

# TRI NEWS

Tropical Resources Institute

Yale University School of Forestry & Environmental Studies      Fall, 1992      Vol 11, No. 2

## THE CONTINUING RELEVANCE OF TRI

Dean Jared L. Cohon

Last Spring, my predecessor Dean John Gordon included in his column the wonderful analogy attributed to John Gardner: if universities built cars, they'd produce Edsels -- Ford's avant-garde model of the 1950's which was a spectacular failure because it did not meet the demands of the market. Using this as a point of departure, John accurately identified relevance as a key criterion for evaluating TRI's performance and proceeded to suggest that the Institute was well on the path to avoiding academic detachment from real world problems.

Upon my recent arrival to Yale, I am pleased to report to you that TRI has continued to perform admirably -- and in powerfully relevant ways. TRI is no Edsel.

All of TRI's many ongoing activities are relevant and important to the School, but two are especially noteworthy. In both cases, they represent the best of the Yale School of Forestry and Environmental Studies.

Dean Gordon mentioned in his Spring message a new research program to explore the links between human health and de- and reforestation. We were delighted to hear that this joint effort with the Department of Epidemiology and Public Health in Yale's School of Medicine and Yale's Center for International and Area Studies is expected to receive a major award from the Rockefeller Foundation in the coming year. This is a first-ever attempt at systematic research into the interdependence of human and ecological health, which embraces a crucial and difficult set of questions. The project also represents exactly the kind of interschool and interdisciplinary relationships that I hope to make a hallmark of our School.

The Spring newsletter also included an announcement of an international conference on the Himalayas, organized by our student chapter of the International Society of Tropical Foresters. I was pleased to be able to make opening remarks and to hear much of the first day's sessions. Supported by TRI, it was a splendid event -- excellent speakers and very well attended. Like so much

of what is great about our School, the event was conceived, organized and executed by our students, with the advice and guidance of Professors Florencia Montagnini and Bill Burch.

As a new Dean, and new to Yale as well, I am especially appreciative of our strong programs like TRI. Not an Edsel in the bunch.

### Contents

A Message from the Dean	1
A Message from the Director	2
Faculty Profile	
Dr. Nancy Peluso	3
The UNCED Meeting	
<i>Observing the Observers: Rio 1992</i>	4
<i>Comparing UNCED to UNCLOS III</i>	5
<i>NGOs in Environmental Policy Making</i>	6
<i>The Commission on Sustainable Development</i>	8
Articles	
<i>The Beza Mahafaly Project in S. Madagascar</i>	12
<i>Wildlife Education in Nepal</i>	14
<i>Valuing Non-timber Forest Products in Ecuador</i>	16
<i>Socioeconomic Valuation of Tourism in Belize</i>	19
<i>Bat Tree Roost Interactions in Costa Rica</i>	22
<i>Collection of Recyclables in Manila, Philippines</i>	25
Book Review	28
Literature	29
TRI Notes	31
Cooperator Notes	31

## A MESSAGE FROM THE DIRECTOR

Dr. Florencia Montagnini

In the last issue of TRI NEWS (Spring 1992) I described the Tropical Studies Curriculum at the Yale School of Forestry and Environmental Studies. In this issue I want to expand on other programs promoted by the Tropical Resources Institute.

### INTERNSHIPS AND FIELD TRIPS

The highly successful summer internship program has been a centerpiece of TRI's work, providing Master's and Doctoral students with the opportunity to carry out original research in tropical regions. Since the summer of 1984, 101 students have enjoyed full or partial funding for summer projects, yielding over 72 working papers. Whereas in 1984, when all TRI internships were based in Puerto Rico, in the last two years, interns traveled to Brazil, Argentina, Guyana, Ecuador, Costa Rica, Belize, Mexico, Afghanistan, India, Sri Lanka, Nepal, China, Thailand, Indonesia, and the Philippines.

TRI employs an internship endowment of \$1,000,000 to fund most summer internships. Funding and opportunities from other sources have proven vital as well. In the past few years, the Sequoia Foundation, the Tinker Foundation, and the MacArthur Foundation have provided grants for summer work, and the Organization of Tropical Studies has contributed funding to support course work in Costa Rica through TRI's membership. Research by professors like Mark Ashton, Graeme Berlyn and Robert Mendelsohn has also brought students to the tropics through a variety of funding sources.

TRI sponsored field trips have been a great success. In their first year, four trips to Puerto Rico led by Dr. David M. Smith, Dr. Thomas Siccama, and Dr. Peter Hannah of the University of Vermont enabled students to study tropical silviculture, botany, and natural history. Fifteen of these students eventually spent their summers in Puerto Rico under the advisement of five agencies including the Department of Natural Resources (Puerto Rico), the University of Puerto Rico, the Institute of Tropical Forestry, the Center for Energy and Environment Research, and the Conservation Trust. During their stay, the fifteen students held a conference in Mayaguez, a seminar at the Toro Negro Forest, and a symposium at the Puerto Rican Department of Natural Resources to present their work. Six undergraduate students from the University of Puerto Rico also participated in TRI intern research, making the cooperative effort very successful.

Since then, Dr. Siccama has continued to lead annual trips to Puerto Rico, several of which were conducted jointly with Dr. Arthur Johnson from the University of Pennsylvania. TRI's Memorandum of Understanding with Cornell University has enabled a number of Cornell students to join these trips. Dr. Brian Boom from the New York Botanical Garden (NYBG) has also led tropical plant systematics trips to Puerto Rico as part of the course he teaches at our school. The interaction with NYBG has also yielded collaboration in research and other course offerings such as Botanical Resources of the Tropics by Dr. Michael Balick.

### PUBLICATIONS

Our TRI News has become an entirely student-run enterprise, and is published twice a year. It serves to communicate TRI/activities, faculty and student research and internships, and new literature sources acquired by the School Library to roughly 1600 institutions and resource professionals around the world (800 in the United States). The News also updates members on the major activities of our international cooperators.

TRI publishes TRI Working Papers which are required upon completion of TRI-funded student research. All may be borrowed from TRI's Reference Center, and may be purchased through the School Library. Some of the most recent titles include, "Preliminary Study of Rural Primates in Southwestern Puerto Rico," "Agro-Forestry Systems in South-East Asia," "Can Secondary Forest Aid in the Conservation of Brazil's Atlantic Forest Birds?" "New Perspectives on Culture, Tourism and Economic Development: Providing Planning Alternatives for Punta Ballena, Guanica, Puerto Rico," and "Cultural Significance of Fruit Bats (*Pteropus* spp.) to the Chamorro People of Guam: Conservation Implications." The Working Papers qualify as internal publications and are frequently cited in relevant articles. They also frequently precede the publication of the work in refereed journals in the scientific literature.

In upcoming issues I will continue with details on TRI's outreach program, and will explain current initiatives for expanding TRI's linkages with international institutions in tropical countries worldwide.

# FACULTY PROFILE

**Nancy Peluso, Assistant Professor of Resource Policy  
Yale School of Forestry and Environmental Studies**

Nancy Lee Peluso, a rural sociologist, arrived this fall as the newly appointed assistant professor of resource policy. Her current research focuses on the impact of social and environmental change on indigenous resource management in West Kalimantan, Indonesia. She is specifically looking at property institutions and their roles in tropical forest management regimes.

Nancy has spent the last 13 years conducting research on Indonesian forestry policy, its history and impacts on local resource management systems. In 1979, she joined the Man and Biosphere Research Project No. 1 on "Interactions Between People and Forests in East Kalimantan, Indonesia", and studied the province's trade in non-timber forest products.

In 1984 Nancy went to Java to conduct her dissertation research and to coordinate social forestry research in 12 village sites for the State Forestry Corporation of Java and the Ford Foundation. The study focused on the persistence of antagonistic relations between peasants and the government forest services in Java through different political-economic periods under the Dutch colonial government and the contemporary Indonesian government. Her book, Rich Forests, Poor People: Resource Control and Resistance in Java was based on this research and was published this year by the University of California Press.

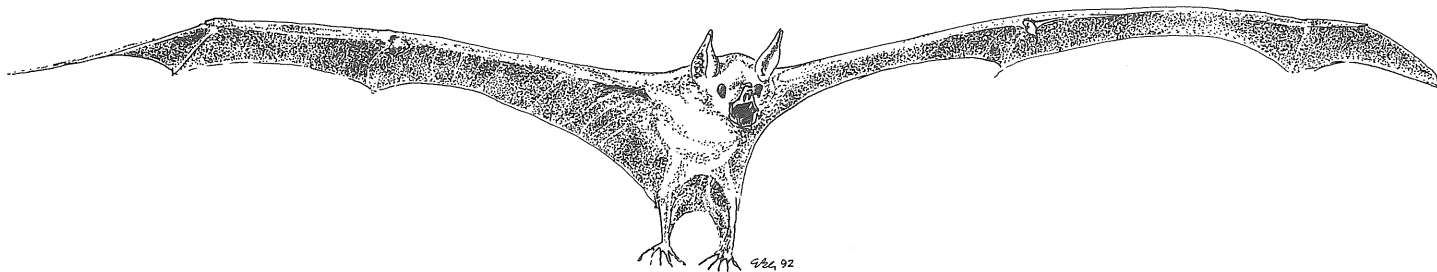
Before coming to Yale, Nancy taught at the University of California-Berkeley for two and a half years. Subsequently, from 1990 to 1992 she was a Ciriacy-Wantrup Postdoctoral Fellow in Natural Resource Studies in the Energy Resources Group. Her research at that time focused on extractive economics and the potential for extractive reserves in Indonesian Borneo (Kalimantan). In addition, she has taught intensive workshops in China and Indonesia on social science research methods for



*Dr. Peluso in Indonesia*

biological, forestry, and ecological scientists undertaking interdisciplinary village research. The methods ranged from rapid rural assessment techniques to participant observation to interviewing techniques and questionnaire design. She also worked with the FAO Community Forestry Unit to develop a nested curriculum in social forestry for policy makers, planners, field foresters and university students. She will soon be publishing an FAO monograph on social and environmental change in forest villages of West Kalimantan. Her current projects include an edited volume with Dr Christine Padoch of the New York Botanical Garden on conservation in Borneo.

In addition to her on-going research and teaching, Nancy serves as an associate editor for the journal, *Society and Natural Resources*, and was a member of the Rural Sociological Society's Task Force on Rural Poverty - sub-group on Rural Poverty in Natural Resource Dependent Areas in the United States. We are proud to welcome Dr. Peluso to the School of Forestry and Environmental Studies community and look forward to her involvement with the Tropical Resources Institute.



# UNCED CONFERENCE

## OBSERVING THE OBSERVERS: RIO 1992

**Jane Whitehill, MES Candidate**

Yale School of Forestry and Environmental Studies

In June 1992, national and non-governmental organizations met in Rio de Janeiro, Brazil, for the United Nations Conference on Environment and Development (UNCED), widely known as the Earth Summit. The Earth Summit was, in fact, only the last three days of the meetings, featuring heads of state from around the world. UNCED resulted from vigorous lobbying and four rounds of preliminary conferences to shape an agenda for the meeting in Rio. The conference was divided between meetings among governmental representatives at RioCentro and the Global Forum for the non-governmental organizations (NGOs).

On October 7, 1992, the Tropical Resources Institute sponsored a round table discussion at the Yale School of Forestry and Environmental Studies with presentations by F&ES students who had attended the UNCED conference in various capacities. Each of the round table participants had approached the conference with some degree of skepticism; all of them left with a certain amount of hope on some aspect of what had been accomplished. They raised questions about transnational treaty enforcement, NGO treaty significance, and the United Nations Sustainable Development Council.

**Ada Gonzalez**, who worked as a reporter at the conference for the *Earth Summit Times*, remarked on the difficulty that geographically-focused reporters had in presenting a sophisticated analysis of environmental and scientific questions, issues that were outside their particular areas of expertise.

For **Deborah Trefts** there was a notable contrast between the Third United Nations Conference Law of the Sea (UNCLOS III) she had attended between 1979 and 1981 and the UNCED conference. Between the UNCLOS and UNCED conferences the number of NGOs world-wide exploded and the interest of the press in the conference had expanded similarly. Trefts noted that the more personal atmosphere from the earlier conference had been lost in corridors of bureaucracy, even in the colorful tents of the Global Forum.

**Ken Snyder** described how the Global Forum, the meeting for the NGOs, had developed as an outgrowth of the UNCED preparatory meetings. Frustrated by the pace of action of the diplomatic process, the NGOs decided to hold a separate assembly called the Global Forum. Operating like a parallel conference 45 minutes from the UNCED meetings, the Global Forum promulgated

treaties which its members were free to sign in whole or in part. No one was sure what force the treaties would have internationally, but participants seemed encouraged that they could have at least a moral impact.

**Brad Auer** spoke about the possible effects of the conference on the future. He described one of the main products of the conference, Agenda 21. This formal document should serve as the environment/development agenda for future United Nations activities. The existence of Agenda 21 and all the other documents that came out of the conference notwithstanding, there remains the problem of implementation and enforcement. The United Nations does not have the equivalent of a peacekeeping force to enforce environmental policy. Furthermore, clauses on national reporting were weakened by the time the document was finally completed and agreed to by its signatories.

Every speaker at the round table commented about the tension between the more industrialized nations of the northern hemisphere and the developing countries of the south. The isolation of the United States in particular was disturbing to the participants. When an audience member asked if the conference had addressed problems of over-population several panelists described the argument as being frequently geographically and nationally defined. "Whenever the North said, 'Population,' the South said, 'Consumption.'" Delegates at UNCED seemed to define themselves nationally rather than globally. Representatives of less industrialized countries insisted on the integrity of their national sovereignty.

The one common theme shared by all the panelists at the TRI round table was that no plausible assessment of UNCED's success can be made for a year or more.

