of Forestry Research (1982 and 1986). At the first, the conferees declared the need for stronger coordination among national research institutes in the region. During the second workshop, the Center presented the results of a regional survey that examined the allocation of resources to forestry research within national forestry institutions (Lundgren 1986, Lundgren and others 1986).

The study concluded that over 50 percent of research efforts were directed to biological factors of forestry, including watershed management, forest hydrology and protection, wildlife, recreation and resource inventory. Twenty and 22 percent of the resources addressed forest products and plantation management research, respectively. Agroforestry and social forestry research accounted for less than 6 percent of the resources (Lundgren and others 1986).

In 1984, the International Union of Forestry Research Organizations (IUFRO) Special Programme for Developing Countries (SPDC) organized a regional workshop at Kandy, Sri Lanka. The workshop set priorities for forestry research and ranked

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silviculture and management research as the greatest need. Other priorities included genetic improvement of multi-purpose trees, species selection, design of agroforestry systems, and pest management. Recommendations also included establishing 10 regional species research networks (Lundgren and others 1986).

An International Task Force on forestry research proposed a global research strategy for tropical forestry (Anon. 1988b). It accorded high priority to agroforestry research and set priorities in three categories: tree/crop interactions, especially hedgerow intercropping and the effect of shade; nitrogen fixation; and the effect of green leaf manure on crop yields. Other priority research included shelterbelts and farm fuelwood production.

The Bellagio I meeting (1987) acknowledged that the resources allocated to forestry research were severely deficient. Subsequent to the meeting, an international task force organized to examine tropical forestry research recommended increased research in five fields: agroforestry, natural forest management, tree improvement, wood utilization, and forest policy. It proposed seven institutional options to coordinate and expand forestry research that were deliberated during the Bellagio II (1988) meeting. That meeting endorsed the proposed option to expand the responsibilities of the Consultative Group for International Agricultural Research Board (CGIAR). At the 1989 meeting of the Board, this alternative was supported and a declaration to that effect was adopted. The governing body of CGIAR gave special importance to forest resources as essential to rural economies and energy (Anon. 1989).

In August 1989, the Asia and Pacific Regional Office of the FAO, convened an expert consultation of directors of forestry research institutions. A primary objective of the meeting was to identify research appropriate to neighboring countries. The consensus of the group was that considerable research was available to improve national programs, but that access to the results was a serious obstacle. Several mechanisms to improve the flow of information were discussed. Two were endorsed and acted upon—INFORM and FORSPA.

The fourteenth session of the Asia-Pacific Forestry Commission (APFC) met in March 1990 and endorsed the recommendations of the TFAP task force for increased forestry research in five fields. It urged the FAO to take actions similar to the CGIAR to improve forestry research and recommended that FORSPA be made operational (Anon. 1990).

Research Priorities in the Pacific Islands

To understand the potential for sharing forestry research between countries, it is important to appreciate the needs identified by the professionals in the region. For the purpose of the XVII Pacific Science Congress, research needs are limited to Pacific Island countries. This vast region, though included in the rhetoric, has been seriously neglected in regional and international forestry research programs. The priority research needs in Pacific Island countries as expressed and determined in recent endeavors are as follows (H = high; M = medium; L = low):

| Heads of Forestry | USDA Forest Service |
|-----------------------------------|---------------------------------------|
| Plantation Benefit/Cost Analysis | Forest Policy and Legislation (H) |
| Regeneration of Degraded Sites | Erosion Control Methods (H) |
| Non-Wood Forest Products | Watershed Management & Protection (H) |
| Utilization of Coconut Wood | Natural Forest Management (H) |
| Wood Properties of Timber Species | Agroforestry Practices (H) |
| Forest Plantation Techniques | Forest Products Marketing (H) |
| Species & Provenance Trials | Pest Control (M) |
| Nursery Techniques | Nursery Management (M) |
| Forest Policy and Legislation | Tree Improvement (M) |
| Forest Plantation Techniques | Silviculture (rotation length) (M) |
| | Mensuration (growth and yield) (M) |
| | Mangrove Management (M) |
| | Stress Tolerance (wind, salt) (L) |

