Tropical Resources Institute

TRI NEWS

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Message from the Director

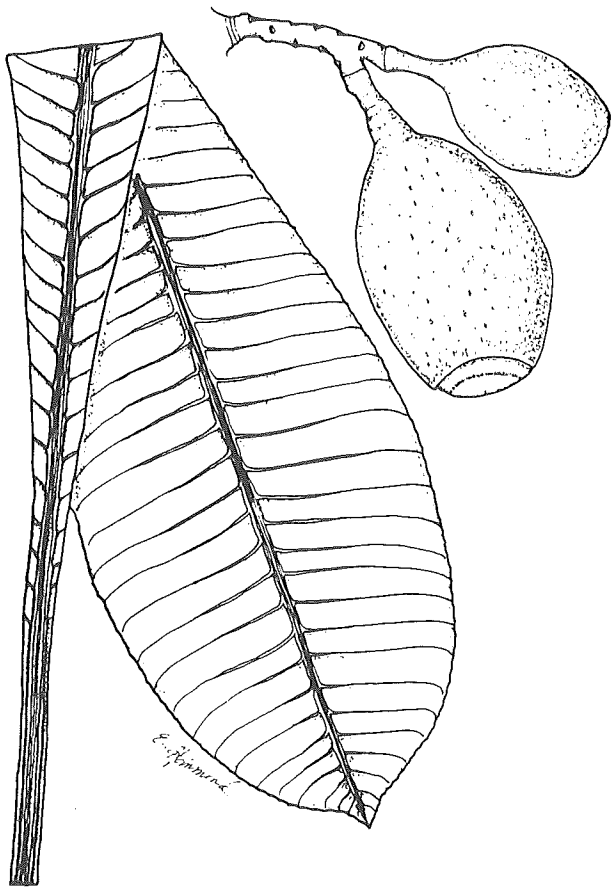
In the U.S. during the past few years, there has been considerable debate about the role of the university in national life. There has been much concern that universities not only create new knowledge and cummulate that of the past, but that they assume a moral role regarding knowledge and the uses to which it is put. All of us in the natural resources field know that ultimately all resource decisions are moral acts. To plant or not to plant, to protect or to exploit, to probe the complexity of sustainability are not pure technical choices, but are actions which overlay an original moral choice. It is better to plant than not, even if the personal costs are higher. Somewhere underlying all the equations and technical jargon, the original impetus for considering the action was someone's sense of right and wrong.

These thoughts were stimulated by attending a colleague's seminar on environmental planning for a military bombing range in southern Arizona. He pointed out the need for planners to educate their clients about resources that were entrusted to them, and about the legal and moral obligations they had in regard to those resources. He then pointed out that education of the military, and the technical development of the plan were not enough. The truly effective environmental planner must go the next distance to ensure that the political institutions would ensure the implementation and effectiveness of the plan.

Contents

It is from this position that I wondered how well all our recent concerns for establishing national parks and equivalent reserves in developing countries were treated as moral acts, whose very morality required follow through. My observation is that many parks and reserves in developing countries are the result of a certain moral outrage by domestic and overseas elites. There is a sense that if anything is to be "saved" it must be placed within these arbitrary boundaries. Yet, establishing a national park is easy compared to maintaining it. Do our elites who establish parks at much expenditure of money and energy, spend the even greater amounts on developing programs for accomodating local and overseas tourists? Have they given full attention to sources of funding for long-term maintenance? Or are they going to be like most nature protection folk in the U.S. who greatly agitate for drawing lines on the map and calling them parks and then run on to more line drawing, with the odd interim complaint about the failure of the Park Service to manage it "their way". Certainly, such folk seem scarce at budgetary hearings to hire more rangers, to improve their salaries, to buy the typewriters, pay the telephone bills and all the other mundane neccessities that go on forever in the maintenance and management of a natural resource.

Morality and follow through, the determination to complete what we start, the dignity of humility do not seem to have any more popularity today than they did in the past. Unfortunately, today we have a shrinking resource base relative to rising human expectations. The challenge in ecological management or eco-development in our times is that any connection that is left out or overlooked is likely to have severe consequences for the whole system. In that sense, the now fashionable "biocentric" management or the hopes that "heroic" species will propel wider habitat protection are comfortable short-hand hopes most likely to earn long-run failure. In the developing world, people are part of the biological solution not the problem. People become natural resource problems only through our failures of moral vision and the persistence to follow our good resource ideas to all of their neccessary conclusions. We, not "they", are the problem. Once we begin to accept that responsibility, we have made a quantum step toward practicing the ecological management we so tirelessly preach.



Grias Peruviana

RESEARCH PROFILES

Primary and Secondary Forest Lowland Gorillas: A Comparative Ecological Study

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Yale School of Forestry and Environmental Studies

Objectives: To determine the density and distribution of the lowland gorillas(*Gorilla g. gorilla* (Savage&Wyman)), the forest elephant (*Loxodonta africana cyclotis*) and associated fauna in the dense forest of the Haute Sanga Prefecture of Southwestern Central African Republic (CAR) with the goal of identifying potential areas for the conservation of these species and their habitat, and to gather ecological information on the lowland gorilla.

Participating Organizations: The New York Zoological Society; the Anders Clausen Fund and the Tropical Resources Institute, (Yale School of Forestry and Environmental Studies.)