## COMPARING UNCED TO UNCLOS III

Deb Trefts, Ph.D Candidate

Yale School of Forestry and Environmental Studies

For two weeks in June the United Nations Conference on Environment and Development (UNCED) and the 1992 Global Forum transformed the Brazilian city of Rio de Janeiro. I traveled to Rio expecting to spend most of my time at the Forum. But as luck would have it, I was able to observe the diplomatic proceedings at UNCED, just as I had at the four sessions of the Third United Nations Conference on the Law of the Sea (UNCLOS III) from July 1979 through April 1981. In many respects the negotiations at UNCED contrasted sharply with those which occurred at UNCLOS III more than a decade ago.

The atmosphere at UNCED was vastly different from that at the sessions of UNCLOS III which I attended at the United Nations in New York City and Geneva, Switzerland from 1979 to 1981. First and perhaps foremost, UNCED attracted many more people and received much greater press attention than did UNCLOS III. Representatives from hundreds of NGOs attended. So many people applied for credentials that the U.N. accredited no more than two individuals per NGO. There was much dissatisfaction with this restriction, since the U.N. did not circumscribe participation in the four preparatory meetings held during the two years prior to UNCED. I am not aware that there was any such limitation at UNCLOS III, but far fewer NGOs attended those negotiations probably because they focused on the marine environment.

Many NGOs got around the two person limit because they published newsletters and could claim that they were members of the press. They joined the hundreds of newspaper, magazine, and television press who poured through the halls asking questions of diplomats, Heads of State, and other VIPs, such as the U.S. Senators and Congressmembers who attended. Because of the large number of people not associated with a delegation or the press, in contrast to UNCLOS III, open meetings and access to diplomats were restricted. Most of the negotiations occurred in "closed" meetings attended by official country delegates only. This was true of UNCLOS also.

NGO representatives were permitted to attend the Main Committee and Plenary meetings, held each morning and afternoon, but were restricted to a specific section of the meeting rooms. Heads of delegations made political speeches in the Plenary, while in the Main Committee meetings their staffs agreed on the exact wording of controversial provisions in Agenda 21. Twice a day, on a first-come, first-served basis, the U.N. issued a limited

number of NGO tickets for the open meetings. NGO representatives who could not obtain a ticket, however, often were able to attend programs sponsored by various NGOs in the NGO structure. For the Earth Summit, which was convened for Heads of State during the last three days of UNCED, access to tickets was far more difficult. A geographically balanced list of NGOs permitted to observe the Plenary speeches was promulgated by a group of NGOs. Some representatives of organizations not included on this list secured Plenary tickets by arriving well in advance of the meetings and waiting in line for tickets not claimed by listed groups. Many, however, were completely shut out of these meetings.

Daily publications of free bulletins and newspapers discussing the events and negotiations which had occurred at the Conference, and notifying participants of what to expect in the days ahead were available at RioCentro and elsewhere. For example, the two-page Earth Summit Bulletin, published by Island Press and the International Institute for Sustainable Development (IISD), provided highlights of the Plenary and Main Committee meetings, meetings of "contact groups," and discussions in the corridors. Earth Summit Times, UNCED's official newspaper, was published in cooperation with The New York Times Fax and Jornal do Brasil.

An important difference between UNCED and UNCLOS III was that the national delegations represented at UNCED did not want to repeat the protracted negotiations of UNCLOS III. The latter was not viewed as a model to replicate, but rather as one to avoid since it began in 1974 and met for two 6 to 8 week sessions each year until the spring of 1981. Despite the fact that UNCED's Agenda 21 involves issues which are even more complex than those confronting the Law of the Sea negotiators, many of the diplomats gathered at RioCentro worked laboriously, but in vain, to conclude final agreements on environment and development as quickly as possible.

Criticism of the United States was far greater at UNCED than at UNCLOS III. Only when Ronald Reagan came into office and scuttled the Law of the Sea negotiations in 1981 was the United States criticized to the extent that it was at UNCED. While many diplomats and NGO representatives at UNCED respected and worked productively with members of the U.S. delegation, they were

harsh in their criticism of President Bush and his political appointees. Talk of the United States' official policies, and what was perceived by most as an attempt by Bush to "buy" the support of countries with sudden promises of foreign aid given with "no strings attached," seemed to dominate the corridors at UNCED. While Americans visiting Rio found themselves repeatedly apologizing for and trying to explain the Bush Administration's position on many environmental issues, members of the U.S. delegation found themselves apologizing for displays of discourteous behavior by Bush and his political entourage during the Earth Summit.

## CONCLUSIONS

The Law of the Sea Convention has not entered into force because the requisite number of countries, including the United States, have not signed and ratified it. It is likely that the Clinton-Gore Administration will be far more amenable to supporting the treaty, or a revision of it, than the Bush Administration has been. Many legal scholars argue that most of its provisions are becoming customary international law anyway.

Agenda 21, the UNCED document which concerns the oceans (Chapter 17 in particular) in addition to numerous other environmental issues, was issued in Draft form on the last day of the Conference in Rio. The date of the

text, however, is 1 May 1992, not 14 June 1992. Apparently it is the text negotiated during the fourth session of the UNCED Preparatory Committee, held from 2 March to 3 April 1992 in New York.

It became clear to me in Rio that environmental issues have attracted a broad international following during the post-UNCLOS III decade. The attention they are now receiving had both positive and negative consequences for the UNCED negotiations. While the negotiations made significant strides forward they did so amidst a throng of NGOs, press, and VIPs competing amongst themselves for access to meetings and for consultations with official country delegates. Away from the glare of cameras and curious bystanders, diplomats and NGOs will need to continue their efforts. UNCED has provided a critical impetus. But when issues are as controversial, complex and interrelated as those which confronted the delegates at UNCED, it is particularly difficult to avoid the protracted negotiations for which UNCLOS III has become infamous.

## ACKNOWLEDGEMENTS

I would like to thank Andy Palmer, Political Director of the American Ocean Campaign, who made it possible for me to observe the activities at UNCED.

---

## THE ROLE OF NGOS IN INFLUENCING ENVIRONMENTAL POLICY MAKING

**Ken Snyder, MES Candidate**

Yale School of Forestry and Environmental Studies

### INTRODUCTION

During the preparatory sessions leading up to UNCED, the negotiating sessions for treaties on climate and biodiversity, and at UNCED itself, non-governmental organizations (NGOs) came to be recognized as an integral part of the designing, implementing and regulating of environmental and development policies. Where progress working within the policy-making system has proven to be unacceptably slow, NGOs have learned to better work together and move things forward on their own. This article briefly reviews my experiences with environmental NGOs at the climate negotiations and the Earth Summit, my view of their role in international negotiations, and how NGOs, more than ever, have become a well-coordinated international force in environmental issues.

### UNITED WE STAND: CLIMATE ACTION NETWORK PRECEDENT

At the first negotiating session of the Intergovernmental Negotiating Committee (INC) on climate change held in Chantilly, Virginia in February 1990, NGOs arrived uncertain to what degree they would be able to participate in the delegate meetings. In the past, at other United Nations international meetings, participation has often been limited to a few NGO representatives invited to be part of a country's delegation. Given that the INC represented a newly formed body of the UN and no rules had yet been established on NGO participation, a cautious ground-testing strategy was taken. NGOs worked under an umbrella organization, the Climate Action Network, to build up the trust and respect of delegates at the negotiations. A daily newsletter, *ECOs*, published by the Climate Action Network, served as a valuable medium for NGOs to voice their concerns while being more "diplomatic" in their direct interactions with delegates at

meetings and in the halls. Eventually it was established that NGOs could provide statements to the open assembly with prior consent from the Chairman of INC. These statements and commentary writing in *ECOs* were an important source of information for the delegates, furnishing them with the critical analysis only the NGO community could provide.

In a sense, the Climate Action Network represented the one voice where global interests were kept separate from national interests and proposals could be put forward without the suspicion of ulterior motives. However, when one stops and examines the end product, namely a weakened climate treaty with no targets or timetables, one may conclude NGO presence at these negotiations made little difference. It is humbling that NGOs were not as successful as they had hoped in getting the US to change its position on climate change and accept more aggressive commitments. Nonetheless, as an observer of the process, it is clear that delegates depend on NGOs in a variety of roles they have come to serve — from giving expert advice and putting forth critical analysis of different country proposals to, at times, being an important source of comic relief in a high tension environment.

#### TAKING ACTION ON THEIR OWN: THE NGO FORUM

The NGO Forum emerged from frustration with governments at the Preparatory meetings leading up to UNCED and their inability to adequately address the environmental crisis. The Forum was intended to mobilize the NGO community to work around a system that was seen to be progressing unacceptably slowly. If the people lead, the popular phrase goes, the leaders will follow.

Building on the results of previous consultations, the Forum pulled together language for treaties on close to 30 subject areas. Draft treaties circulated extensively at the Preparatory meetings, climate negotiations and other environmental meetings and through electronic mail so that first-run drafts of the treaties could be ready for discussion and refinement by the participants of the NGO Forum.

The Forum had four main goals: 1) To build the foundations of a worldwide movement of NGOs, including grass-roots organizations and social movements to establish new patterns of equity, participation and sustainability for the planet; 2) to articulate important solutions proposed by NGOs to be promoted by governments; 3) to build the mechanism for cooperation among NGOs, in global decision-making processes



*Indigenous peoples were represented at the negotiations*

through treaty agreements; and 4) to initiate the formation of alternative mechanisms that will empower NGOs and local communities particularly in the areas of funding, technology and communications.

The NGO Forum and its treaty-making process was envisioned as a means to do more than put together a set of principles and appeals to governments, but to lay out practical solutions which can be implemented by NGOs regardless of the outcome of UNCED. Thus, centerpiece to the NGO treaties was to be a list of actions and commitments NGOs themselves could pursue. After the Earth Summit, organizations would return home with the treaties where they would once again be distributed and available over electronic mail for organizations and individuals to sign. Signatories could choose to sign the entire treaty or sign specific actions listed in the treaty which they are willing to commit themselves.

At the Earth Summit, I participated in the treaty making process for a treaty on climate change and a treaty on forests. Environmentalists and environmental organizations seemed to be particularly good at pointing out what was wrong and who was to blame. Innovative ideas and constructive thinking on how we might tackle the problems at hand and how we might begin to work together more effectively to bring about needed change were often missing. Nevertheless, the NGO Forum represented an unprecedented degree of coordination among organizations on the local, national and international level with well over a hundred organizations in Brazil and hundreds more via electronic mail. As a result of the NGO Forum, NGOs are becoming more and more adept and versatile in coordinating on an international level. So, while the importance of the final treaties is yet to be seen, more significant in my mind is how the treaties have served as a focal point of an important, on-going process.

## BECOMING PART OF THE PROCESS: AGENDA 21

Increasingly, environmental and other social and non-governmental organizations seek ways to actively get involved in the design and implementation of environmental policies on international and national levels. The final negotiated text of Agenda 21, the institutional framework for government strategies to coordinate efforts regionally and globally towards sustainable development, discusses strengthening the role of NGOs. The chapter stresses the importance of recognizing formal and informal organizations as partners in the implementation of the Agenda 21 mandate. NGOs, the text argues, represent a key component of participatory democracy. Their involvement is integral in the monitoring, compliance and implementation of policies working to replace unsustainable development patterns with environmentally sound and sustainable development.



*NGOs can serve an important watchdog function: Protestors in Rio*

## IMPLICATIONS OF THE MANY ROLES OF NGOS

Typically, environmental organizations have served as watchdogs of government and business activities. Reactive rather than pro-active involvement has amounted to an up-hill battle where compromise after compromise adds up to significant losses. However, by moving beyond simple advocacy and policy "watch-dogging," an organization puts its reputation at a greater risk. It is one thing to criticize government policies and provide general recommendations for change, but when an organization becomes an integral part in the designing and implementation of environment and development projects, it places its reputation under greater scrutiny. This has led to increased professionalism in the way environmental NGOs go about their business.

One of the most important roles of NGOs is adding transparency to the process by holding governments and themselves more accountable for projects and policies affecting the environment. As some organizations work more closely with governments and businesses, they experience trade-offs. Organizations may find themselves in situations where they have to compromise their position to work with an agency or business and as a result become more susceptible to criticism from peer organizations and members.

In my mind, diversity in environmental and development NGOs — in the different roles they take in working with or around governments and institutions — helps fill the many niches of a healthy political system. Some groups will figure out how to better work within the system and thereby catalyze change while others will find their role on the outside, and we will all be better off as a whole.

Readings: All the NGO treaties along with Agenda 21, the Rio Declaration, the Forest Principles and the Climate and Biodiversity Treaties can be found on Econet.

### ACKNOWLEDGEMENTS

I would like to thank Gordon Geballe and Florencia Montagnini for helping acquire funds through the Anders Clasen Fund which made my trip to Rio possible.



## FOLLOW-UP TO THE EARTH SUMMIT: THE COMMISSION ON SUSTAINABLE DEVELOPMENT

Brad Auer, MES Candidate

Yale School of Forestry and Environmental Studies

The city of Rio de Janeiro was transformed for two weeks in June, 1992, from "a cidade maravilhosa" - the marvelous city of beaches and nightclubs - to a hotly contested epicenter of the debate on the future of the planet. The United Nations Conference on Environment and Development (UNCED), with its 7,000 delegates, 30,000 representatives of non-governmental organizations (NGO's), and 7,000 members of the press in attendance, commanded the attention of the World as it attempted to define the nature of future human relations with the physical environment. In a surprisingly short time, however, awareness of the scope and importance of what happened at UNCED seems to have faded, and the agreements reached there appear to have returned to the impenetrable realm of diplomats and international lawyers. Have the lofty promises made in Rio been forgotten, destined only to create yet more U.N. bureaucracy, or are they being translated into substantive action, ushering in a new era of cooperation on international environmental issues?