The Heads of Forestry of eight Pacific Island countries met in Suva, Fiji, in November 1990 to, among other business, establish priorities for national and regional forestry programs (Anon. 1990). The assembly recognized many problems and issues that spanned the region, including increasing population growth, low priority for forestry in national policies, and lack of information on many forestry aspects. It identified various research needs that would improve national and regional programs. For example, high priority was placed on developing benefit/cost analysis of plantations as they relate to the preservation of natural forests. Regeneration techniques of logged and degraded sites were identified as the preferred research focus. The demand to identify and quantify the non-wood forest products used in each country has been strong.

The members observed that “most countries in the region have substantial unused coconut resources” and that “. . . little is known about the physical properties of many common tree species.” (Report of Heads of Forestry Meeting 1990, draft). They recommended that increased resources be focused on researching the uses of coconut wood. Resources also should be allocated to test the physical properties of commercial and potentially commercial species. In addition, basic forest plantation research, species and provenance trials, nursery techniques, and spacing trials were recognized as priorities.

In 1990, The USDA Forest Service examined the forestry situation in Pacific Island countries. Their study’s objectives included surveying forestry programs for the need to improve education, extension, and research facilities. The report identified numerous activities to improve national and regional programs. For example, high priority was placed on developing effective erosion control measures and agroforestry and community forestry practices. Medium priority was given to such research topics as pest control, nursery management, tree improvement, silviculture (e.g., rotation length), mensuration (e.g., growth and yield), and mangrove management. The survey placed low priority on stress tolerance (e.g., wind, salt, etc.) research and forestry on degraded sites (Booser 1990).

Forestry Research in the Pacific Islands

Except for Fiji and Papua New Guinea, it is not apparent that other Pacific Island countries have national forestry research programs. As of 1989 the Cook Islands had no forestry research center. Research in the Cook Islands was mostly done as part of reforestation programs, and their Forestry Department has relied on research results from other Pacific basin countries, most notably Fiji, Vanuatu, and New Zealand.

Forestry research conducted in other Pacific countries has not been coordinated by national programs. For example, a variety of research undertaken in Western Samoa and reported in the Nitrogen Fixing Tree Research Reports was performed by Peace Corps and other nongovernmental organizations. Kidd and Taogaga (1985) examined the effect of "green manure" on upland taro. Cable and others (1983), with the University of South Pacific, analyzed intercropping NFTs with taro. Research at the University of South Pacific also has examined growth and yield of fuelwood for many nitrogen fixing trees (Cable and others 1984).

In-depth case studies illustrate the social and ecological relationships of land use systems. They provide researchers basic information of the systems that research may affect. Kunzel (1988, 1989) described agroforestry in Tonga and the role of trees in traditional land use systems. The studies examined factors that support or inhibit agroforestry, and recommendations were made to improve the systems. Thaman (1989, 1990) described the role of trees in Pacific Island countries, most notably Kiribati and Fiji. The Richardsons (1986) described the environment and major components of agriculture systems in the Pacific Islands. Surveys provide an important foundation to advance research on specific components of agroforestry. They are typical of the research initially undertaken to understand and improve land use systems.

Research in Hawaii is an important resource for national and regional forestry research programs. The USDA Forest Service has been conducting forestry research for decades in Hawaii and much of this may be useful to other countries. In addition, the Forest Service's research program extends to Pacific Island countries, where it has direct benefits. The University of Hawaii is an important research facility and source of appropriate forestry information. For example, Raynor (1989) examined indigenous agroforestry systems in Pohnpei; Dudley (1990) analyzed the performance and management of fast-growing trees in a variety of ecological conditions; and MacDicken (1983) studied the growth rates of nitrogen fixing trees (NFTs).