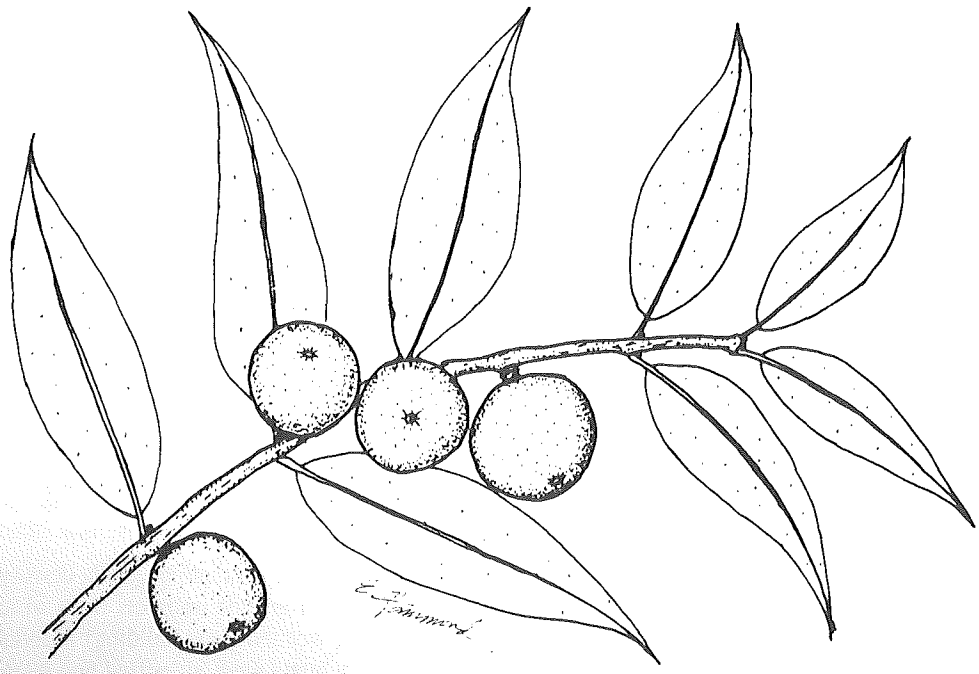
The dense forests of CAR represent the northern extension of the great Congo Basin. Approximately 3,500,000 hectares of forest cover southern CAR, however, 48 percent are being exploited by forestry societies. Prior to this study, no reserve existed in the CAR to protect this dense forest ecosystem. This study confirmed that this area contained outstanding examples of the range of dense forest habitats and some of CAR's last important strongholds of the lowland gorilla, forest elephant, bongo (*Boocerus euryceros*), dwarf forest buffalo (*Synercus caffer nanus*), chimpanzee (*Pan trogloytes*), and many other dense forest wildlife. The flora and fauna of this region represent a richness of great natural, scientific, economic, aesthetic and cultural value that is currently severely threatened by logging exploitation, encroaching human population and subsequent heavy illegal poaching for meat and ivory. From the results of this study, the Dzangha-Sangha Dense Forest Santuary was proposed to, and completely accepted by, the CAR government. This reserve would compliment CAR's existing system of savanna parks and reserves and represents the CAR government's efforts to conserve significant representative segments of all its natural environments. This reserve will cover approximately 3300 km^2 and will include a wildlife protection program, tourism development and efforts to ensure the cultural integrity of the BaBinga (Aka) Pygmys of the region. This reserve will be managed in an integrated manner, allowing limited traditional hunting and logging in certain areas, as well as regions of total preservation of the natural forest ecosystem.

Previously, it was thought that the eastern distributional limit of the western lowland gorilla was limited to the west bank of the Sangha River in the vicinity of Nola (Gartlan, in Dixon, 1981). During this study, populations of gorillas were observed west of the Sangha River to the Congo border and beyond. This represents a significant range extension for this subspecies. There is no reason to believe that they do not extend through the Congolese forests at least to the UBangui River.

The overall study area consisted of approximately 6000 km^2, with the phase of the work concentrating on an area of 3300 km^2 mostly on the east bank of the Sagha River to the Congo border.

The method for estimating gorilla density was based on nest counts from line transects from which the population density of weaned (nest building) individuals was derived. Twelve habitats were identified and related to four logging status types and 1420 gorilla nests and 100 chimpanzee nests were recorded in 783 kms of transects and the mean gorilla density ranged between .89 and 1.45 gorillas/km^2. These figures are high in comparison to large areas of regrowth of herbaceous vegetation, especially *Aframomum sulcatum*, in logged areas. Gorillas favored secondary forest habitats, but they used all forest habitats for feeding and/or nesting. Light gaps, herbaceous inundated forest, and depleted forest habitats exhibited high relative densities of gorillas. Thirty-six types of gorilla foods were identified, although most seemed to make up a small amount of the diet. Their primary food consisted of *Aframomum sulcatum*, but termites of the genus *Cubitermes* and a termite species of the interior savannas played an important role in the diet of the gorillas in this area. Gorillas nested primarily in thickets of *Aframomum sulcatum*, however, 33 nests were observed along the savanna/forest edge, 18 of which had grass as a major construction material. Six of these nests were actually in the savanna itself, up to 10 meters from the forest edge, and constructed solely of grass. Gorillas were observed on several occasions in herbaceous marshy clearings feeding on the blanched lower stem of the sedge, *Rynchospora corymbosa.*

The list of gorilla food items consists of 33 species of plants and three types of insect foods. *Aframomum sulcatum* pith comprised 29 percent of all gorilla food observations. Of these 33 plant food items, 25, or 75.8 percent were observed in the secondary, depleted and inundated forest habitats. The abundant herbaceous material in these habitats, especially *Aframomum sulcatum* support the highest nesting densities and largest group sizes.



Myrciaria dubia

Chimpanzee densities in the study area ranged from .01 - 13 km^2. The highest relative densities of chimpanzees in this study were found in forests of *G. dewevrei* and recently logged depleted forests. All the densities calculated for chimpanzees are low in comparison to those of similar habitats in other areas of Africa. The small sample size and limited ecological information of this species prohibit speculation of the factors contributing to its distribution in the study area.

Sixteen of the 20 species of primates listed by Mittermeier (1985) for CAR are found in this dense forest zone.

Elephants play an important role in shaping the dense forest habitats. In areas of high elephant density, their passage creates a vast network of open trails throughout the forest. In their foraging and feeding, many large trees are killed and knocked down creating a secondary forest aspect. In their search for minerals, forage and water, they maintain, enlarge and perhaps create many of the herbaceous marshy clearings in the study area. Dzanga, one of the principal clearings in the study area, hosts a large concentration of elephants and is known to the Pygmys as the "village of the elephants".

The highest densities of elephants in the study area were the region of these marshy clearings. The mean elephant density, determined by dropping counts (Wing & Buss, 1970; Short, 1983; Jachman & Bell, 1979), for the entire study area ranged between .016 and 2.63, with an overall mean of .86 elephants per km^2.

These marshy clearings are also important to Bongo, Dwarf Forest Buffalo, Sitatunga and other illusive dense forest wildlife which come for food, water, and minerals. With careful management these marshy clearings offer great tourist potential. The elephant trails are the major thoroughfares of the BaBinga (Aka) Pygmys who hunt and gather throughout the forest.

The results of this survey reveal the great wildlife conservation and tourist potential of this dense forest region of southwestern CAR. The area holds substantial gorilla populations and likely the last major population of elephants in CAR. It has been shown that carefully managed, limited selective logging, which created a mosaic of herbaceous, secondary growth can be beneficial to gorillas if subsequent poaching can be controlled. The BaBinga Pygmys have demonstrated their willingness to participate in a plan to ensure the future of their forest.