The answer to this question will depend on the efforts of individuals, businesses, NGOs, governments and international institutions worldwide in the coming years. The focus here, however, is on the latter two actors. The agreements in Rio were entered into by national governments, and with them the commitments of funding, resources and expertise necessary for their implementation. Nation-states are still the dominant actors in international affairs, and it is their faithfulness to the spirit of UNCED on which we must depend for substantive change. Just as importantly, however, the success of UNCED hinges on the ability of these political entities to express their will through cooperation and compromise. It is with this understanding that one must look to the offices of the United Nations to fulfill the mandate of the Earth Summit.

### THE COMMISSION ON SUSTAINABLE DEVELOPMENT

The intent of this paper is to describe and examine the primary means by which the U.N. intends to coordinate and execute actions relating to UNCED; the United Nations Commission on Sustainable Development (CSD). Although it received limited press attention in Rio, the CSD was one of the key provisions of Agenda 21, the 800-page agreement signed in Rio and intended as a framework for addressing many of the natural and human

resource problems of the present and future. The CSD is to be established, based on the agreements in Agenda 21, by the UN General Assembly in November, 1992, and is expected to be operational by early 1993 (Abbasi 1992). The mandate of the CSD includes 3 major operational goals which are outlined below:

### MANDATE OF THE U.N. COMMISSION ON SUSTAINABLE DEVELOPMENT

1. Ensure Compliance with UNCED Agreements: The CSD will try to insure that signatory nations comply with the promises made in Rio. This charge will include participatory states to the Rio Declaration, Agenda 21, the Statement of Principles on Forests, the Biodiversity Convention, and the Global Warming Convention.
2. Expedite Aid-flow from North to South: The CSD will attempt to coordinate funding programs for developmental and environmental efforts in developing countries, particularly to aid compliance with the terms agreed upon in Agenda 21.
3. Coordinate Other U.N. Agencies: The CSD will be asked to coordinate the activities of other UN agencies in their efforts to meet the goals and requirements of the various UNCED documents. It will have particular responsibility for coordinating agencies such as UNEP, UNDP and UNCTAD (United Nations Environment Program, Development Program, and Conference on Trade And Development, respectively). The CSD will also attempt to integrate these agencies efforts with those of the Bretton Woods institutions, primarily the World Bank and International Monetary Fund (French 1992).

Given this mandate, one must next ask what the likelihood is that the CSD will be able to fulfill these functions. Instead of looking at the potential of the CSD to accomplish each of these goals separately, which will be at least partly a function of future national commitments and bureaucratic maneuvering among U.N. agencies, more benefit can be gained by identifying strengths and weaknesses of the organization. This analysis should be instructive for predicting the overall future efficacy of the CSD.



*Rio de Janeiro, Brazil*

### STRENGTHS OF THE COMMISSION ON SUSTAINABLE DEVELOPMENT

1. **Need For and Uniqueness of the CSD:** The Rio Earth Summit, which drew delegates from 178 nations, including 118 heads of state, clearly demonstrated the importance of international cooperation on issues of environment and development and the political pressure felt by national governments to take concerted action without delay. After two years of negotiating efforts, it is unlikely that policymakers will simply abandon the framework they have developed within the U.N. and allow the CSD to wither on the vine. Adding urgency to the CSD's already critical role is the fact that, as of August 1992, there is no official international organization with its principle goal being implementation of the agreements signed at UNCED. The UNCED Secretariat, although funded through the end of 1992, has been disbanded by U.N. Secretary General Boutros Boutros-Ghali. The CSD, therefore, is the sole official mechanism through which nation-states can continue to work in concert in trying to address the issues of UNCED (Barratt-Brown 1992).

2. **High-Level Representation:** It is anticipated that the CSD will be composed of national representatives with the authority and political power to commit substantial national resources towards the fulfillment of its functions. It is even possible that many nations will appoint their environment ministers to represent them with the CSD (French 1992). Given this level of participation, the CSD, unlike many U.N. agencies, should have an authoritative role within the U.N. and the ability to convince member-states to heed its efforts.

3. **"Rounds" Format:** One strategy for reducing the likelihood of the CSD becoming a forgotten entity has been the proposal that the organization establish rounds of work during which it will focus on a few specific

issues (Sandbrook 1992). Lasting approximately 5 years each, and with some overlap possible, each round of negotiations will include efforts to address several pressing issues, while all will probably include specific work on technological and financial considerations. This format will allow the CSD to push for concrete results on any chosen issue within a specified time limit and thus complete negotiations in a timely fashion. Furthermore, the increased chance of signing completed and comprehensive agreements will be more likely to spur the involvement of high level national representatives eager to claim credit for successes, and thus enhance the image of and commitment to the CSD.

### WEAKNESSES OF THE COMMISSION ON SUSTAINABLE DEVELOPMENT

1. **Reporting to ECOSOC:** The CSD will not report directly to the General Assembly, but rather to the Economic and Social Council of the U.N. (Special Report 1992). This will reduce the prestige of the CSD within the U.N., distance it from national U.N. ambassadors, and limit the amount of publicity the organization might receive.

2. **Lack of Enforcement/Coercion Powers:** As is the case with the administrative bodies of most international environmental agreements, the CSD has no mandate for compelling compliance with the treaties for which it is responsible. Instead, it will have to rely largely on publicizing the compliance failures of signatory states. It is hoped that this publicity will generate sufficient public pressure among citizens of the errant country, or peer pressure from other signatory states, to convince guilty parties to comply. While this strategy has worked well for organizations such as the U.N. Human Rights Commission, it is clearly not as forceful as a CSD with coercive or punitive powers.

3. **Weakened Country Reporting Requirements:** Because of diplomatic opposition in Rio, coming primarily from developing countries concerned with issues of national sovereignty, the requirements for reporting on compliance to the CSD by signatory nations were weakened in the final version of Agenda 21. As was noted above, publicity and peer pressure will be the primary mechanisms used by the CSD in trying to ensure treaty compliance. While it is possible that NGOs will be given the right to report non-compliance by nation-states to the CSD, allowing nations themselves to withhold substantial information concerning their activities will clearly make the tasks of monitoring compliance and then identifying and pressuring laggard states more difficult.

4. **Weakened Review of Pre-UNCED International**

Environmental Treaties: The CSD was to have been entrusted with the task of ensuring that signatory nations fulfill their commitments to treaties other than those signed at UNCED. However, the United States and other nations successfully lobbied in Rio to "dilute the provisions for reviewing implementation of existing environmental conventions" (French 1992). As a result, the CSD has little influence over most of the important international environmental treaties signed before 1992. These include agreements such as the Montreal Protocol on Substances that Deplete the Ozone Layer, for which many nations have failed to comply with their reporting requirements.

#### FUTURE TRENDS

The ability of the Commission on Sustainable Development to fulfill the mandate entrusted to it by UNCED will be known only with time. The commitment of the U.N. member states to the CSD, in terms of both money and qualified personnel, will largely determine the extent to which the CSD can pursue its enormous mandate. The willingness of nation-states to cede some measure of their sovereignty will qualify the ability of the CSD to apply its measures comprehensively. And in the U.N. itself, the CSD faces a daunting task in trying to exert control over other U.N. agencies. In the short term, however, one should look at the decisions made about the CSD in the current General Assembly meetings for some indication of future trends.

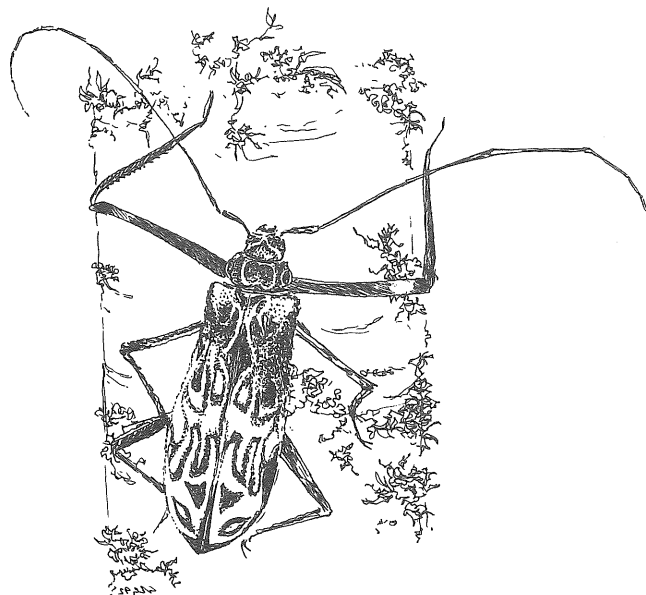
As this article went to press, the 47th General Assembly had yet to determine the nature of the CSD, but several issues evidently were to be crucial. Some issues concerned the relative influence of the CSD with the U.N. system; for instance, whether or not the CSD would have an under-secretary of its own, and whether it would be allowed to determine its own agenda and rules of procedure. Also important was the degree to which the CSD would be granted fact-finding and investigative powers related to national compliance with UNCED agreements. Finally, the nature of NGO access to the CSD was seen as vital, with some countries advocating limited access similar to that of NGOs for the Global Environmental Facility and ECOSOC, while others argued for allowing NGOs the extensive access given them during the UNCED process (United Nations 1992). In particular, the issue of compelling the CSD to respond to NGO submissions of information was considered important; because the CSD depends on publicity/peer pressure, and not coercion, to achieve compliance, and since national reporting requirements have already been weakened, it was deemed vital that the CSD use this proxy form of national reporting without potential interference from member-states (Barratt-Brown 1992).

#### CONCLUSION

To many who were there, the atmosphere at UNCED, despite several years of preparatory negotiations, seemed rushed and incoherent. The intense pressure felt by most states to please domestic audiences, and not to appear as obstacles to consensus in this highly publicized forum, led to much last minute bargaining and compromise. Consequently, it is my opinion that many countries may actually be quite reluctant to carry out what they promised in Rio. For this reason, building a strong U.N. Commission on Sustainable Development will be crucial to making the agreements signed at UNCED even a limited success.

#### LITERATURE CITED

- Abbasi, D. R. 1992. 'Development' framework is approved. *Earth Summit Times* 06/10/92: 5
- Barratt-Brown, L. 1992. Natural Resources Defense Council. (Personal Communication).
- French, H.F. 1992. Hidden Success at Rio. *WorldWatch* 5(5):7-8.
- Sandbrook, R. 1992. Proposed commission faces uncertain future. *Earth Summit Times* 06/11/92: 6.
- Special Report. 1992. *Earth Summit Times*, Rio Commemorative Issue (Draft Report of United Nations Conference on Environment and Development). 09/14/92: 34.
- United Nations. 1992. International institutional arrangements. UNCED Document A/CONF.151/4 (Part IV).



# ARTICLES

## REFLECTIONS ON THE BEZA MAHAFALY PROJECT IN SOUTHERN MADAGASCAR

Alison F. Richard, Director, Peabody Museum  
Yale University

Robert W. Sussman, Department of Anthropology  
Washington University, St. Louis, MO

### INTRODUCTION

With growing recognition of the urgent need to conserve biodiversity worldwide has come growing recognition that efforts to achieve these objectives are often fundamentally exploitative: people living adjacent to the targeted area are deprived of its actual or potential economic value; the benefits, whether in the form of research or revenues from tourism, commonly accrue to foreigners or the central government. Where there is such unequal sharing of the costs and benefits of conservation, it raises questions about the longterm effectiveness of the enterprise as well as about its morality. Recognition of these issues has led to an increasing emphasis on the need to integrate conservation with activities designed to compensate for the short- and medium-term losses sustained by the people most directly affected by conservation activities - communities living around the protected area - and to redirect local economic activities to reduce or eliminate pressures on the protected area.

While this emerging prescription for "integrated conservation and development" is attractive, and morally as well as practically compelling, in reality it has turned out to be much more difficult to follow than first envisaged (e.g., Wells and Brandon 1992). Since its inception fifteen years ago, the Beza Mahafaly Project in southern Madagascar has had as a goal the integration of conservation and development activities (Sussman et al. 1985, Richard et al. 1987, Rakotomanga et al. 1987, Richard and Dewar submitted, Richard et al. submitted, Ladley Maille 1991, Maille 1991). The project has had successes, encountered problems -- and raised questions that remain unanswered to our satisfaction. Here, after a brief review of the project's history, we explore some of the issues emerging from our experience as co-directors.

### THE BEZA MAHAFALY PROJECT

The Beza Mahafaly Project began in 1975 when, together with Guy Ramanantsoa from the School of Agronomy at the University of Madagascar, we set out to establish a reserve that would conserve important and currently unprotected forest types in the south of the island. The new reserve was to be different from existing reserves imposed under French colonial rule: it was to be founded

in collaboration with the people most directly affected -- those who would have to give up their use rights to the forest. The new reserve would also serve as a training ground for students at the School of Agronomy of the University of Madagascar. It included 100 ha of riverine Tamarindus forest, and 500 ha of nearby, but non-contiguous xerophytic forest, dominated by Didieraceae, and supported an abundant and diverse fauna. Between 1977 and 1985, with the financial support of the World Wildlife Fund, the reserve boundaries were demarcated, rough-and-ready facilities were constructed, guards were recruited locally, and a field school was developed for students from the School of Agronomy.

The idea of instigating development activities in villages around the reserve was integral to the project's conception, but it did not start to become a reality until 1985, with increased support from WWF and USAID's involvement. At the request of the local community, the project targeted the production and marketing of crops, education, and health. The most ambitious undertaking was to renovate a former irrigation canal, a substantial engineering project the outcome of which remains to be seen. Agricultural and agroforestry efforts were pursued on a more modest scale, with students and faculty from F&ES (among others) working in partnership with local farmers on a range of activities. In 1987, the road from Beza Mahafaly to the market town 35 km away was repaired, so that produce could again be transported to the weekly market. On the education front, the project helped by supplying the materials and labor to construct an elementary school; the community supplied the teacher's house and furniture for the school, and the provincial government supplied the teacher. The school opened in 1989. The health problems of the Beza Mahafaly population are diverse (Sussman, L., 1991). Contributing to them in some villages was the absence of clean, readily available water, and in 1991 the project provided wells in an effort to improve this situation.