In the 1930's the Department of Forestry in Fiji tested over 200 species for potential in reforestation. *Swietenia macrophylla* was selected as the "best" species, and until the mid 1970's was the species of choice. After a devastating attack by the Ambrosia Beetle, five other species were added to the forestry programs. The Ministry now uses seven species: *Swietenia macrophylla*, *Pinus caribaea*, *Anthocephalus chinensis*, *Maesopsis eminii*, *Cordia alliodora*, *Agathis vitiensis*, and *Endospermum macrophyllum* (Jiko 1989). The recent publication by the Timber Utilization Research Division, "A Guide to the Specifica-

tions of Local Timbers for Building Applications," has perhaps, the greatest potential benefit for neighboring countries to increase utilization of timber resources, especially that of lesser known species.

Forestry research institutes in Papua New Guinea (PNG) have much to offer neighboring countries. For example, a variety of species have been identified that are suitable for reforestation of logged areas. Forestry research institutes have also developed nursery and plantations techniques for other species. Over 40,000 forest insects have been identified, collected and stored in a national insectarium. The Papua New Guinea Forestry Research Institute (PNGFRI) recently published a book on micro-identification of all commercial timbers and has published more than 10 volumes on wood preservation and utilization of minor forest products.

Forestry Research in Asia

Most if not all Asian countries have national forestry research programs. Some, like the Philippines, India, and Thailand, are more developed and their results are easily accessible. Others, like Malaysia, may be well developed, but their research results are not readily available. Yet other countries have modest research programs (Myanmar and Bhutan) or their programs concentrate on supporting other countries. Japan's main priority is to promote international research and contribute to world forestry.

We summarize here only the major research programs in each country, providing examples of the primary research (*table 1*). The lack of inclusion of other countries should not suggest that they are unimportant, or have nothing to offer. Rather, they are not included for lack of space or information on them.

All research programs have results, experience, and expertise to share, and research from all countries should be considered for its potential benefit to other programs. For example, the primary focus of Bhutan's forestry research program is fodder species. Perhaps the forestry research from China most appropriate to share with other countries focuses on management techniques for shelterbelts and intercropping to improve traditional farming systems. China also has performed comprehensive economic analysis of the effects of shelterbelts and intercropping on traditional systems.

Southeast Asia

The focus of research in Myanmar (Burma) may be relative to other national forestry research efforts. Tree improvement research on *Tectona grandis* and *Pterocarpus macrocarpus* might help improve the use of these species. Research on *Pterocarpus* has focused on clonal propagation and development of seed orchards. The national research program is examining growth performance and the control of pests of *Accacia auriculiformis* (Norbu 1989).

Other forestry research that may be applicable includes fuelwood production, social forestry planning, and agroforestry for erosion control. With the over dependence throughout the region on a few species for pulp production, the results of

Table 1—Examples of primary forestry research in Asia

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|--------------------|--|
| India | Agroforestry Marketing Spacing Trials in Social Forestry Species Selection for Agroforestry & Degraded Sites Volume and Yield Tables for Social Forestry Species |
| Indonesia | Tree Improvement Seed Orchards Plantation Establishment Techniques Silviculture of Rattan Species |
| Myanmar | Tree Improvement Clonal Propagation & Seed Orchards Fuelwood Production Agroforestry for Erosion Control Growth, Yield & Pest Management of <i>Acacia auriculiformis</i> |
| Nepal | Fodder Trials Vegetative Propagation of Fodder Species Spacing Trials; Protection of Fodder Trees Coppice Management in Short Rotations |
| Pakistan | Stress Tolerance Trials —Waterlogged and Saline Conditions |
| Philippines | Species Selection for Reforestation Economics of Agroforestry Species Performance for Erosion Control Soil & Water Conservation Techniques Agroforestry Cropping Systems Traditional & Non-Traditional Uses of Mangroves Production of Mycorrhizal Tablets Silviculture of MPTS Propagation by Tissue Culture Artificial Regeneration — Assisted Natural Regeneration Species & Provenance Trials Wood Properties and Use of Coconut Lumber |
| Sri Lanka | Species Selection for Livestock Systems & Erosion Control Soil Fertility Rehabilitation with Green Leaf Manure Socio-economic Studies of Agroforestry Economics of Agroforestry |
| Thailand | Biomass Production Nutrient Cycling in Agroforestry Systems Benefit/Cost of Fuelwood Production Silviculture of Agroforestry Systems |

research in Myanmar on species for pulpwood could greatly enhance planting programs. Like other countries, Myanmar is pursuing research on production and management of bamboo.