3300 km^2 of this area has been proposed to the CAR government as the Dzanga Ndoshi National Park to protect these animals, their habitat, and the cultural heritage of the BaBinga Pygmys. Classifications of this important area as a reserve awaits only the funding to inact a protection program. The CAR government has recently closed the hunting of elephants and the collection of ivory, and gorillas and bongo are protected species in CAR, but they lack the means to enforce these laws. Urgent action and the fluid borders make international trafficing of wildlife products relatively easy.

Shades of Green: Environmentalism in Two Continents

Ramachandra Guha
Visiting Lecturer in Social Ecology

The objective of this study is to provide a historical understanding of the growth of environmental consciousness in a non-Western setting, viz. India, and to contrast the Indian experience with the richly documented American one. It hopes thereby to hasten a union of two scholarly discourses that have run somewhat parallel to each other.

The first discourse is environmental sociology, whose rise in recent decades has been quite spectacular. Its geographical setting is the advanced industrial nations; its practitioners, chiefly English and American scholars; its concerns, the growth of environmental consciousness in the West. The second discourse is the sociology of development, a somewhat older field that emerged shortly after World War II. Its geographical setting is the Third World; its practitioners, both Western and non Western academics; its concerns, the historical and structural factors facilitating - or retarding - industrial development and modernization in "underdeveloped" countries.

While environmental sociology is quite innocent of the dimensions of environmental degradation in the Third World, and especially of social responses to such degradation, the sociology of development, for its part, has barely acknowledged the environmental limits to economic growth. The present study hopes to overcome these limitations by drawing upon the distinctive strengths of the two approaches. Thus the concepts and categories of environmental sociology, while reminding us that humans are not above and exempt from natural processes, are vital to a comparative analysis of environmentalism in industrialized and industrializing countries. Likewise, the analytical frameworks of the sociology of development, particularly strong in understanding relations of power between and within nations, can with a little imagination be used in interpreting environmental degradation in terms of the dynamics of class relations and the role of the state.

One way of fruitfully synthesizing the two discourses is by recasting the environment debate as a debate about industrialization. In my view, the literature on environmentalism has focused rather narrowly on human attitudes towards nature without trying to explore their underlying social bases, or conversely, what implications different social philosophies ostensibly innocent of environmental concerns have for the relationship between nature and humans. However, a study of environmental consciousness claiming, as this one does, to be an exercise in historical sociology must view the development of such a consciousness against the backdrop of its "other", viz. the growth and maturity of industrialization, not merely as a mode of economic organization but as an overarching social philosophy. The several centuries of the industrial and post industrial revolutions have had a far greater impact on the ecological and social fabric of human society than the preceding millenia of human habitation on this planet. In this sense, the growth of environmental consciousness may justifiably be viewed as an integral element of the wider response to the most far-reaching process of social change since the Neolithic Revolution: the coming of age of modern industrialization. Like socialism, feminism, and democracy - political trends with which it has an elective affinity - ecological thinking has been formed in the crucible of industrialization.

The empirical content of this project will consist of a historical comparison of environmentally oriented thinking in the United States and India. At one level, the two countries have much in common. They are both large and ecologically complex democracies: democracies is the operative word here, for it is not possible to conceive of an environment debate (or any other debate for that matter) in a undemocratic social system (such as the Soviet Union). Moreover, in both countries environmentalism seems to have come in cycles; (i) an early conservation movement asssociated with key personalities (Muir, Pinchot, Gandhi) concerned with the pace and direction of industrialization; (ii) an intervening period of "ecological innocence" following World War II, when there existed a widespread social and intellectual consensus on the benefits of industrial development; (iii) the reemergence of environmentalism since the 1960's, this time as a social and political movement able to mobilize large numbers of people.

Inevitably, there are significant differences in the ecological and cultural histories of the two countries. The histories of settlement have followed radically dissimilar time frames. For most of recorded history the Indian subcontinent has been dominated by a complex agricultural civilization with relatively high population densities. In contrast, the North American continent was sparsely populated till the arrival of the white man, while the technologies of rapid resource expolitation brought by the European have heralded an ecological transformation of unprecedented scope and intensity. More recently, India was under foreign domination for close to two centuries. High population densities, the history of colonialism, the Hindu-Muslim religious heritage and the fact that it is still dominantly an agrarian society all distinguish India from the most powerful country in the Western industrial world.

These differences and similarities will be elucidated in the comparative analysis. The strategy would be to identify prominent individuals in each country who exemplify a particular social philosophy, and explore the development of their thought against the backdrop of their times. Tentatively, I have identified four major strands: (i) the Agrarian Ideal, e.g. Jefferson and Gandhi, who believed that a society of peasant farmers could escape the moral depravity and rampant individualism of a commercial-industrial culture; (ii) the Pre-Agrarian Ideal , e.g. Thoreau, Muir and the great Indian anthropologist Verrier Elwin, protectors of the wilderness for whom hunter-gatherers and shifting cultivators were the prototypes of ecological wisdom; (iii) Marginal Scientists , e.g. Aldo Leopold, Lewis Mumford, and in India, the pioneering organic agriculture proponent Albert Howard and the advocate of "ecological sociology" Radhakamal Mukherjee. These individuals worked for the most part within the scientific enterprise, but their sensistivity to ecological issues made them marginal to, and subversive of, "mainstream" science; (iv) Imperial Scientists, e.g. forestry experts and irrigation engineers, whose vision of large scale, centralized, and expert controlled resource management held sway for many decades but has recently come under close scrutiny. The analysis of these four strands will bring to the fore their contrasting visions of ecology and society, as well the different articulation of each strand in the two cultures.

The concluding section of the study will deal with the modern environmental movement. I will argue that while in the U.S. environmental degradation has become a social issue only after a certain level of industrialization, in India (due to high population densities, colonialism, etc.) it is part of the very process of industrialization. Moreover, it directly threatens the livelihood of rural populations living close to the subsistence margin. If in the U.S. environmentalism is primarily a class struggle over access to leisure, in India it is primarily a class struggle over the use of nature between competing groups (typically industry and peasants). I shall explore the manner in which these different motivations for the environmental impulse inform different stategies of political action. Finally, I shall trace the organic links between earlier debates and the growing schisms within the contemporary movement. In the U.S. the mantle of Muir is claimed by the "Deep Ecologists" with their celebration of wilderness and aboriginal populations. Meanwhile, there is also a revival of Jeffersonianism which integrates environmental concerns with the agrarian ideal (e.g. Wendell Berry). And in India, Gandhian style environmentalists are split into two camps, each claiming to be the inheritor of the Mahatma's mantle. One strand, invoking Gandhi's mystical side, rejects Western science in its totality; the other strand, drawing upon Gandhi's social activism and village reconstruction work, believes in a synthesis of modern and traditional technology.