### DISCUSSION

The Beza Mahafaly project is controlled by people whose primary residence is far from the project site itself. Despite real efforts to ensure local participation, it is unclear that the project would prove to have had any lasting effect on the local management of natural

resources if the current project leaders were to abandon their responsibilities. We have come to believe that project objectives will be pursued in the long run only to the extent that they are fully adopted and their implementation fully controlled locally. Participation and consultation are no more than a starting point, and from the outset the project should have included a viable plan to transfer management and real control of activities to the local community. Of course, such a step presupposes the presence of a local organization to which control could be passed, as well as actual or potential sources of revenue to provide direct support for continuing activities -- conditions that are either already met, or could readily be met at Beza Mahafaly.

The Beza Mahafaly Project is small, arguably too small to be more than an idiosyncratic case. Can a "grass roots" approach be made to work on a larger scale? We suggest that the answer to this question depends on the process of scaling-up (and see Richard and Dewar, submitted). The goal of establishing local control cannot be achieved if project goals are established and pursued at the level of regional authorities. Taking a more hierarchical view, however, a large-scale project can be recast as the integrated sum of many small-scale projects. The challenge is to replicate small-scale projects, attuned to the scale of local community interactions, over and over again.

Problems of scale have a temporal dimension too. There is a disturbing discrepancy between the grant-giving cycles of funding agencies which look for rapid "results" and the time needed to achieve enduring change. A different kind of time-related problem arises with the rapid staff turnover in funding agencies. For both the project leaders and the community of Beza Mahafaly, this has involved a frustrating and enormously time-consuming process of educating a succession of newcomers to local needs and problems -- only to find that the newcomer in question is no sooner well-informed than he or she is reassigned elsewhere. This is not a way to make things work.

Time is an issue in yet a third context -- that of our role in the project. As university professors with standing commitments to spend nine months of most years at our home institutions, our involvement is necessarily limited. We believe it is important, nonetheless: we help train Malagasy nationals who are future leaders; our presence is enduring, though intermittent, and continuity is surely needed in such projects; we work with Malagasy colleagues on the basic ecological and anthropological research vital to developing appropriate goals.

## CONCLUSIONS

- 1) Conservation efforts will only succeed to the extent that they become truly local efforts; a mechanism and timetable for achieving this should be planned from the outset.
- 2) The transfer of control to local leadership depends crucially on relationships of mutual trust, respect, and understanding between local communities and those initially funded to lead conservation efforts.
- 3) Projects need to be small and long-term to achieve meaningful results, and international funding agencies must find ways of accommodating these new organizational and temporal scales.
- 4) Academics have important long-term roles to play as researchers, teachers, and providers of continuity.
- 5) Conservation goals must be for as close to "for ever" as we can make them.

## ACKNOWLEDGMENTS

The Beza Mahafaly Project which provided the starting point for this paper is a product of the ideas and efforts of many people, in particular Guy Ramanantsoa, Gilbert Ravelojaona, Pothin Rakotomanga, Andrianasolo Ranaivoson, and Joseph Andrimampianina. The project has been funded by the World Wildlife Fund and by USAID.

## LITERATURE CITED

- Ladley Maille, R. 1991. Forest resource use by villages near the Beza Mahafaly Special Reserve in S.W. Madagascar. *TRI News* 10(2):9-11.
- Maille, P., 1991. Low-tech leaf mulch experiment in Madagascar: negative effects of *Tamarindus indica* on corn. *TRI News* 10(2):18-20.
- Rakotomanga, P., A.F. Richard and R.W. Sussman, 1987. Beza Mahafaly: formation et mesures de conservation, Pp.41-44 In *Priorités en Matières de Conservation des Espèces à Madagascar*, Occasional Papers of the IUCN Species Survival Commission No. 2.
- Richard, A.F., P. Rakotomanga and R.W. Sussman, 1987. Beza Mahafaly: recherches fondamentales et appliquées, Pp.45-51 In *Priorités en Matières de conservation des Espèces à Madagascar*, Occasional Papers of the IUCN Species Survival Commission No. 2.
- Richard, A.F. and R.E. Dewar. Politics, negotiation and conservation: the view from southern Madagascar. (Submitted to *Conservation Biology*.)

Richard, A.F., S. Zack, and A. Ranaivoson. Conservation education: perspectives from Madagascar and abroad. (Submitted to Conservation Biology).

Sussman, R.W., A.F. Richard and G. Ravelojaona, 1985. Madagascar: Current projects and problems in conservation. *Primate Conservation* 5:53-59.

Sussman, L. 1991. Diet, nutrition and health status among the Mahafaly of southwestern Madagascar. paper presented at the Annual Meetings of the African Studies

Association. Distributed by the Pan-African Documentation and Information System. United Nations Economic Mission for Africa.

Wells, M. and K. Brandon (with L. Hannah), 1992. *People and Parks: Linking Protected Area Management with Local Communities*. World Bank Publications.

A longer version of this paper was presented at the Annual Meeting of the African Studies Association, 1991

---

## WILDLIFE EDUCATION IN NEPAL

Jai N. Mehta, Asst. Professor, Institute of Forestry, Pokhara, Nepal.  
Visiting Fellow, Yale School of Forestry and Environmental Studies

### BACKGROUND INFORMATION

Nepal, located in South Asia between Tibet (China) and India, is close to the tropics (latitude: 26° 22' N to 30° 27' N). The elevation rises from 75 meters to 8,848 meters (Mt. Everest) above the sea level. This altitudinal variation results in three distinct climatic/ecological zones: the subtropical (Terai, flat region), temperate (Middle hills), and alpine (the Himalayan regions). Each zone supports vegetation and wildlife characteristic of these elevations.

Nepal is relatively rich in wildlife despite its small size (147,181 sq. km). To date about 150 species of mammals, 858 birds (10 % of the total world list), 30 amphibians, 70 reptiles (including 52 species of snakes and 2 crocodiles), 129 fish species, and 642 butterflies and moths have been recorded in Nepal (updated from Shrestha 1981).

Fifteen protected areas (8 national parks, 4 wildlife reserves, 2 conservation areas, and 1 hunting reserve) have been established with the primary objective of conserving biodiversity. The current official protected species list considers 27 mammals, 9 birds, and 3 reptiles as endangered (Jha 1992). Human population pressure (growing at a rate of 2 % annually) and resulting encroachment, along with unsustainable and indiscriminate use of natural resources, leads to the primary wildlife conservation problems of habitat alteration and fragmentation (Upreti 1989). The depletion of populations of large mammals (such as tigers, rhinos, swamp deer, and leopards) may also be attributed to the large scale hunting in the past (Gurung 1983).

### CONSERVATION EFFORTS

The need to conserve wildlife drew attention in the mid 1950s when Nepal's only one-horn rhino population began declining at an accelerated rate because of habitat loss and poaching (Heinen and Kattel 1992). In 1957, the first wildlife law was enacted to protect rhinos and their habitat (HMG 1973). The first National Park and Conservation Act, passed in 1973, provided more holistic and comprehensive conservation approach (HMG 1977). The year 1973 also marked the establishment of the Royal Chitwan National Park, the first national park in Nepal (Mishra 1974). The 1980s witnessed a number of local and international non-governmental organizations (NGOs) working toward the goal of conservation of Nepal's biodiversity. A prime example, the King Mahendra Trust for Nature Conservation (KMTNC, an autonomous and non-profit NGO) came into existence in 1982. Its main objective is promoting, financing, and coordinating conservation projects in the country (HMG 1982).

### FORMAL WILDLIFE EDUCATION

At present, 10-15 percent of the courses offered at the secondary school level cover environmental topics, some of which deal with wildlife (Jha 1992). Of the 4 technical institutes at the University level in Nepal offering courses in environmental science, the Institute of Forestry (IOF) is the only one which offers specialized training in wildlife management. Most of the IOF graduates are employed by the Ministry of Forests and Environment while some work for the local NGOs.

## IOF AND ITS WILDLIFE PROGRAM

The Institute offers a 2-year Certificate (Ranger level) program and a 3-year BS (officer level) program to produce forest/wildlife technicians and natural resource managers for the country (Rayachhetry et al. 1990). At the ranger level, one course introduces basic concepts of Wildlife Biology and Management, and Protected Area Management Systems in Nepal.

At the BS level, basic, applied, and specialized courses are offered to students specializing in wildlife management. Wildlife courses for the BS level were designed in the late 1970s with the objective of enabling the IOF graduates to serve as protected area managers adhering to Western conservation paradigms. However, these concepts of wildlife management were never realized in Nepal because of the multifarious factors of population pressure, poverty, subsistence agriculture economy, illiteracy, and lack of adequate government funding. Little consideration has been given to direct wildlife population management (harvesting, transplanting, etc.) or indirect management of populations through habitat manipulation. In most of the national parks and reserves of Nepal, a major portion (over 80 %) of the yearly budget is spent on paying salaries of the military, administrative and technical staff. Very little money, if any, is allocated for either research or monitoring of wildlife populations. In such a situation there is not much use of technical skills learnt by the IOF graduates.

On the other hand, other important skills that the IOF graduates need are not covered in the present curriculum. For example, tourism has become the largest industry in Nepal and most tourists visit protected areas. Managers must be familiar with concepts relating to Tourism, Parks, and Recreation Management. Second, protected area managers have to positively interact with the local people. They need to be well equipped with communication skills. The subsistence economy of the local people and their dependence on natural resources to meet their basic needs (in terms of fuelwood, fodder, and timber) initiates conflict with the management objectives of the protected areas. Thus, it becomes essential for the IOF to offer courses in Social Forestry, Conservation Education and Community Development to provide graduates with skills needed to promote sustainability and foster economic growth.

Recognizing that human needs and conservation should be integrated, the Institute of Forestry is striving to update its curriculum. A national level curriculum workshop was held in December 1990 to get advice from experts and conservation officials. Based on the feedback, the institute has developed new park/wildlife

courses. These courses provide a more integrated approach and focus on the present conservation issues while exploring possible planning, policy and decision making processes to overcome these issues. The new courses include Wildlife Conservation, Conservation Biology, and Protected Area and Tourism Management Systems.

## CONCLUSION

Conservation awareness and activities have grown in Nepal in the last decades. The Institute of Forestry has assumed the main responsibility of training the new generation of park/wildlife managers who strive to more effectively conserve wildlife diversity in Nepal.

## LITERATURE CITED

- Gurung, K. K. 1983. *Heart of the Jungle*. Andre Deutsche Ltd., London.
- Heinen, Joel and B. Kattel. 1992. Parks, People and Conservation: A Review of Management Issues in Nepal's Protected Areas. *Population and Environment: A Journal of Interdisciplinary Studies* 14 (1): 49-84.
- HMG 1973. National Parks and Wildlife Conservation Act 2029. Nepal Gazette 2029-11-28 B.S.
- HMG 1977. National Parks and Wildlife Conservation Act 2029 (1973). Ministry of Law and Justice, Kathmandu, Nepal.
- HMG. 1982. King Mahendra Trust for Nature Conservation Act. Ministry of Law and Justice. Nepal Gazette 34 (26), Kathmandu.
- Jha, P. K. 1992. *Environment and Man in Nepal*. Craftsman Press, Bangkok.
- Mishra, H. R. 1974. *Nature Conservation in Nepal: An Introduction to the National Parks and Wildlife Conservation Programmes of His Majesty's Government*. Tribhuvan University Press, Kathmandu.
- Rayachhetry, Min B., J. N. Mehta, and A. Mallik. 1990. Institute of Forestry Annual Report 1989. IOF, Pokhara.
- Shrestha, T. K. 1981. *Wildlife of Nepal*. Curriculum Development Center, Tribhuvan University Press, Kathmandu.
- Upreti, B. N. 1989. Conservation of Fauna and Flora in Nepal. *Tigerpaper* XVI (2): 1-5.

## VALUING NON-TIMBER FOREST PRODUCTS IN AMAZONIAN ECUADOR

Sally Loomis, Paul Jahnige, MES Candidates  
Yale School of Forestry and Environmental Studies

Alicia Grimes, Research Associate  
New York Botanical Garden

### INTRODUCTION

Historically, financial analyses of Latin America's tropical forests have focused on timber harvesting and land conversion for agricultural and livestock production, overlooking the value of non timber forest products (NTFPs) in local and regional economies. Results of these analyses indicate that cattle ranching in once forested areas and natural forest management for timber generally exhibit low economic productivity while having negative ecological impacts in most of tropical Latin America. However, recent attention to NTFPs demonstrates that the sustainable extraction of these resources can provide significant benefits to local people while simultaneously conserving standing forests (Allegratti 1989; Peters, Gentry and Mendelsohn, 1989; Balick and Mendelsohn 1992).

This project was inspired by the work of Peters, Gentry and Mendelsohn (1989) in Iquitos, Peru which found the extraction of NTFPs for sale in local markets to be significantly more profitable than timber harvesting or cattle ranching. We use ethnobotanical techniques to systematically value three different hectares of primary forest in Amazonian Ecuador when used for the harvest of non-timber products. We augment the methodology of Peters, Gentry and Mendelsohn (1989) by valuing trees on an individual basis to account for the wide discrepancies in production among individual trees of the same species in tropical forests.

The values of long-term NTFP extraction generated from studies such as this can be compared to the value of land for other uses, and provide information essential to making appropriate land use decisions in forested areas of the tropics. In addition, by demonstrating the potential profitability of non-timber forestry these studies can provide an incentive for the conservation of intact forests and offer local populations an income generating scheme that is technologically feasible under existing conditions.

This article will describe and evaluate the methodology we used to value NTFPs in Amazonian

Ecuador. The results of the study will later be published as a TRI working paper.