Nine Indonesian institutes and universities are active in forestry research, yet the primary institute is the Agency for Forestry Research and Development (AFRD). For many years, AFRD focused on the “genetic improvement” of *Pinus merkusii*, the main reforestation species. Increased research from AFRD and other institutions has resulted in the establishment of seed orchards of *Pinus merkusii*, *Eucalyptus urophylla*, *E. deglupta*, *Acacia mangium*, *Paraserianthes falcataria*, and *Leucaena* sp. (Agency for Forestry Research and Development 1989). AFRD also has important findings in establishment techniques of many of these species for industrial plantations. The institute is studying the silviculture of rattan species.

No less than 34 institutes are engaged in forestry research in the Philippines. Many have important and potentially pertinent research that is appropriate for neighboring countries. The Ecosystems Research and Development Bureau (ERDB) has identified eight multi-purpose tree species for reforestation: *Paraserianthes falcataria*, *Anthocephalus chinensis*, *Eucalyptus deglupta*, *Gmelina arborea*, *Endospermum peltatum*, *Ochroma phymidale*, *Xylopia ferrugeni* and *Leucaena leucocephala* (Polisco and Natividad 1989). The ERDB also examines important aspects of agroforestry, including the economics of perennials under plantations, species performance for erosion control, soil and water conservation techniques, agroforestry cropping schemes, and extension strategies to enhance adoption of agroforestry. Recently, the ERDB analyzed traditional and non-traditional uses of mangroves.

The University of the Philippines at Los Banos (UPLB) has been doing forestry research for many decades. An example of important research here is the development of mycorrhizal tablets to increase pine and eucalyptus seedling performance in nurseries. UPLB has found that *P. falcataria* coppices profusely even when its stumps are over 30 cm in diameter. UPLB scientists found no substantial loss in survival when *paraserianthes* stems were cut flush with the ground, or at 15 cm or 30 cm above the ground (Polisco and Natividad 1989).

Other institutes are examining propagation by tissue culture, artificial regeneration and species and provenance trials. Using tissue cultures, researchers have developed plantlets of *Calamus ornatus* 25 days after placing the embryos in a planting medium. Philippine institutes have been able to decrease germination period from 120 to 2 days with almost 100 percent success (Polisco & Natividad 1989). They also are finding ways to regenerate *Dipterocarpus* species. Assisted Natural Regeneration (ANR), a promising form of wasteland reclamation, was developed and tested in the Philippines. Philippine institutions are also testing a variety of multi-purpose trees (mpts) for fuelwood production; *Leucaena leucocephala* and *Paraserianthes falcataria* had the highest survival rates in provenance trials of mpts.

The Philippines conducts forest products research that is important to neighboring countries. Examples include cocolumber processing, handmade rice paper, low-cost housing materials from wood excelsior, and small-scale charcoal production (Tesoro 1989).

The forestry research center in northeast Thailand has examined the effects of intercropping on biomass production of four fast growing species—*Acacia auriculiformis*, *Leucaena leucocephala*, *Eucalyptus camaldulensis* and *Peltophorum dasyrachis*—and several agricultural crops (Personal observation 1989). Similar experiments examined annual rates of nutrient cycling by tree crops in agroforestry systems. The cost-benefit analysis of fuelwood production in agroforestry has been examined. Other research includes studies of the optimal combination of trees and crops. Thinning and pruning studies are determining management practices to optimize crop and tree yields. On-station research is examining multi-storied mixed planting systems and coppicing ability of selected tree species.