The primary research on the American side is substantially complete, while the research on Indian materials will commence when I return to India in July 1987. I hope to have a draft of the book by end 1988. While the research on Indian environmentalism will be wholly original, my research on American environmental history will hopefully recover the vision of key figures - notably Lewis Mumford - who have been neglected by American environmental historians. Finally, while a comparative history provides its own justification, I would like to enter a special plea for my reanalysis of American environmentalism. For too long have Western scholars studied the Third World without a corresponding interest being expressed by non-Western scholars in the study of Occidental societies. While such an exercise will reveal my own biases, an outsider's appraisal of the American environmental movement may provide a perspective missing in internal assessments.

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COOPERATORS

The South-east Asian Rain Forest Research Committee, Institute of South-east Asian Biology, University of Aberdeen, Scotland

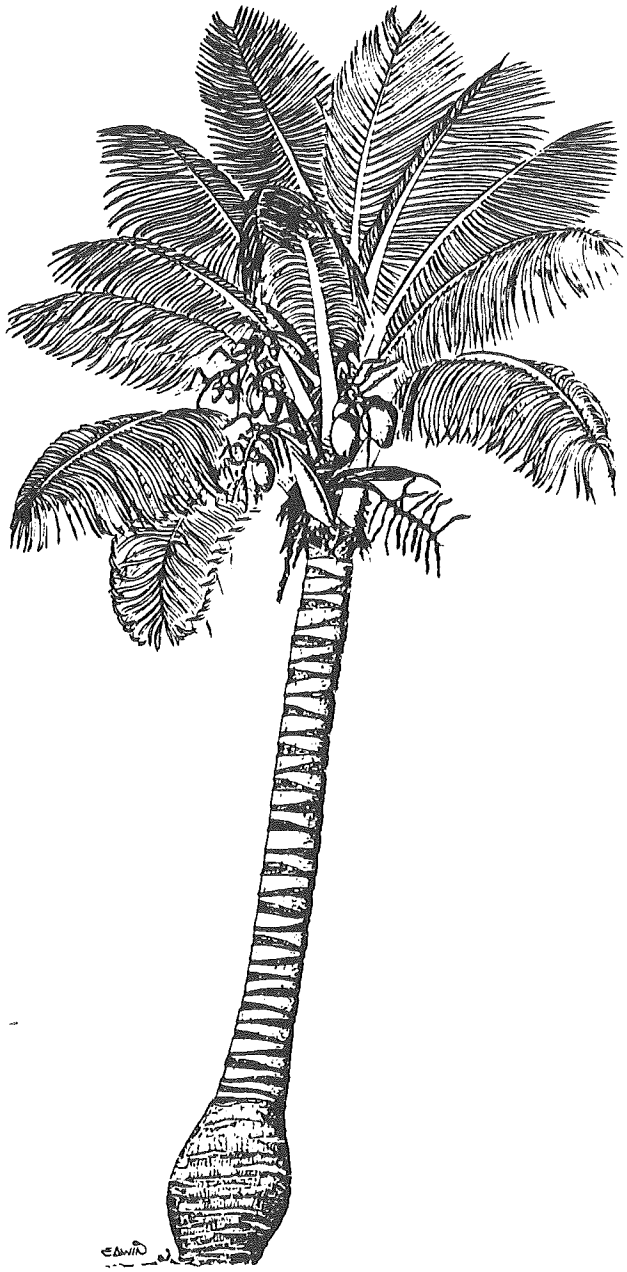
In 1984, the South-east Asian Rain Forest Research Committee was formed with Dr. A.G. Marshall as chairman. Its broad theme concerns recovery of tropical forest following disturbance: patterns and processes. It encorporates projects of a fundamental nature, as well as studies with an applied aim. Providing training and taking part in collaborative work with colleagues overseas is a basic commitment of the Programme. Research centers on the Danum Valley Conservation Area in Sabah, Malaysia, but will move into other areas of South-east Asia to provide valuable comparisons and to establish further international collaboration.

The Progamme's objective is to gain an understanding of the influence of the creation of gaps of various sizes and types, upon the flora and fauna of closed canopy forest, and of the processes whereby these gaps are filled. This work focuses on the regeneration of trees from seed. It requires knowledge about the reproduction and seed dispersal of tree species, the dynamics of the 'seed bank' in the soil, the factors affecting germination and the establishment and growth of new plants and the demography of seedlings and saplings below the forest canopy.

Areas of Programme research include: the processes of gap formation, initial stages of recovery, the key differences between primary and secondary secondary forest tree species, soil processes and forest hydrology, interaction of animal and plant populations, and the effects of disturbance upon the fauna. Research projects currently underway or being planned are: plant collecting and taxonomic studies, forest enumeration and dynamics, dynamics of rain forest on ultra-basic soils, recovery of tropical forest after chip-logging, the role of mycorrhiza in forest recovery, birds as dispersers of figs in tropical forests, and insects as seed predators in tropical forests.

The Danum Valley Conservation Area covers 438 km of lowland rain forest in south-eastern Sabah. It is bordered to the east and north by the Segama River and the northern boundary lies near the Danum River. The Conservation Area is one of the few remaining large expanses of dipterocarp forest in Borneo. The Danum Valley lies within the timber concession of the Sabah Foundation which has set aside the area for conservation.

The Programme is both international and interdisciplinary and has long-established links with several research workers and institutions in South-east Asia. To find out more about the Programme and how you may be able to join it, please contact Dr. Adrian Marshall, Institute of South-east Asian Biology, c/o Department of Zoology, University of Aberdeen, Aberdeen, AB9 2TN, Scotland.



Cocos nucifera L.

COOPERATOR NOTES

These "cooperator notes" give brief details about an organization's overall focus or about their specific research and educational activities. We would welcome any submissions by our readers on their research or their institution's activities. Please send information to Katherine Snyder, Editor, TRI NEWS, Yale School of Forestry and Environ-mental Studies, 205 Prospect Street, New Haven, CT 06511, or call (203) 432-5118.