### SITE DESCRIPTION

We conducted the study at the Jatun Sacha Biological Station (1°04' S; 77° 36' W) located on the south bank of the Napo River, 8 km from the town of Puerto Misahuallí, Ecuador. The research station includes approximately 500 hectares of primary and secondary forest and has been managed as a private foundation since the mid-1980s. The area is classified as tropical wet forest (according to the Holdridge Life System) and has a mean annual rainfall of approximately 4100 mm evenly distributed throughout the year (Neill et al, in press). This study was conducted using three separate one-hectare forest plots representing a range of soil types in the area. Plots A and B are about two kilometers apart and are located on tierra firme forest with red clay Dystrochrept soil at an elevation of about 400 m and plot C is situated one kilometer from plot A along the bank of the Napo River in floodplain forest with alluvial soil (plots A, B, and C in this discussion refer to permanent plots 2, 3 and 5 respectively at Jatun Sacha). The forests of the three permanent plots are representative of unprotected mature phase forests in the area; people have sporadically hunted and gathered some products from these forests but the area has not experienced major human disturbances in known history.

The indigenous Quijos Quichua inhabit the Upper Napo area and make their living through a combination of shifting cultivation of yucca and plantains, hunting, and the collection of forest products. Since the construction of a road adjacent to the study site (half a kilometer from plot A) in 1987, increasing numbers of outsiders have come to the area to raise cattle and cultivate cash crops. Migration, oil exploration, population growth, and insecure land tenure all contribute to accelerated forest clearing in this area and threaten the region's ecological integrity and social stability.



## METHODOLOGY

Between 1987 and 1989 Neill, Cerón and Palacios laid the essential groundwork for this study by scientifically identifying all of the trees and lianas 10 cm in DBH (diameter at breast height) in the permanent plots at Jatun Sacha. We used these botanical inventories as a guide in conducting ethnobotanical inventories in the three forest plots with four different groups of Quichua forest collectors. We visited the tree species on the plots with Quichua informants who identified the common names and uses of NTFPs sold in local markets. For the species producing economically important barks or resins, informants estimated a sustainable annual level of harvest and extraction costs for each individual tree. We visited each fruit tree of potential market value with at least two groups of informants in order to gather multiple estimations of average annual production, seasonality, and harvesting time. These measures allowed us to account for the wide variation in harvesting potentials and production rates among individual tropical trees. Previous studies (Peters et al 1989) have measured production from a subsample of trees and then extrapolated across all individuals of a given species.

The Quichua forest collectors who assisted in this study are experienced harvesters of NTFPs from the forests near Jatun Sacha and can estimate tree vigor and annual production with accuracy comparable to many ecological studies. They are familiar with the long-term fluctuations in production inherent in tropical species and attempt to account for these variations in their estimations. Such fluctuations may be overlooked by scientific studies that are often conducted over only 1-2 years. Local collectors are also able to determine whether non-destructive harvesting from a given tree is feasible. In order to harvest fruits without felling the tree, local forest collectors will climb (without equipment) either the fruit producing tree or a nearby pole tree.



*The authors and two Quichua forest collectors*

The potential for sustainable harvest often depends on the climbability of the individual tree which cannot be deduced from botanical studies. For these reasons, we believe that ethnobotanical methods are the most practical means of calculating rates of production and potential harvest in this type of valuation.

To collect data on market prices, transportation costs and rates of sale, we regularly visited the weekly market in Tena and made periodic visits to markets in the surrounding towns of Misahuallí, Archidona and Puyo. We used a combination of market observations and interviews with buyers and sellers to determine the prices per unit of forest products as well as the labor costs involved in their harvesting, processing, and sale. We frequently visited these markets with indigenous informants who verified the tree names from which various products originated and answered further questions concerning the costs and revenues associated with market sales. To supplement these data, we interviewed pottery makers about the use of a resin as a ceramic glaze, and traditional healers regarding the sale and identification of valuable herbal medicines.

We also collected information to calculate comparative land use values for timber harvesting and cattle ranching. To determine timber revenues, two local wood contractors who have had extensive experience buying and extracting forest timber conducted a cruise on the upland plot A. They surveyed the entire plot, identified all potentially merchantable trees on the hectare, and provided the stumpage values for each individual tree of worth. The total stumpage value for the plot represents the net value of the timber on that hectare. We chose plot A for this valuation because it is closest to the road thus minimizing the extraction costs. To calculate a per hectare value for cattle ranching we interviewed several area ranchers who estimated the annual revenues and annual medical and pasture maintenance costs associated with raising cattle.

Field and market interviews provide us with sufficient data to quantify the net costs and revenues and hence the Net Annual Value (NAV) associated with the harvest of NTFPs from the three forest plots at Jatun Sacha. With this information, we will calculate a Net Present Value for the land from NTFP's using the formula  $NPV = (NAV/r)$  where  $NAV = (\text{Net Revenues for NTFPs} - \text{Total Extraction Costs})$  and  $r = \text{the inflation free discount rate}$ . This net present value can then be compared to local land

prices, and the NPVs for timber harvesting and cattle ranching to determine the most economically efficient land use under existing conditions.

## DISCUSSION

We believe ethnobotanical techniques to be the most practical in valuing the forest for NTFPs, but this methodology is not without flaws. It is often difficult to attach numbers to something not typically quantified, such as product collection times. The Tena market is rapidly expanding and several forest products are being sold for cash for the first time. Some of these items are undoubtedly experimental, and will soon fail while other products may become heavy sellers. Determining the NTFPs currently sold was thus not a simple task, and to make projections regarding the future of the market for forest products we must assume that the successes and failures balance out. Fortunately, prices in this area are remarkably stable, simplifying the calculations of potential gross revenues from a given product identified as economically important. In addition, most forest products in this area are collected and sold by the same people thus eliminating the complication of middlemen in the valuation process.

This study calculates the potential value of three different hectares of forest for the harvest of NTFPs based on the assumption that local collectors are able to estimate a sustainable level of harvest for barks and resins. For fruits, our informants estimated production levels. We will follow the methodology of Peters et al (1989) and assume 75% of this figure to be sustainable (based on scientific production studies). In many cases, indigenous people are best able to estimate sustainable levels of harvest. However, as the local people enter the cash economy, currently low levels of NTFP extraction may escalate to unsustainable levels. This is an important factor to be considered in planning a NTFP extraction system for this area.

The value of a forest for timber and non-timber products as well as environmental services depends on conditions specific to each site. Floristic composition, distance to markets, infrastructure such as roads and public transportation, market demand, and cultural norms influence whether NTFP extraction is an appropriate land use in a given area. Site specific systematic valuations such as the one described in this study must be carried out before promoting or initiating extraction schemes for timber or non-timber products in

tropical forest areas. Indeed, valuations of all land use options in tropical forests are necessary before accurate land use decisions can be made.

Demonstrating the profitability of forest resources to the local populace, and encouraging policies that create incentives for long-term management are fundamental to establishing successful NTFP extraction schemes. On the fragile lands of Amazonia, forests represent a store of wealth which can be managed sustainably to reap both economic and ecological benefits into the future. As information disseminates people will become aware that the management of intact forests for NTFP extraction is a practical option in many areas of the humid tropics where soils are infertile and timber stocks poor.

## ACKNOWLEDGEMENTS

We would like to thank Dr. Bradley Bennett for initiating this ethnobotanical research in Ecuador and, along with Dr. Rocío Alarcón, for putting us in contact with Quichua informants. We are grateful to Dr. Michael Balick and Dr. Robert Mendelsohn for acting as advisors throughout this project and making this study possible in Ecuador. This study would not have been possible without the botanical inventories conducted through years of hard work by Walter Palacios, Carlos Cerón and David Neill to whom we are indebted. We also thank our Quichua co-workers for sharing with us their experience and knowledge. This research was supported by grants from the Tropical Resources Institute at Yale University, the New York Botanical Garden/Institute of Economic Botany and the SUBIR project, Quito, Ecuador.

## LITERATURE CITED

- Allegratti, M. H. 1990. Extractive Reserves: An Alternative for Reconciling Development and Environmental Conservation in Amazonia. in A. B. Anderson, ed. *Alternatives to Deforestation: Steps Towards Sustainable Use of the Amazon Rain Forest*. Columbia University Press, New York.
- Balick, J.M. and R. Mendelsohn. 1992. Assessing the Economic Value of Traditional Medicines from Tropical Rain Forests. *Conservation Biology* 6:128-30.
- Neill, D.A., W.A. Palacios, C.E. Cerón and L.E. Mejía (in press) "Composition and Structure of Tropical Wet Forest on the Upper Río Napo, Amazonian Ecuador: Diversity and edaphic differentiation", submitted to *Biotropica*.
- Peters, C.M., A.H. Gentry, and R. Mendelsohn. 1989. Valuation of an Amazonian Rainforest. *Nature* 339:655-56.

## SOCIOECONOMIC VALUATION OF TOURISM IN BELIZE

**Erika Svendsen, MES Candidate**

Yale School of Forestry & Environmental Studies

**Jennifer Davis, MESE Candidate**

University of North Carolina at Chapel Hill

### INTRODUCTION

Our study was designed to examine socio-economic impacts of tourism in Belize and to help quantify the value of the country's protected and unprotected areas. A grant from the Tropical Resources Institute enabled us to survey over 250 international tourists visiting Belize during June and July of 1992. The survey included travel cost questions which will be used to develop demand curves for selected natural regions in Belize. A contingent valuation section will aid in estimating the value that these tourists place upon the sites they visit and the natural environment.

This project drew upon the economic valuations research of Professor Robert Mendelsohn and attempts to build upon his work in Costa Rica (see Tobias and Mendelsohn 1991). Whereas Tobias and Mendelsohn focused upon domestic visitation rates, this is the first travel cost and attitudinal study which addresses international tourists. Complete results of this survey are forthcoming and will be presented in a Spring 1993 TRI Working Paper.

### BACKGROUND

Eco-tourism is a relatively new concept which is of interest not only to those in the tourism industry, but also to development professionals, policy-makers and local communities as a potentially lucrative mechanism for conserving the natural resource base. The objective of eco-tourism - despite often ambiguous applications - is to attract tourists to natural areas and to use revenues for local conservation and economic development activities.

Many developing countries in tropical regions have the potential for eco-tourism. These nations possess a myriad of natural attractions and many have tourism industries which generate significant amounts of employment and income. In some cases the majority of tourism revenues are neither spent within the host country nor remain in the area due to high foreign ownership and weakly enforced business regulations. Therefore, the challenge is to redirect tourism and tourists toward natural attractions, while also ensuring that economic development and environmental protection are achieved.

Located on the Caribbean coast of Central America -

bordered on the north by Mexico and on the south/west by Guatemala - Belize's tourism industry has traditionally centered around the country's coastline. The well-known coastal waters shelter island cays and coral reefs which extend the length of the country.

Developing the tourism industry was a particular emphasis of the 1984 government administration and has been recognized as a major economic growth strategy in Belize. The "Integrated Tourism Policy and Strategy Statement" of 1988 outlines the government's commitment to developing tourism throughout the country while also striving to enact stronger protection of Belize's natural areas (Boo 1990). In the past few years Belizean tourism officials have emphasized the natural beauty of their sub-tropical climate by promoting visits to inland sites - Mayan ruins, mountain pine forests, winding rivers, and wildlife reserves.

Based upon government figures, Belize had a population of 190,792 in 1991. During that same year, 215,000 people visited Belize (Government of Belize 1992, Belize Tourist Board 1991). As a result Belizean officials and tourism operators realize the need to plan for a visitor population which is in excess of their own. In some cases, a dilemma arises when the desire to maximize profits overshadows the protection of the natural and human resource base. For example, each year the government grants concessions to cut the mangroves to allow for resort development but at the same time supports low-impact, eco-tourism and natural resource protection.

Surprisingly, little information exists regarding where visitors go and what their motivations are for visiting Belize. Planning decisions could be made more accurately with specific tourism information. Although our study sampled only a percentage of visitors, the majority of those surveyed could be categorized as tourists who are interested in viewing natural attractions. Yet it is imperative that additional research be conducted to determine whether there is an actual demand for low-impact, natural resource recreation.

Belize is a developing country whose leaders recognize a need for economic diversification (Government of Belize 1992). As a result, Belizean policy-makers must know

whether tourism is profitable - particularly on the mainland. In addition, the government acknowledges the need to establish a mechanism for generating reliable data on the growth and impact of tourism, as well as on the value of Belize's protected areas. While the worth of a given area can be quantified in terms of its agriculture, cattle or forestry potential, it is much more difficult to assign a market value to the conservation of the land for recreational purposes. Yet it is precisely this type of information that may help policy-makers from many countries form a more complete picture of their development and environmental protection options, and therefore to devise sound strategies.

## METHODS

Because June and July are not peak tourists months but instead mark the beginning of the rainy season, we decided to interview tourists traveling throughout the country in an attempt to maintain an adequate and diverse sample size. The majority of our survey subjects were found at the international airport which is located a few miles outside Belize City. We surveyed visitors at local restaurants, hotels, market squares in Belize City and on Caye Caulker. We continued to survey tourists in the country's capital city of Belmopan and in the western city of San Ignacio. One day was spent surveying people in route from or to San Ignacio and the Guatemalan border. As a result of our sampling pattern we were able to survey a greater diversity of tourists.

Questionnaires were administered in an interview style to minimize potential survey bias. Survey responses will be used to develop demand curves based on a standard empirical relationship between the price of a good and the quantity purchased. As per Tobias and Mendelsohn (1991), distance to the sites will be converted into monetary units using an average cost per kilometer estimate. Tourist origins, transportation costs, a percentage of fixed costs, and the number of trips to specific regions will be included in the distance/travel cost calculation. The relative value of regional characteristics will be compared using both the demand function and a consumer surplus calculation.