India has a long history of forestry research, the results of which may help improve forestry programs in other countries. National forestry research has focused on several important species: *Acacia catechu*, *Ailanthus excelsa*, *Anthocephalus chinensis*, bamboo species, *Bombax ceiba*, *Lagerstroemia parviflora*, *Melia azedarach*, and *Tetrameles nudiflora* (Singh 1989). Results from Indian studies on agroforestry marketing, development of volume and yield tables for social forestry species, species selection for degraded sites, and silvicultural treatments could help other national forest programs. The effect of trees on crop production and spacing trials in a social forestry context are research topics examined extensively by Indian research institutes.

Research in Nepal, especially that which focuses on the Terai, may be useful to other countries. Extensive fodder research has included species trials, intercropping multi-purpose trees with fodder grasses, methods of protecting fodder trees from grazing animals, and vegetative propagation of fodder species. Agroforestry/social forestry research includes methods to gain people's participation in forestry programs, propagation methods suitable for farmers, and on-farm mulch demonstrations. Coppice management on short rotations is another example of research that may prove useful. Bamboo propagation, cutting trials, and seed collection and storage studies might help improve bamboo production in other countries.

Important research findings from Pakistan include species for water-logged and saline areas, tree/crop relationships, sericulture, and agroforestry. Some of the species identified for water-logged and saline conditions are *Eucalyptus camaldulensis*, *Albizia procera*, and *Pithecellobium dulce* (Sheikh 1989). Results from agroforestry trials indicate a decrease in crop yields along shelterbelts but an overall increase in income from the sale of trees. Researchers in Pakistan have developed a disease-free FI hybrid of mulberry and have found that one hectare of mulberry (planted 1 × 1) can yield 23 metric tons of utility leaves. Adding five bags of urea per ha. can increase yields 100 percent (Sheikh 1989). Agroforestry research in Pakistan has looked at the effects of single trees and boundary planting on crop yields, and the design of appropriate systems to meet social needs and biological (e.g., saline) conditions.

Forestry research in Sri Lanka has examined the effects of trees on crop yields, the performance of different combinations of species on biomass production, and species selection in tree/livestock systems. Research to improve productivity of systems includes the effect of leaf manure on soil fertility, and methods of using trees for erosion control; species selection for intercropping and improvement of pasture grasses. Socio-economic research in Sri Lanka includes the economics of hedgerow intercropping, development of models for mixed cropping systems, and economics of home gardens.

Mechanisms to Access Forestry Research

Much of the forestry research done in Asian and Pacific Island countries could benefit national programs in neighboring countries. But, access to these findings varies greatly with the subject and development of information networks. Published research results are obtainable only if national libraries can purchase or exchange documents and many lack basic current literature.

Research projects supported by international agencies such as work on rattan, bamboo and multi-purpose trees have well developed networks, and their documentation may be circulated throughout the region. For example, experts in rattan may know about similar research in other countries. Further, a member of the MPTS research network will know about colleagues' research in participating countries. Unfortunately, results of less popular or more recent research are difficult to obtain. For example, much work has been done throughout the region on growth and yield of agroforestry species, yet this information is not widely distributed. Though growth and yield varies between sites, this information could provide decision-makers general guidelines of expected yields and advance research efforts.

Mechanisms are needed to share basic research results. There are networks for specific research (e.g., multi-purpose trees, rattan, bamboo), but until recently no networks focused on collecting and sharing information on forestry in general. The FAO, with the Directors of national forestry research institutes initiated, two networks to enhance the flow of forestry information.

At the 1989 FAO consultation on forestry research for Asia and the Pacific, an Informal Network of Forestry Research Managers - Asia-Pacific Region (INFORM) was created. Its objectives are to promote: 1) regional cooperation and foster closer working relationships among the forestry research institutes (FRI's) of the region; 2) information-sharing and exchange of experiences among the FRI's for mutual benefit and collective self-reliance; 3) traditional IUFRO activities in the region. Periodic meetings are planned to increase the flow of materials.

The Forestry Research Support Programme for Asia-Pacific (FORSPA) was started in 1989, also during the consultation of Directors of Forestry Research Institutes (Anon. 1989c). Its primary objective is to improve forestry research capabilities in the region to respond more efficiently to the needs of participating countries. These include Bhutan, China, Fiji, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, and Thailand.