During 1984-1985, the **U.S. Geological Survey**, in cooperation with the Puerto Rico Department of Health and the Puerto Rico Aqueduct and Sewer Authority, conducted a detailed reconnaissance for volatile organic compounds in public supply wells throughout Puerto Rico. The investigations, at a cost of more that $175,000, is the most comprehensive of its kind in Puerto Rico. In addition, U.S.G.S. has recently published two other reports: a "National Water Summary 1985 - Hydrologic Events and Surface Water Resouces, Puerto Rico and the Virgin Islands" and "Water Resources of the Lower Rio Grande de Arecibo Alluvial Valley, Puerto Rico". Copies of these reports can be obtained from the Department of the Interior, U.S. Geological Survey, GPO Box 4424, San Juan, PR 00936.

In November 1986, a workshop organized by the **U.S. Man and the Biosphere Directorate on Caribbean Islands** brought together thirty of the world's leading experts on the problems of small islands. These experts met in Puerto Rico for a week to develop recommendations to international organizations, governments and research institutes. The group looked at development from three perspectives: 1) environmental conservation 2) using resources for economic gains and 3) combining conservation and economic gain to produce sustainable development which considers the quality of life of the islanders. For the workshop recommendations please write the U.S. National Committee for Man and the Biosphere, Depart-ment of State, OES/ENR/MAB, Washington, D.C. 20520.

A group of organizations dedicated to improving and publicizing the practice of comprehensive management and planning of coastal natural resources have developed a **Coastal Area Managment (CAMP) Network.** These organizations include the University of Rhode Island (on behalf of U.S.A.I.D.), the South Carolina Seagrant Consortium, the International Affairs Division of the National Park Service, the Griffis Foundation and the International Center for Living Aquatic Resources Management (ICLARM) in Manila. The CAMP Network assists professionals worldwide through information dissemination, access to literature, announcement of training opportunities and meetings and intercommunication among professionals. Many countries are now organizing CAMP programs and a few have programs in operation (the U.S. and Sri Lanka). Additional information about the CAMP Network can be obtained by writing Dr. John R. Clark, U.S. Department of the Interior, National Park Service, P.O. Box 37127, Washington, D.C. 20013.

The **Island Resources Foundation** is carrying out a project, sponsored by the World Wildlife Fund-US and the Rockefeller Brothers Fund, which addresses the need to institutionally strengthen small, non-government organizations in the Eastern Caribbean. The project is particularly concerned with organizations which focus on natural resource management issues. IRF plans to work with both traditional conservation organizations and with business and professional groups such as chambers of commerce, hotel associations or service clubs in an effort to improve the NGO role in decision-making about development and resource management issues. Currently, an eight-island survey is being done to establish a database and institutional profile of Eastern Caribbean non-government organizations. Additional information about IRF's activities as well as a list of their publications is available through the Island Resources Foundation, Red Hook Box 33, St. Thomas, U.S.V.I. 00802 (809) 775-6225.

The Organization for Industrial Spiritual and Cultural Enhancement International (OISCA) of Japan, which was founded twenty-five years ago, is undertaking the following activities: 1) development cooperation programme which concentrates on agricultural and rural development in Asian and Pacific countries. Volunteers for this program are currently in service in Bangladesh, Thailand, Malaysia, Indonesia, the Philippines, Taiwan amd Palau; 2) technical training programme for potential young national builders which offers training programs in agriculture and engineering; 3) a green drive which promotes tree planting activities throughout Thailand, Nepal, Sri Lanka, India and the Philippines. Write OISCA - International, 6-12 Izumi 3-chome Suginami-ku, Tokyo 168 Japan for more details about these and other programs.

The **Forestry Research Institute of Malaysia (FRIM)** which was founded in the 1920s, conducts and promotes research on the production, extraction, processing, storage, transportation and utilization of forest products for continued development of the forestry sector and the conservation of the resource base. FRIM has various facilities at its disposal: a forest science park, a nursery, 5 arboreta, an herbarium, a wood collection, museum and a library that has 120,000 volumes and 1000 journal titles.

Primary research areas include: timber utilization, and botanical, ecological and forest protection studies. The Institute operates a number of research field stations in the following areas of Malaysia: Pasoh, in the middle of a 2000 ha lowland dipterocarp forest; Mata Air where research on teak and pine occur; Jengka located within the Syarikat Jengka Sendirian Berhad timber concession and Jambu Bangkok where work on degraded land takes place. Currently, FRIM is conducting research on oil palm trunk utilization, rubberwood, rattan, bamboo forest plantation management, hydrology, urban forestry and is developing the FRIM grounds into a forest science and recreational park. For more details on FRIM, write Institut Penyelidikan Perhutanan Malaysia (FRIM), Kepong, Selangor, 52109 Kuala Lumpur, Malaysia.

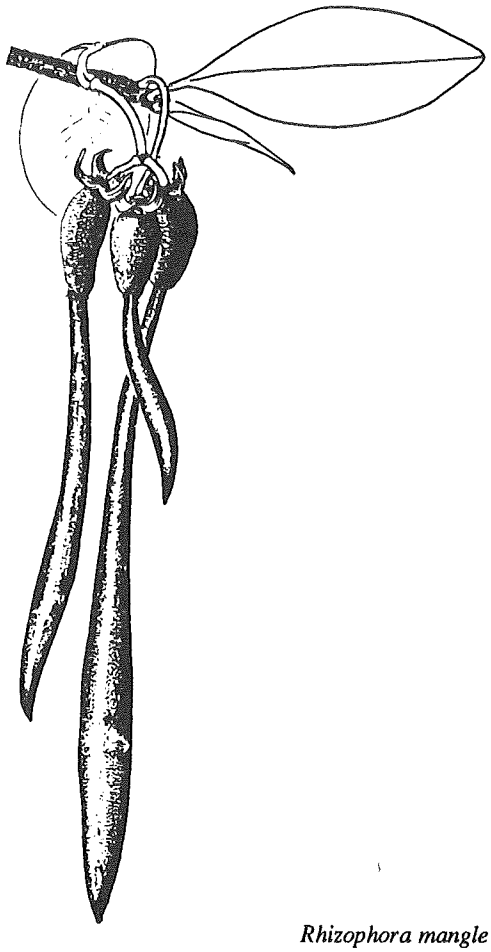
The Renewable Natural Resources Department of the **Centro Agronomic Tropical de Investigacion y Ensenanza (CATIE)** focuses on three program areas: silviculture for wood production, agroforestry, and wildlands and watersheds management. The silviculture program promotes and studies management of natural tropical forests, both primary and secondary as well as planting systems for fast-growing and multiple-use forest species. The program has three project areas: 1) firewood and other alternative energy sources, 2) improvement of trees with economic value and 3) research about natural forests, including the design of silvicultural techniques to produce wood under sustained production levels. The agroforestry program undertakes biological and socio-economic studies of systems that combine trees with annual crops for domestic animals. These studies include management of living fences, forage and wood producing trees, shade trees for certain perennial shrubs, and management of trees with grasses. The wildlands and watershed management program's main objectives are: the design and development of techniques and methodologies to attain a sustainable planning scheme and an integrated management of watersheds as well as wildlife areas, in cooperation with national institutions of the Central American and Caribbean countries. More detailed information about the activities of CATIE and the Renewable Resources Department can be obtained from CATIE, Turrialba, Costa Rica.