Site analysis will be separated into three general regions of visitation - the cayes/reef, inland sites, and a combined visit to the cayes/reef/inland regions. Because almost as many tourists enter Belize overland (100,856 in 1991) as by plane (106,957 in 1991) we will attempt to treat both types of transportation methods in the travel cost (Belize Tourist Board 1991). The travel cost method will be used to quantify the value of each regional visit (ie. reef, inland, and both) based on the costs incurred by tourists to reach these sites.

The travel cost portion of our survey was comprised of questions such as "where do you reside and where did your travel originate?" It is important that the survey questions distinguish between where a tourist began their trip and where they actually live. A person may respond that his or her trip to Belize originated in Miami or in Guatemala City but may live in New York. An accurate travel cost will calculate expenses from New York through Miami or Guatemala City and on to Belize. Each visitor told us how much money they spent on transportation as well as on food, accommodations, guides, etc... In this section of the survey, we were careful to have the tourist break down the types of transportation used (car, boat, bus, plane, other) and expenses in order to accurately reflect total travel costs. To complete the travel cost, we solicited information regarding sites tourists had visited or were planning to visit in Belize. Supporting questions covered international travel frequency, return rate to Belize, employment status, age, income, and specific reasons for visiting the country.

We addressed documented shortcomings in the travel cost method such as the inability to assess environmental values or tourist motivations by also administering a contingent valuation survey (Mitchell and Carson 1989). The contingent valuation was designed to elicit data concerning visitors' motivations and preference, ecological concerns, and values of personal time. We utilized this approach in an attempt to estimate the costs and benefits of various uses for goods and services by measuring responses to hypothetical conditions. Subjects provided information regarding the values which they placed upon transportation, guide programs, wildlife conservation, infrastructure development, vegetation conservation, local community assistance and a natural history museum. Unlike the travel cost method, these questions relied upon hypothetical behavior, and



*Mountain Pine Ridge in Cayo District, Belize*

therefore can elicit information regarding existence or non-use values (the existence of a resource may be important to you even if you are not a user).

Data collected in the contingent valuation sections will be analyzed in comparison with the results of the travel cost survey to determine whether current costs associated with travel to Belize accurately reflect the value for the region as represented by the survey responses. As suggested in Mitchell and Carson (1989), we have expanded our survey process from a direct valuation to include behavior ranking and attitudinal preference questions in order to obtain more "meaningful" results. In addition, the contingent valuation questions can indicate a change in utility which can later be converted into dollar amounts.

#### PRELIMINARY RESULTS

Although specific results from the travel cost and attitudinal responses await statistical analysis, some general trends can be observed. The majority of tourists surveyed were from the United States. There were many visitors from Germany and Canada but overall, over twenty countries were represented. The majority of respondents were frequent international travelers, aged 23-38. Some were visiting Belize for a second time. An interesting finding was that nearly all of those surveyed stated that they would return to Belize again. Most of those surveyed reported an annual income level exceeding \$60,000.

Almost all of the tourists surveyed told us that they had already or planned to visit the cayes/reef. A significant number of scuba divers, however, did not even visit mainland Belize. This appears to support a trend in which tourists explore the reefs and then bypass inland Belize for a short trip to Tikal - the great Mayan center in Guatemala. The main Belizean town in route to Tikal is San Ignacio where we often observed tourists who had decided to stop over while moving from or to Tikal and the Belizean coast. In contrast to the high-income scuba diver population, low and middle income tourists typically stayed in Belize for longer periods and traveled throughout the country.

#### DISCUSSION

The results from this survey include approximately 240 viable observations and 34 variables which will be used to analyze qualitative and quantitative statistical relationships. Is there a relationship between a visit to Belize and a concern for environmental protection and/or conservation? Can communities depend on the income of

"eco-tourists?" Are those surveyed on business and visiting sites out of convenience, therefore placing less value on the sites, or were they strictly vacation visitors?

Any results of this survey must be considered within the context of a distinct tourist travel season and should not be applied to annual estimates. However, the project findings should prove directly useful to the Belize Tourist Board and the Belize Tourism Industry Association as a way to assess the viability of eco-tourism as a development strategy for Belize.

The final outcome of this project will be an attempt to create an alternative method to value previously non-marketed resources such as a pine forest or a coral reef. It is important to consider that tourism is not the only value of a natural resource. It is also not the only valuation method. In fact, it may be unwise to evaluate a resource based solely upon the attitudes and behaviors of international tourists. The valuation of a resource associated with tourists is often less dependable than demands for a food or energy source. Above all, any form of tourism development has a threshold level wherein the sustainability and adaptability of the resource becomes questionable. The real challenge is to utilize economic valuation techniques to explore regional land use options and to create situations which enhance the community and ecological resource base. One way to help accomplish this is to explore new methods of economic assessment which include all values - market and non-market - of a nation's natural resource base.

#### LITERATURE CITED

- Belize Tourist Board. 1992. Visitor Statistics 1987-91. Immigration and Nationality Services of Belize.
- Boo, Elizabeth. 1990. Eco-tourism - The Potentials and Pitfalls, Vol 1 & 2. World Wildlife Fund. Washington, D.C.
- Government of Belize. 1992. Belize Fact Sheet - A Belize Information Service Publication. Government of Belize Printery: pp. 1-10.
- Tobias, Dave and Mendelsohn, Robert. 1991. Valuing Eco-tourism in a Tropical Rain Forest Reserve. *Ambio*, 20(2):91-93.

## TREE ROOST INTERACTIONS BETWEEN THE COMMON VAMPIRE BAT AND TWO FRUGIVOROUS BATS

Tim Wohlgenant, MES Candidate  
Yale School of Forestry and Environmental Studies

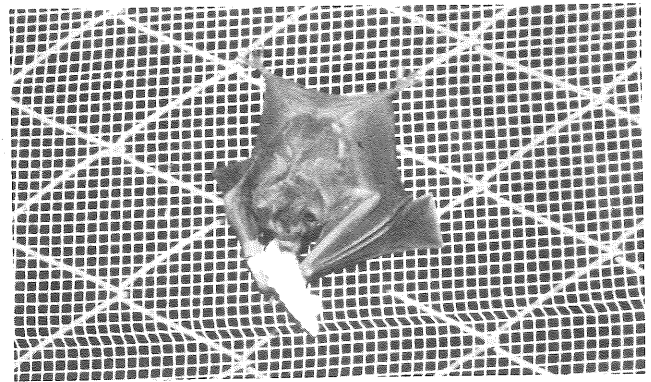
### INTRODUCTION

Bats make up over half of the mammalian species found in Latin America. Many bat species play crucial roles in pollinating tropical plants which have coevolved with bats in a dependent "lock and key" relationship (Myers 1986). Other bats influence the reproductive success of nearly 100 genera of fruiting plants which in turn provide food to an array of animal species (Gardner 1977). The economic significance of bats in Latin America is obvious. In addition to the role of many insectivorous species in controlling the abundance of insect pests, the ecology of many valued tropical plants including fruits, spices, nuts and timber are linked to the habits of bats. Therefore, the ecological and economic implications of misdirected control of vampires and the competitive dominance of vampires over more beneficial bat species may be vast.

Three of the nearly 250 species of bats found in the neotropics are true vampires, feeding on the blood of land vertebrates. The vampires occur only in the warmer regions of Central and South America and southern Mexico. *Diaemus youngi*, the White-winged Vampire, and *Diphylla ecaudata*, the Hairy-legged Vampire, feed almost exclusively on avian blood. In contrast, the Common Vampire, *Desmodus rotundus* prefers the blood of mammals (Koopman 1988).

Prior to the introduction of domestic animals to Latin America, *Desmodus* probably fed upon the blood of wild mammals such as llamas, peccaries, deer, capybara, agouti, and paca (Greenhall 1988). However, many researchers suggest that vampire populations were limited by the blood supply (e.g., Lord 1988; Turner 1975). The introduction of domestic livestock in Latin America provided the common vampire with an accessible and abundant supply of blood. Coupled with the relatively recent growth of the Latin American beef industry was a corresponding increase in vampire bat populations. Now one of the more abundant bats in Central and South America (Greenhall 1985), *Desmodus* is the most significant vector of paralytic rabies in the region (Arellano-Sota 1988).

Economic losses due to the spread of rabies among vampire-bitten cattle continue to be significant. Over 100,000 cattle are reported to die of rabies each year in



*Carollia perspicillata* feeding against cage side

Latin America (Acha and Malaga-Alba 1988). Such losses stimulated research into the biology of *Desmodus* in an effort to identify effective control measures. The most efficient and commonly employed method of controlling vampires takes advantage of the grooming behavior of vampires in the roost. Mist nests are set around corralled cattle and vampires are captured and smeared with slow-acting anticoagulant mixed with vaseline. Upon release, the bats return to their roosts and through communal grooming contaminate between 20 and 40 roost mates each (Linhart, et. al. 1972). Using this method, entire colonies of vampires may be wiped out following one evening of control. Although an effective method, it is likely that some of the topical anticoagulant mixture is rubbed off on roost walls by treated vampires. Unfortunately, the secondary effects of the anticoagulant on non-vampire bat species are not well known (Lord 1988).

*Desmodus* is known to share cave and tree roosts with almost 45 species of frugivorous and insectivorous bats. Where caves are uncommon, hollow trees serve as the principal roosting resource for Neotropical bats. In many areas of Latin America, tree roosts may be scarce due to human agricultural and grazing pressures. In such areas, tree roosting bats compete for roosts and for preferred space within roosts (Fleming 1988). In Guanacaste province, Costa Rica, using captive bat colonies housed in a flight enclosure, I observed the roosting interactions of *Desmodus* with two common frugivorous bat species, *Phyllostomus discolor* and *Sturnira lilium*.

### METHODS

The study took place during the rainy season months of June through August, 1992, in Guanacaste, Costa Rica. The experimental component of the study was conducted

at the Estacion Experimental Enrique Jimenez Nunez, a research station operated by the Costa Rican Ministry of Agriculture and Cattle, (lat. 10 15' N, long. 85 10' W). Forest transects and measurements of tree roosts took place in relatively large, contiguous patches of forest located at the research station and on surrounding property in three ecological life zones: tropical dry forest, tropical dry transitional forest, and premontane moist forest.

At the research station, I built a 3.5m X 5m X 3m flight enclosure framed with wood and screened with fine mesh window screen. The enclosure was divided by light weight netting to create two chambers, each large enough to allow the captive bats free flight. The enclosure was built within a roofed shelter which provided some measure of protection from excessive sun and rain.

Each chamber contained two artificial roosts made from plastic buckets lined with fabric screen. I designed two types of roosts: Type A, made from two buckets, was 83 cm in length which the bats entered and exited through a 15 cm diameter hole in the side; Type B consisted of a single bucket which the bats entered through a larger opening in the bottom. By virtue of its greater length and the position of the entrance opening, Roost A provided a darker, more protected environment than Roost B. Roosts were placed on small shelves on opposite sides of the chamber approximately 1.2 m above the ground.

In order to preserve the social composition of the captive colonies, most bats were captured in mist nets set outside known tree roosts. The bats were aged, weighed, sexed, and banded with reflective bands to allow identification in the enclosure. Over the course of the summer, from 10-15 individuals of five different bat species were held in captivity for the roosting experiments. Of these, three species, *Desmodus rotundus*, *Phyllostomus discolor*, and *Sturnira lilium*, consistently roosted in the artificial roosts and were successfully tested. Fruit bats were fed nightly a diet of bananas, mangoes, papayas, melons and other locally available fruit. Vampires were fed using bowls containing fresh bovine blood (treated with trisodium citrate to prevent clotting) obtained from a local slaughterhouse.

Two experiments were conducted with the captive bats in the enclosure. First, in order to establish roost preference, a single species was introduced to an enclosure chamber containing both Roost A and Roost B. Roosting locations of the colony were then observed daily and the artificial roosts rearranged within the enclosure according to a randomized schedule. A roost choice was counted if more than 80% of the bats in a colony roosted together. Testing was conducted for 10 to 15 days. In

order to examine interactions between species when preferred roosts are scarce, I then introduced a colony of vampires and a colony of non-vampires to an enclosure chamber containing either one or two preferred roosts. Again this version of the experiment was conducted for 10 to 14 consecutive days.

The field component of the research consisted of locating natural tree roosts, identifying the trees and examining them for bat species composition and roosting locations. A variety of tree roost parameters were measured including temperature, dbh, diameter of the roost hollow, total tree height, height of roost, and dimensions of the opening.

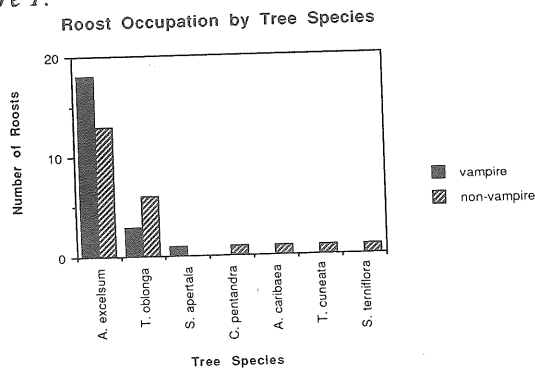
## RESULTS

During intraspecific preference tests, both *D. rotundus* and *P. discolor* showed a distinct preference for Roost A when given a choice between both roost types. Although both species would roost in Roost B when no other roost was available, when the two species were placed in the same chamber for interspecific interaction tests, they shared Roost A in each of 6 trials ( $p=.0156$ ). However, when two Roost A's were made available, the bats did not share but segregated themselves by species ( $p=.0312$ ).

Interestingly, *S. lilium* roosted only in Roost B in 8 trials ( $p=.0039$ ) during preference testing. As with *P. discolor*, when two Roost B's were made available during interaction tests with the vampires, the two species roosted separately. If only one Roost B were present, the *S. lilium* tended to roost on the ceiling of the enclosure while vampires roosted in the artificial roost.