Recognizing a need to coordinate agroforestry research and share results of this research, the FAO initiated a third mechanism in May 1991 to address this concern. The approach is to set up a participatory network of national forestry institutes for increased training, research, and extension of agroforestry activities and information. The project will set up demonstrations of successful agroforestry systems and provide a source of documentation of agroforestry information. Based in Jakarta, Indonesia, the geographic focus of the network are nine South and Southeast Asian countries. No reference is made in the operation plan to include Pacific Island countries.

Other international agencies are coordinating research on specific aspects of forestry. Examples of some are included below.

The Australian Centre for International Agricultural Research, established in 1982, encourages research aimed at identifying and finding solutions to agricultural problems in developing countries. ACIAR commissions research and communicate research results to individuals and institutions. The Centre works on a variety of issues common through the region, including smallholder agriculture development, tree improvement, forage crops, as well as marine problems. Its forestry research works to promote the use of Australian trees in developing countries. Participating institutes have established adaptability trials of about 50 species of eucalyptus, acacia and casuarina.

The International Development Research Center (IDRC) recognized the importance of bamboo and rattan and developed a network to support research on these species. The research seeks to find efficient ways to solve the problems of insufficient supplies of raw materials and other obstacles to provide greater employment opportunities for rural populations.

The Forestry/Fuelwood Research and Development (F/FRED) project, funded by USAID, responded to the fuelwood needs in the region. Its aim is to advance the research and research capabilities on multi-purpose trees in participating countries. After its initial funding cycle, the network includes over 30 institutions in 12 South and Southeast Asian countries. These institutes are examining the performance of select multi-purpose trees in three ecozones: humid, arid, and semi-arid. The project also supports three trials representing 25 provenances of *Acacia auriculiformis*. Other experiments supported by F/FRED are *Leucaena psyllid* trials, alley cropping, and feeding trials.

The Nitrogen Fixing Tree Association (NFTA) provides scientists a way to evaluate a variety of nitrogen fixing trees (NFTs) and select the most appropriate species for given conditions. The Cooperative Planting Program (CPP) is used by scientists throughout Asia and the Pacific to test NFTs. NFTA has over 240 trials with scientists at locales, throughout the region, including Fiji, Guam, Yap, American and Western Samoa, Tonga, and Papua New Guinea.

Conclusions

The amount of funds dumped into forestry research each year is having little, if any, effect on arresting the monumental degradation of our natural resources. An astronomical amount of monies support research that will provide little benefit to society. Until most recently, societal issues had little, if any priority in national forestry research programs. Over the last decade the focus of forestry research is shifting toward these issues. Most, if not all, national programs include social forestry in the rhetoric. Some even have research programs that address this critical issue. But, few allocate sufficient resources to understanding the diverse cultural factors of managing or growing a forest.

More attention and consideration must be given to the societal characteristics that complicate the technical aspects of forestry. The forestry community knows how to grow trees. We

can calculate growth and yield and determine the "best" species for a particular climates. But, without a genuine understanding of different cultures and how their people view trees, technical "fixes" are ineffective at stopping deforestation.

A concerted effort is needed to collect and share the results of forestry research throughout the eastern hemisphere. This information must be readily available to forestry professionals in every country in the region.

The Pacific Island countries must be included in all phases of the evolution of international and regional forestry research programs. It is essential to the health of the region that the island countries no longer be viewed as ". . . and the Pacific." Research networks based outside the Pacific region are ineffective at coordinating the flow of information among the islands.

The forestry research community in the Pacific Islands would greatly benefit from a coordinated effort to gather and share research results. This must include information from continental as well as island countries. But, the coordinating body and the central repository for the information must be located within the Pacific Island countries. The information center must serve the needs of the people of the region, and their participation in the network is essential to its health. To gain this participation, it is critical that the network managers come from local communities, for they can better serve the needs of their people. But, we all have a vital role to play in sustaining the health of our global ecosystem.

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