The **Tropical Science Center (TSC)**, based in San Jose, Costa Rica, was founded in 1962 as a private not-for-profit association. The objectives of TSC are to conduct and support scientific research and education and to encourage the acquisition and application of knowledge concerning Man's relationship with the biological and physical resources of tropical environments. Membership in TSC includes a large group of professionals and scientists from various educational and research institutions in Costa Rica. In addition to members' activities, the center contracts to undertake development projects in basic and applied ecology and the technical survey, evaluation and management of renewable natural resources. The Tropical Science Center owns and administers the Monteverde Cloud Forest Biological Reserve, an 8,000-acre private conservation unit located in the highlands of the Tilaran mountains of northern Costa Rica. For more information about TSC, please write Dr. Joseph Tosi, Jr. at Tropical Science Center, Apartado 8-3870, San Jose, Costa Rica.

The **Eastern Caribbean Natural Area Management Programme (ENCAMP)** is a cooperative effort of the University of Michigan's Wildland Management Center. ENCAMP collaborates with governments and non-governmental organizations in the Eastern Caribbean in managing and planning the use of natural areas and resources critical to development. All ENCAMP projects involve research, training and education and field action. Resource users, consumers, government officals, and reseachers are involved in all phases of management, from project design to implementation. Some of ENCAMP's projects have been: the development of a strategy for marine conservation in the Wider Caribbean (in conjunction with Johns Hopkins University); a survey of conservation priorities in the Lesser Antilles through the compilation of data atlases; a National Parks and Forest System Plan, Dominica; National Parks System Plan, British Virgin Islands; Marine Resources Development Plan, Anguilla; and a Study of Management Alternatives, Southeastern Peninsula, St. Kitts. ENCAMP has several publications on these topics and runs workshops on park planning and ecological guidelines for development. Contact Allen D. Putney, West Indies Laboratory, Teague Bay, Christainsted, St. Croix, U.S.V.I. 00820 (809-773-5854) for more information.

The **National Park Foundation** and the **State Open University**, both of **Costa Rica** have recently published in Spanish a work entitled "Climate and Vegetation of Costa Rica". The work is composed of two volumes and includes chapters on such topics as atmospheric systems, the Costa Rican paleoclimate, and the historical perspective of the regional and Costa Rican phytogeography. To order this publication, please send a check or international money order of US $27 to: President, Fundacion de Parques Nacionales, Apartado 236, 1002 San Jose, Costa Rica. (Price includes air mail postage to any country). Dr. Daniel Janzen's work "Guanacaste National Park: Tropical Ecological and Cultural Restoration" can also be purchased by sending US $7 to the above address.

The **International Institute of Tropical Agriculture (IITA)** will be running a twelve-week training course in Maize Research and Production for Research Workers and Extension Supervisors responsible for accelerating maize production in tropical Africa. The course will be conducted at IITA in Ibadan, Nigeria from September 14 to December 14 1987. For applications and



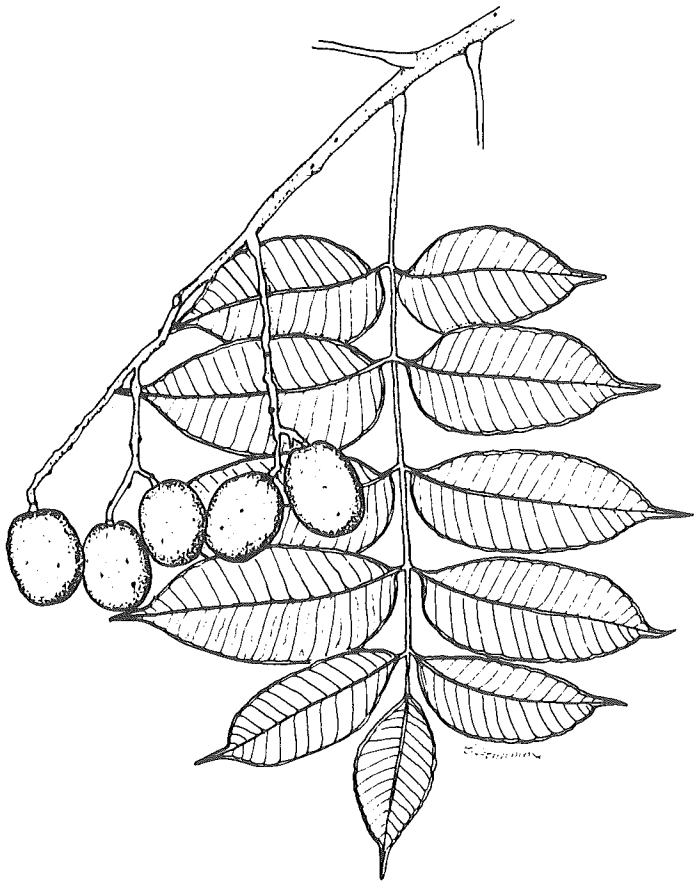
Rhizophora mangle L.

more details on this course, please write Heinz Gasser, Director Training Program, IITA, Oyo Road, PMB 5320, Ibadan, Nigeria. Telephone: 413244, telex: TROPIB NG 31417.

The **Australian Centre for International Agricultural Research** publishes a biannual forestry newsletter edited by Dr. J.W. Turnbull. If you would like to receive a copy of this newsletter, write Dr. Turnbull at ACIAR, GPO Box 1571, Canberra, ACT, 2601, Australia. Telex: AA62751.