I encountered forty-four occupied natural tree roosts in the field. Of these, 18 roosts were occupied solely by vampires and 4 roosts shared by vampires and a non-vampire species. The remaining 22 roosts sheltered only non-vampires. No differences in tree roost parameters were detected among those roosts occupied by vampires and non-vampires, or when grouped by ecological zone or tree genus (Kruskal-Wallis ANOVA). Roosts were found in seven species of trees: *Anacardium excelsum* (29), *Terminalia oblonga* (10), *Sterculia apetala* (1), *Ceiba pentandra* (1), *Albizia caribaea* (1), *Trichilia cuneata* (1), and *Sloanea terniflora* (1) (see Figure 1).

Figure 1.



## DISCUSSION

The results from this research may have implications for the better management of vampire control programs in problem areas. Both the experimental data and the field data from this project suggest that non-vampires are unlikely to share tree roosts with vampires unless preferred roosts are scarce. However, the roosting proximity of vampires and non-vampires within shared roosts and the rate of roost repopulation following extermination of a colony are important factors in the likelihood of secondary effects on non-vampires. In captivity, *Phyllostomus* shared the Roost A with the vampires in extremely close proximity when no other preferred roost was made available. Further, the non-vampire species I tested did not hesitate to roost in a previously occupied vampire roost if the vampires were not present.

Quantification of vampire roost requirements from field measurements may allow early identification of vampire roosts and suggest the use of highly specific control methods. My experience in Guanacaste suggests that while local knowledge of bats is limited (many Costa Ricans refer to all bats as vampires), there is strong interest in management practices that control vampire populations without negative consequences for more desirable species. After minimal training, ranchhands I worked with became adept at locating and identifying vampire roosts in the field.

Costa Rica continues to experience one of the highest rates of deforestation in Central America. The conversion of forest to cropland and pastureland increasingly fragments forest habitat creating a greater proportion of 'edge.' This research implies that vampires are competitively dominant, particularly at the edges of habitat where roosts are scarce but foraging sources (i.e., domesticated animals) are abundant. This information sheds light on the importance of roosting interactions and roost availability in structuring the bat community in Guanacaste, Costa Rica.

## LITERATURE CITED

- Acha, P. N., and A. Malaga Alba. 1988. Economic losses due to *Desmodus rotundus*, in *Natural History of Vampire Bats*, Greenhall, A. M. and U. Schmidt, eds., CRC Press, Boca Raton, Florida, 246 pp.
- Arellano-Sota, C. 1988. Biology, ecology and control of the vampire bat. *Rev. Infect. Dis.*, 10(4): S615-S619.
- Fleming, T. H. 1988. *The Short-tailed Fruit Bat: A Study in Plant-Animal Interactions*. University of Chicago Press.
- Gardner, A. L. 1977. Feeding habits. Pp. 293-350 in *Biology of Bats of the New World Family Phyllostomatidae*, Part II, Baker, R. J., Jones, J. K. Jr., and D. C. Carter, eds., Spec. Publ., Museum of Texas Tech University, Lubbock, Texas. 364 pp.
- Greenhall, A. M. 1985. Effects of vampire bats and paralytic rabies on livestock production. Pp. 537-553 in *Parasites, Pests and Predators*, Gaafer, S. M., Howard, W. E., and R. E. Marsh, eds., Elsevier Science Publishers, Amsterdam.
- Greenhall, A. M. 1988. Feeding behavior. Pp. 111-132 in *Natural History of Vampire Bats*, Greenhall, A. M. and U. Schmidt, eds., CRC Press, Boca Raton, Florida, 246 pp.
- Koopman, K. F. 1988. Systematics and Distribution. Pp. 7-18 in *Natural History of Vampire Bats*, Greenhall, A. M. and U. Schmidt, eds., CRC Press, Boca Raton, Florida, 246 pp.
- Linhart, S. B., Flores-Crespo, R., and C. G. Mitchell. 1972. Control of vampire bats by topical application of an anticoagulant, chlorophacinone. *Bull. Pan. Am. Health Org.*, 6: 31.
- Lord, R. D. 1988. Control of vampire bats. Pp. 215-226 in *Natural History of Vampire Bats*, Greenhall, A. M. and U. Schmidt, eds., CRC Press, Boca Raton, Florida, 246 pp.
- Myers, N. Tropical deforestation and a mega-extinction spasm. Pp. 394-409 in M. E. Soule (ed.) *Conservation Biology, The Science of Scarcity and Diversity*. Sinauer Associates, Sunderland, Mass. 584 pp.
- Turner, D. C. 1975. *The vampire bat: a field study in behavior and ecology*. The John Hopkins University Press, Baltimore, 145 pp.



## PRIVATE COLLECTION OF RECYCLABLES IN METRO MANILA, PHILIPPINES

Martin Medina, Ph.D. Candidate  
Yale School of Forestry and Environmental Studies

### INTRODUCTION

The following report is part of a larger study on waste management and recycling in Manila, Philippines being carried out by the author and funded by TRI and the MacArthur Foundation. It is based on visits to the Payatas and Smokey Mountain dumps, interviews with scavengers, community leaders, Ms. Leonarda Camacho - Chairperson of the Metro Manila Women Balikatan Movement, members of the group Work Against Trash for Ecological Rebirth (WATER 1992), and library research.

### WASTE MANAGEMENT IN METRO MANILA

Metro Manila, the consolidation of Manila proper, 13 municipalities and 3 surrounding cities, has an estimated population of 8 million (Ouano 1991). The management of solid wastes has been problematic for several years (Fernandez 1991). At present, Metro Manila generates over 3,000 tons of garbage a day. Of these, an estimated 233 tons a day are burned, illegally dumped or thrown into canals, streams or the Pasig River (Environmental Management Bureau 1990). Many areas in Metro Manila suffer from insufficient and inefficient waste collection. Lack of and inappropriate trucks, inadequate truck maintenance and irregular collection routes



*Payatas, Manila's largest dump.*

constitute the major problems (Ouano 1991).

Seven open dumps receive all waste collected in the metropolitan area (PTFWM 1988). This creates environmental and public health hazards because of the gaseous emissions and leachate generated, due to their lack of containment structures. For example, leachate from Payatas, the largest dump, pollutes La Mesa reservoir, the most important source of drinking water for the city (WATER 1992). In January of 1992, an outbreak of typhoid fever in the surrounding community sent more than 1,000 people to hospitals, and at least 4 people died (WATER 1992). Community leaders also report cases of dysentery, diarrhea, headaches and what they called "temporary insanity" among residents.

Manila Bay waves periodically wash away some of the garbage discarded at Smokey Mountain, the oldest dump located on Balut Island (CCP 1990). The wastes dumped in canals, streams and the Pasig River also end up in Manila Bay. As a result of inadequate sanitation and waste disposal, 5 communicable diseases (pneumonia, tuberculosis, gastroenteritis, bronchitis, and measles) are among the 10 leading causes of death and illness (Environmental Management Bureau 1990).

### PRIVATE COLLECTION OF RECYCLABLES

Private collection of recyclable materials helps improve Manila's economy and environment by creating jobs and reducing the pressure on waste collection and disposal. The Metro Manila Authority does not provide separate collection of recyclables.

A large number of itinerant collectors roam the streets buying old newspapers, empty bottles, tin cans, old clothes and rags. Servants or housewives usually separate these items which they then sell to the collectors. At this point, materials command the highest price, since they are normally undented and reusable. Collectors are commonly seen carrying recyclables in either wooden push carts or plastic bags. After collection, they clean and sort the materials. Middlemen buy recyclables from collector and store them at junk shops. Industries purchase recyclables from middlemen for reuse or recycling. This collection of recyclables benefits households that obtain extra income, the collectors, and the middlemen who buy the materials from the collectors.

Some push cart collectors open the trash bins or rip the plastic bags placed in the streets for curbside collection, thus obtaining the recyclables free of cost. Authorities receive complaints from residents about the collectors scattering the waste, which attract flies and other animals. Residents also complain about damage to and loss of trash cans.

Local authorities consider all push cart collectors a problem. They see the push carts as unsightly, unattractive to tourists and a traffic hazard. Government officials contend that thieves frequently use push carts to carry stolen goods (Keyes 1982).

### THE LINIS GANDA PROGRAM

A Non-Governmental Organization, the Metro Manila Women Balikatan Movement created an innovative program, named "Linis Ganda." Balikatan is Tagalog for "shoulder to shoulder," emphasizing their willingness to work with the government to protect the environment. Linis Ganda is Tagalog for "clean and beautiful." Linis Ganda took advantage of the positive aspects of a previously existent system of itinerant collection while reducing some of its shortcomings.

In 1983, the Balikatan Movement, headed by Ms. Leonarda Camacho, started organizing junk shops and households for the collection of recyclables. Balikatan conducted an educational campaign for the separation of dry waste (recyclables) and wet waste (basically kitchen and food waste) among households and commercial establishments, informing them of the waste collection schedule, location and telephone numbers of participating junk shops. Balikatan also made arrangements with homeowners associations for the entry of the collectors on fixed days of the week (Camacho 1992).

Balikatan gave assistance to facilitate the granting of loans to junk shops, and discussed with users of waste materials possible new materials that could be recycled. The Linis Ganda program established a network of itinerant collectors, called "Eco Aides" who were provided with I.D. cards, green T-shirts and green push carts. Two categories of Eco Aides exist: land based and river based.

Land-based Eco Aides roam the streets and housing complexes on fixed routes buying recyclables from households and salvaging materials from garbage dumped in streets and back alleys. At present 120 of these Eco Aides serve 5 municipalities in Metro Manila: San Juan, Pasig, Manila, Quezon City and Muntinlupa. Their income ranges from 50 to 500 Filipino pesos (approx. 2-20 U.S. Dollars) a day (Camacho 1992).

River-based Eco Aides collect recyclables floating on the San Juan River from small, single-person boats called "bancas". Women make up approximately 30% of the more than 100 river-based Eco Aides in the San Juan River (CAPS 1992). These Eco Aides usually earn higher incomes during the rainy season, as strong streams wash away more materials.

All Eco Aides work for a particular junk shop owner, who lets them use his/her push carts or bancas in exchange for their commitment to sell the collected waste only to him/her (Camacho 1992).

The Linis Ganda program provides a livelihood to over 120 people, supplies raw materials to industry and artisans, helps clean the San Juan River and streets, provides an extra income to households, and reduces the pressure on waste collection and disposal services. Eco Aides collect an average of 50 tons of dry waste a month (Camacho 1992). The breakdown of the recovered materials is as follows: paper, 28%; plastics, 25%; bottles, 18%; cans, 18%; and miscellaneous (wood, rubber, metals, etc.), 11% (Camacho 1992).

The work of Eco Aides and independent collectors renders other environmental benefits. Recycling reduces water use, energy use, water pollution, air pollution, and mining wastes (Cowles 1986).

At present, Eco Aides collect only dry waste. However, Balikatan plans to start collecting wet waste for composting. If implemented, the quantity of waste requiring disposal generated by the areas served will decrease dramatically.

Lack of funding forms the most important obstacle to the expansion of Linis Ganda to other areas in Metro Manila. To solve this problem, the World Bank has agreed to fund the expansion of this program in Mandaluyong, a municipality belonging to Metro Manila.

Besides Linis Ganda, numerous independent collectors work in other areas of Metro Manila, who have their own push carts or boats, and working capital. They are not associated to any group, are not organized, and do not have fixed routes. Estimates on their number or quantity of recyclables recovered by them do not exist. However, my informal observations suggest that the number of independent collectors is probably higher than that of Eco Aides. Many independent collectors do not have pushcarts; instead, they use plastic bags to store the recovered items, such as aluminum cans and styrofoam cups. For example, one female independent collector reported that she supports herself and her two

children by salvaging styrofoam cups and plates from a fast food restaurant, which she sells to a junk shop.

## DISCUSSION

Recovery of recyclables in Metro Manila creates jobs, protects the environment, and can be considered a form of sustainable development. The Linis Ganda program improved, formalized and dignified a previously existing system of itinerant vendors and junk shops. It did not intend to compete with or replace the informal system. Government intervention on recycling has not been positive. In 1982, the government created a program called "Pera sa Basura" (money from waste) but failed because it tried to compete and replace the informal system. Middlemen felt threatened, and they opposed and boycotted the program (CAPS 1991). A similar program, "Kwarta sa basura," initiated by the government in 1986 also failed (NEPC 1986).

Push cart use provides advantages such as affordability, easy maintenance and repair, and reliance on human energy. Many Metro Manila Authority collection vehicles, on the other hand, are imported, expensive, consume imported fuel, and require frequent maintenance and repair (Ouano 1991).

Success of the program, however, can be attributed to the leadership and persistence of Ms. Leonarda Camacho, who has been involved in waste management and recycling issues for over 17 years. The accomplishments of the Linis Ganda program should not be overgeneralized or considered universally valid. If other communities in developing countries intend to create similar programs, several important points should be considered. The existing patterns of materials recovery from garbage must be taken into account, as well as the participation of the local communities, scavengers and middlemen. Possible opposition from local government officials represents another important factor to consider. Officials may feel threatened if a program turns out to be successful, because their services would not be needed in those areas and their influence would decrease. They could also argue that collectors and junk shop owners do not pay taxes, and therefore the government should not support their activities. Consequently, approval and support from the government is crucial. Similar programs could be created in other Third World cities to create jobs and protect the environment.

## REFERENCES

- Camacho, Leonarda, personal communication, 1992.
- Center for Advanced Philippine Studies, CAPS. 1991.

"A Case Study of a Privately-Initiated Solid Waste Collection Management in San Juan, Metro Manila", August, p. 13.

Cultural Center for the Philippines (CCP). 1990. "Smokey Mountain: A Fantasy Vision", p. 8-9.