The **IX International Symposium on Tropical Ecology** will be held during December 11 - 16, 1987 at the Banaras Hindu University on the theme "Ecological Management of Tropical Ecosystems". The symposium will consist of a number of conferences, contributed paper sessions and poster sessions covering a wide variety of subjects of global importance such as land degradation and restoration, human ecology, plant geography, environmental pollution, man's impact on forest, savanna, aquatic and agro-ecosystems. Last date for the receipt of abstracts (not exceeding 250 words) is September 1, 1987. For details contact: Professor J.S. Singh, Organising Secretary, IX ISTE symposium, Centre of Advanced Study in Botany, Banaras Hindu University, Varanasi 221005, India.

Professor J.S. Singh of the **Centre for Advanced Study in Botany at Banaras Hindu University** is coordinating a MAB project funded by the department of environment and the Government of India for a dry tropical region. The title of this study is "Environmental Degradation of Obra-Renukoot-Singrauli Area and Its Impact on Natural and Derived Ecosystems". The study incorporates five different projects: industrial air pollutants and their effects on ecosystem structure and function; analysis of structure and functioning of forest ecosystems; analysis of structure and functioning of savanna and agro-ecosystems; analysis of structure and functioning of watershed and water bodies; and impact of development on changes in land use systems, socio-economic-demographic conditions and environmental perception and behavioral management. Details about this program can be obtained by writing Dr. Singh at the address in the paragraph above.



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TRI NOTES

Faculty and Student Activities

TRI Director William R. Burch visited Panama and Costa Rica in January to serve as a consultant to the Organization for Tropical Studies on a new program of applied research. While in Costa Rica, Dr. Burch visited CATIE, and gave a lecture to students in the renewable natural resources department. He also visited the Tropical Science Center to establish closer ties with this organization. In Panama, Dr. Burch met with School graduate Leroy Watson who has established ANCON, a conservation organization which focuses on involving the business community in conservation activities. In addition, he met with Dr. Ira Rubinoff of the Smithsonian Tropical Research Institute (STRI).

In November, Dr. Burch, along with Dr. Ramachandra Guha, visiting lecturer in sociology, participated in the New England Conference of the Association for Asian Studies 1986 annual meeting. They were part of a group which discussed "The Forests of South and Southeast Asia: A Catastrophe Now Unfolding?" Other participants included Chair Dr. Conrad Totman of Yale, Dr. Harold Conklin of Yale and Dr. Richard Tucker of Clark University.

Dr. Steven Kellert is conducting research on Japanese attitudes, knowledge, and behaviors toward nature, particularly wildlife. He presented a paper on this research at a conference at the National Zoological Park in February and is scheduled to give additional papers at the First Pacific Environment Conference in Nagoya, Japan in June and the International Game Biologists Conference in August. Dr. Kellert also has been working on developing a museology in natural sciences program with Dr. Charles Remington of Yale. In July, Dr. Kellert will serve as co-head of the overseas scientific committee for the first International Conference on Wildlife Conservation in China.

Various faculty members are doing research on tropical issues: Dr. Clark Binkley and Ph.D. candidate John Perez-Garcia are looking into the effects of alternative tropical deforestation scenarios on timber prices; Dr. Graeme Berlyn and Ph.D. candidate Ambrose Anorou are studying genetic stability and physiology of Caribbean pine seedlings and regenerated plants. Dr. D.M. Smith and Dr. Bruce Larson have initiated ties with Mexican forestry institutions and universities and will be developing research with graduate students in this region.

Last semester, during Thanksgiving Break, Dr. Brian Boom, Visiting Lecturer in plant systematics at the School and Assistant Curator at the New York Botanical Garden, travelled to the Dominican Republic to participate in a three-day conference on enthobotany. He also served on a panel that discussed issues raised during the conference. This semester, and for much of the summer, Dr. Boom will be conducting fieldwork in Guyana in conjunction with his preparation of the taxonomic treatment of the Theaceae for the Flora of the Guianas project. In late July, he will present a paper in West Berlin at the XIV International Botanical Congress.

Ph.D. Candidate Jeffrey Vincent spent five weeks in Malaysia this winter to collect data for his dissertation which concerns the impact of international trade on forest utilization. He met and worked with representatives of state and federal forestry, industrial organizations, the Universiti Pertanian Maaysia, the Forest Research Institute Malaysia and the Sabah Foundation. His trip was supported by TRI and the Anders Claeson Fund of Yale School of Forestry and Environmental Studies.

Masters student Elizabeth Kramer joined the tropical ecology course at OTS this winter. After the course, she stayed at La Selva to do a project on herbivore damage type and class in tree fall gaps. This project was supported by a Noyes fellowship.

Meetings

The TRI Advisory Group met from March 25 - 27 to discuss education, communications and sustainability issues of the Institute. Advisors in attendence were: Robert Blake, David Challinor, Hilda Diaz-Soltero, John Earhart (chair), Louise Fortmann, Victor Gonzalez, David Harcharik, John Michael Kramer, Tom Lovejoy, Ariel Lugo, Ghillean Prance and John Sullivan. Recent graduates of the School also attended the meeting. They included: Jim Chamberlain, Mark Dillenbeck, Eliot Gimble (all class of 1986), Vicky Dompka ('83), and Carol Stoney ('84). First year master student Cristin Gallup and second year students Anne Reilly and Kathy Rorison served as rapporteurs for the meeting.

Memberships

Yale School of Forestry and Environmental Studies has been admitted to membership in IUCN, the International Union for Conservation of Nature and Natural Resources, a union of member states, government agencies and non-governmental organizations concerned with the development, promotion and implementation of scientifically based action towards conservation and sustainable use of the world's living resources. Its mission is to provide international leadership for promoting effective conservation of nature and natural resources. IUCN, which was founded in

1948 under the sponsorship of the United Nations Educational, Scientific and Cultural Organization (UNESCO), is based in Gland, Switzerland. Its membership currently stands at: 58 states, 125 government agencies, 333 national non-governmental organizations, 26 international non-governmental organizations and 15 affiliates, giving a total of 557 members in 115 countries.

Visitors

TRI has sponsored a variety of visitors and special seminars and lectures this year. These include: Luigi Boitani from IUCN/WWF who gave a talk on "National Parks and Conservation Strategies in Africa: the Role of Technical Cooperation"; Dr. Purohit, director of the High Altitude Plant Physiology Research Center, Garwhal University - "Social Forestry in the Central Himalayas"; Dr. Michael Robinson, director of the National Zoological Park-"The Biopark and its Role in Tropical Resources Conservation"; Don Henry, director, Wildlife Preservation Society of Queensland, Australia - "Conservation of Australia's National Estate"; Susan Becker, coordinator of international projects/Africa, TreePeople - "Deciduous Trees in the African Tropical Highlands: Ignorance or Innovation?"; Dr. Louise Fortmann, University of California - Berkeley, College of Natural Resources - "Processes and Institutions for Linking Forestry with People"; Dr. Al Gentry, Curator of Botany, Missouri Botanical Garden - "An Overview of Neotropical Phytogeographic Patterns and their Implications in Amazonian Development"; and Hilda Diaz-Soltero, Director of International Conservation, Conservation International Foundation -"Environmental Problems in Latin America and Conservation International's Approach to their Solution." TRI has also hosted two short-term study visits to the School: Maria Lourdes Davies de Frietas, Environmental Coordinator for Campanhia Vale do Rio Doce in Brazil and Mr. S. Sahajananthan, Deputy Conservator of Forests or Sri Lanka.

New Courses

This spring, the Yale School of Forestry and Environmental Studies offered its first course on agroforestry. In cooperation with Professor David Okali from the University of Ibadan in Nigeria, Professor Mergen taught this course which examined the principles of the practice of forestry, agriculture, animal husbandry and aquaculture on the same land at the same time. Approaches for improvement, e.g. application of genetic principles, were also discussed and the biological, economic, and sociological dimensions were considered. Dr. Mergen obtained funding for Dr. Okali's visit from the U.S. Department of Education in Washington, D.C.

Graduates

Bob Clausi ('85) has been working as a forester on CARE's Eastern Refugee Reforestation Project since November 1985. This 5-year project began in 1983 and is being funded by USAID and the Government of the Netherlands. Its goals are to 1) establish 8000 acres of rainfed plantations in the vicinity of Ethiopian refugee camps to provide the refugees with sources of cooking fuel and building materials, 2) provide wage employment for refugees and Sudanese, 3) assist the Sudanese Forestry Department to establish an extension service, and 4) improve the institutional capabilities of the Forestry Department by providing it with vehicles, offices, residences and other materials. The project's two nurseries produce over one million seedlings per year. Most of the species grown are native acacia species and drought-resistant exotics such as mesquite and *Parkinsonia aculeata*. Overall survival in the 5400 acres planted is only about 60 percent due in part to severe drought in 1984. Several experiments have been established as part of the project. In one, three varieties of *Leucaena leucocephela* were grown under irrigation at four different spacings to determine its biomass production potential. Although final analysis of the data needs to be done, the 25-55 kg/tree yield of green fuelwood after two years growth suggests that *Leucaena* may be a viable alternative to eucalyptus as a biomass production species in the Sudan.

Dr. S.C. Chin (Ph.D. ' 84) recently published an expanded version of his Ph.D. thesis as a special monograph in The Sarawak Museum Journal (Special monograph no. 4, December, 1985). This monograph on Agriculture and Resource Utilization in a Lowland Rainforest Kenyah Community concerns swidden farmers living in the central parts of the northeastern portion of the island of Borneo. This publication is an extensive study of the relationship between culture and the environment in a rainforest community. It gives detailed information on the enthnography of the Kenyah peoples as well as the physical resources in this rainforest ecosystem.

Christopher Eliot ('85) is serving as conservation officer at World Wildlife Fund International in Gland, Switzerland. One of his responsibilities in this position was to develop a man-agement strategy for saving the giant panda and its habitat. This is a joint project between the Chinese Ministry of Forestry and WWF. Some of the suggestions for better management presented in the discussion draft include: establishing a network of panda reserves where the conservation of pandas and other wildlife is the main management objective and where human uses are limited to those that are compatible with that objective and improving the chances of panda survival in suitable habitat outside the reserve systems where pandas still occur by limiting human activities and modifying forestry operations in such a way that pandas can continue to survive. For more information about the management strategy discussion draft, contact Christopher Eliot at WWF International, CH-1196 Gland, Switzerland.

BOOK REVIEW

Rich Doenges
MF student (1st year)

REFORESTATION IN ARID LANDS. 1986. By Fred R. Weber with Carol Stoney. VITA, Arlington, VA.

Reforestation in Arid Lands is the second edition of a manual first published jointly in 1977 by the Peace Corps and Volunteers in Technical Assistance. In this edition, there is a new chapter on agroforestry and soil conservation and the text has been reorganized for a "more logical flow from planning to planting".

The book is designed for rural development workers interested in planning and implementing small-scale reforestation, tree nursery, agroforestry or soil conservation activities. Project examples and tree species are primarily from West Africa, and to a lesser extent, eastern and southern Africa. The largest and most detailed chapters cover nursery management, agroforestry and soil conservation. Tree nursery establishment and operation is especially well described and illustrated. Although much shorter than any of the technical chapters, the discussion of project goals and community involvement raises important questions - such as land and tree tenure, social costs and benefits - that must be answered before any ground is broken. Nearly half of the book is appendices, including 165 illustrated tree species, climate, vegetation and soil maps of Africa, names and addresses of organizations involved in arid land reforestation and suggested readings.

While packed with solid technical advice, this book covers too many topics too briefly to be considered a technical reference. It is a high quality general reference book, which is exactly how Peace Corps uses the first edition. In fact, Peace Corps continues to use the first edition in forestry trainings, supplementing it with specific texts on agroforestry and soil conservation due to the general descriptions of agroforestry and soil conservation techniques rather than specific discussions of procedures.

My major criticisms concern the appendices. The maps of Africa are too large a scale to be useful to field workers. These could have been replaced by a comprehensive table of tree species and their agronomic requirements, expanding on Appendix B, the field guide section. Additionally, the appendix on species identification does not have enough information on vegetative or floristic characteristics, in spite of the detailed illustrations, to allow positive identification. One significant omission from the otherwise fine chapter on nursery management is innoculation of nitrogen fixing trees. There was no mention of the *Rhizobium* symbiosis in leguminous trees nor any explanation of innoculation procedures in nursery or planting requirements.

I recommend this text as a useful addition to any rural development worker's field library. For someone who lacks the first edition, the manual provides a valuable overview of reforestation techniques and arid lands and offers much practical advice on how to do it right.

Cassia siamea Lam.

LITERATURE

Noted below are selected, recent additions to the TRI bibliographic database. Searches and printouts of the database will be available on demand. We also can provide copies of some items. We would welcome any papers or reports you could send for inclusion in this database. These publications will be listed in the next issue of TRI NEWS. If you do not have publications to send, please mail us citations of publications you judge to have special importance to tropical resources management.

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