Cowles, R. 1986. Source Separation and Citizen Recycling in *The Solid Waste Handbook* (ed. W. Robinson). John Wiley, New York.

Environmental Management Bureau. 1990. "The Philippine Environment in the Eighties," Manila, Philippines, pp. 234, 238

Fernandez, A. L. 1991. "Integrated Solid Waste Management for Asian Cities," International Expert Group Seminar on Policy Responses Towards Improving Solid Waste Management in Asian Metropolises, Bandung, Indonesia, February 4-8, p.28.

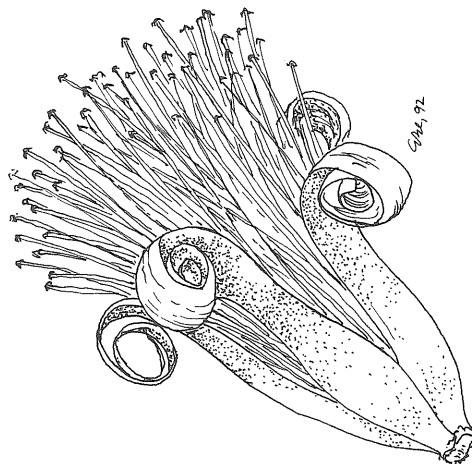
Keyes, W. J. 1982. Manila Scavengers: The Struggle for Urban Survival in *The Philippine Poor I* (ed. Marie S. Fernandez). Ateneo de Manila, Quezon City, p. 50.

Manila Bulletin. 1992. Manila, Philippines, June, p. B-1

National Environmental Protection Council (NEPC). 1986. Kwarta sa Basura, A Resource Recovery Project. Quezon City, Philippines.

Ouano, E.A.R. 1991. "Developing Appropriate Technology for Municipal Solid Waste Management in Developing Countries: Metro Manila Pilot as a Case Study", International Expert Group Seminar on Policy Response Towards Improving Solid Waste Management in Asian Metropolises", Bandung, Indonesia, February 4-8, p. 10.

Work Against Trash for Ecological Rebirth (WATER) members, personal communication, 1992.



# BOOK REVIEW

by Florencia Montagnini

*Financial and economic analyses of agroforestry systems.*  
G. M. Sullivan, S. M. Huke and J. M. Fox (eds.). 1992.  
Nitrogen Fixing Tree Association. Paia, Hawaii. xix +  
312 pp.

This book summarizes the proceedings of a workshop held in Honolulu in July 1991, which was funded by the U.S.D.A. Forest Service, the U. S. Agency for International development and the East-West Center. The proceedings were certainly published quickly! This is a real benefit because concrete case studies and data on the financial and economic analysis of agroforestry are needed to successfully promote these systems. Key aspects of the financial analysis of agroforestry systems include realistic estimations of labor inputs, considerations of market price influence and fluctuations, and evaluations of the environmental impacts of the agroforestry practices. The book deals with all of these topics with varying degrees of detail.

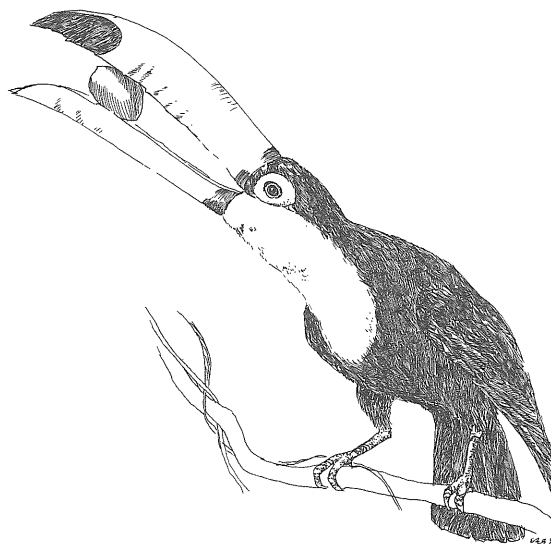
Part I provides a good overview of the entire proceedings, along with an up-to-date review of agroforestry while stressing some of its current weaknesses. For example, a number of new agroforestry technologies have been studied, but they are relatively site-specific and often do not provide enough detail to allow for an estimation of the economic benefits. Furthermore, studies are often ex-ante and hindered by insufficient data which leads to the use of rough approximations in their analyses. Finally, few studies make use of data collected in farms, or through field surveys. These deficiencies are clearly stated in Part I. In conclusion, there is still a lot of work to be done.

Part II addresses these problems. This section offers

good and thorough conceptual presentations of the subject, mostly dealing with methodologies including data collection, the use of experimental stations and on-farm trials, market analysis, and models that can be employed for economic analyses of agroforestry.

Part III includes a collection of case studies and invited papers. Almost all current agroforestry practices and systems are covered by the twelve case studies presented, including alley cropping, windbreaks, live fences, taungya, trees with perennial or annual crops and agrosilvopastoral systems; notably missing are only home gardens and improved fallow systems, although an example of traditional agroforestry is included. The case studies contribute examples of economic research in technology development, ex-ante assessment of agroforestry technologies, appraisal of management options, economic evaluation using data collected on farms, and aggregate economic effects of agroforestry practices. A critique follows the presentation of each case study, adding useful perspective.

Finally, the appendices contain a practical glossary and a summary of financial and economic criteria for investment analyses. As a government-subsidized publication, this book should be inexpensive (approximately \$20 US), and can be purchased through the Nitrogen Fixing Tree Association (NFTA, P.O. Box 680, Waimanalo, Hawaii 96795, USA). It should be of interest to professionals and students in natural resources management and development professions.



# LITERATURE

## GENERAL

Atmospheric deposition to a rural tropical site: analysis of the relationship between amount of precipitation and chemical composition. DeCarvalho, C.N. ; Leprun, J.C. *Biogeochemistry*, 14(2):99-112, 1991.

The ecological crisis of Latin America. Latin American perspectives, 19(1):3-147, 1992. Special issue of five papers on Central America, Brazil, and Mexico.

Ecological resources for conservation and development in Wadi-Allaqi, Egypt. Pulford, I.D. ; and others. *Botanical journal of the Linnean Society*, 108(2):131-142, 1992.

Ecosystem, plant, and animal responses to hurricanes in the Caribbean. *Biotropica*, 23(4)Part A:313-521, 1991. Special issue containing case studies that document hurricane damage, particularly Hurricane Hugo (1989).

The enterprise for the Americas initiative: a second generation of debt-for-nature exchanges, with an overview of other recent exchange initiatives. Gibson, J.E. ; Schrenk, W.J. *George Washington journal of international law and economics*, 25(1):1-70, 1992.

Human climate of tropical cities: an overview. Jauregui, E. *International journal of biometeorology*, 35(3):151-160, 1991.

The international community's claim to rights in Brazilian Amazonia. McCleary, R.M. *Political studies*, 39(4):691-707, 1991.

Is there hope for conservation in Africa? Cartwright, J. *Journal of modern African studies*, 29(3):355-372, 1991.

Microbial agents for the biological control of plant parasitic nematodes in tropical agriculture. Davies, K.G. ; and others. *Tropical pest management*, 37(4):303-320, 1991.

National factor markets and the macroeconomic context for environmental destruction in the Brazilian Amazon. Kyle, S.C. ; Cunha, A.S. *Development and change*, 23(1):7-34, 1992.

Toward a sustainable and equitable future for Savannas. Solbrig, O.T. ; Young, M.D. *Environment*, 34(3):6-15, 32-35, 1992.

A water and sanitation strategy for the developing world. Okun, D.A. *Environment*, 33(8):16-20, 38-43, 1991.

## TREES, FORESTS

Aboveground biomass estimates for tropical moist forests of the Brazilian Amazon. Brown, S. ; Lugo, A.E. *Interciencia*, 17(1):8-18, 1992. Comment by P.M. Fearnside, 19-28.

Extraction of rattan-like lianas in the New World tropics: a possible prototype for sustainable forest management. Whitehead, B.W. ; Godoy, R. *Agroforestry systems*, 16(3):247-256, 1991.

Gender, trees, and fuel: social forestry in West Bengal, India. Nesmith, C. *Human organization*, 50(4):337-348, 1991.

Limits of extractivism: tropical forest strategies beyond extractive reserves. Browder, J.O. *Bioscience*, 42(3):174-182, 1992.

The management potential of neotropical secondary lowland rain forest. Finegan, B. *Forest ecology and management*, 47(1-4):295-322, 1992.

Modelling tropical deforestation and its consequences for global climate. Rotmans, J. ; Swart, R.J. *Ecological modelling*, 58(1-4):217-248, 1991.

Potential, composition and use of legume shrubs and trees as fodders for livestock in the tropics. Topps, J.H. *Journal of agricultural science*, 118(Part 1):1-8, 1992.

Queensland rainforest management: frontier attitudes and public policy. Frawley, K.J. *Journal of rural studies*, 7(3):219-240, 1991.

Recuperation of a degraded Amazonian landscape: forest recovery and agricultural restoration. Nepstad, D.C. ; and others. *Ambio, a journal of the human environment*, 20(6):248-255, 1991.

Social, economic, and ecological consequences of selective logging in an Amazon frontier: the case of Tailandia. Uhl, C. ; and others. *Forest ecology and management*, 46(3-4):243-274, 1991.

Tropical forest biomass estimation from truncated stand tables. Gillespie, A.J.R. ; and others. *Forest ecology and management*, 48(1-2):69-88, 1992.

Tropical rain forest: disturbance and recovery. *Philosophical transactions of the Royal Society of London, Series B—Biological sciences*, 335(1275):327-443+ 1992. Special issue containing proceedings of a meeting held in London, September 1991, organized and

edited by A.G. Marshall and M.D. Swaine. Presents first results of the Royal Society's Southeast Asia rain forest research program, begun in 1985. The focus of research is gaps in the closed-canopy forest—natural or artificial—and the effects on plants and animals.

#### ANIMALS, WILDLIFE

Assigning conservation value: a case study from India. Daniels, R.J.R. ; and others. *Conservation biology*, 5(4):464-475, 1991.

Can parrots be conserved through sustainable harvesting? Beissinger, S.R. ; Bucher, E.H. *Bioscience*, 42(3):164-173, 1992.

Impact of pasture development on winter bird communities in Belize, Central America. Saab, V.A. ; Petit, D.R. *Condor*, 94(1):66-71, 1992.

Influence of selective logging on bird species diversity in a Guianan rain forest. Thiollay, J.M. *Conservation biology*, 6(1):47-63, 1992.

Optimal translocation strategies for saving the black rhino. Hearne, J.W. ; Swart, J. *Ecological modelling*, 59(3-4):279-292, 1991.

The potential for conservation of Polynesian birds through habitat mapping and species translocation. Franklin, J. ; Steadman, D.W. *Conservation biology*, 5(4):506-521, 1991.

Responses of Amazonian rain forest birds to habitat modification. Johns, A.D. *Journal of tropical ecology*, 7(Part 4):417-438, 1991.

#### SOCIAL

Development and degradation, redevelopment and preservation of Jamaican wetlands. Bjork, S. ; Digerfeldt, G. *Ambio, a journal of the human environment*, 20(7):276-284, 1991.

Indigenous control of tropical rain-forest reserves: an alternative strategy for conservation. Cox, P.A. ; Elmquist, T. *Ambio, a journal of the human environment*, 20(7):317-321, 1991.

Local self-governments and geometry of biodiversity conservation: roots of the incompatibility. Damodaran, A. *Economic and political weekly*, 27(8):419-424, 1992.

Modernization versus sustainability: disintegrating village agro-ecocomplexes in the dry zone of Sri Lanka.

Ulluwishewa, R. *Environmental conservation*, 18(2):103-110, 1991.

Participatory management in large irrigation systems: issues for consideration. Raby, N. *World development*, 19(12):1767-1776, 1991.

People, trees and projects: a review of CARE's activities in West Africa. Sumberg, J. ; Burke, M. *Agroforestry systems*, 15(1):65-1991.

Population and the environment: a parable of firewood and other tales. Nerlove, M. *American journal of agricultural economics*, 73(5):1334-1347, 1991.

Rapid assessment methods for the control of tropical diseases. *Health policy and planning*, 7(1):1-92+, 1992. Special issue.

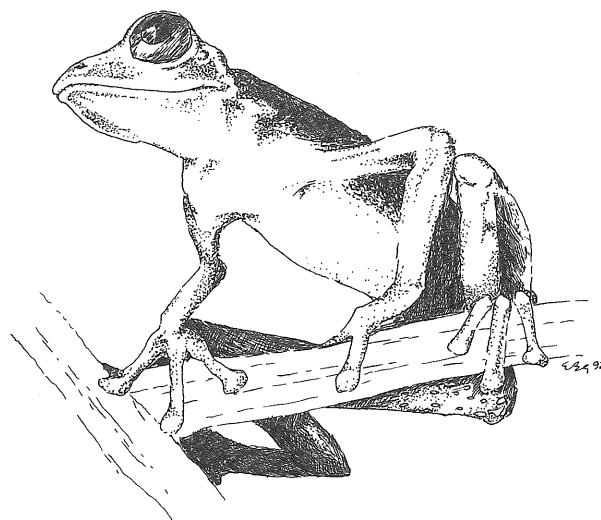
Renewable energy in Third-World development assistance: learning from experience. Foley, G. *Energy policy*, 20(4):355-364, 1992.

Solutions to the tragedy of the commons: sea urchin management in St. Lucia, West Indies. Smith, A.H. ; Berkes, F. *Environmental conservation*, 18(2):131-136, 1991.

The southern Mount Kenya Forest since independence: a social analysis of resource competition. Castro, A.P. *World development*, 19(12):1695-1704, 1991.

Training rural residents as naturalist guides: evaluation of a pilot project in Costa Rica. Paaby, P. ; and others. *Conservation biology*, 5(4):542-546, 1991.

Water management and technological change: village dams in Sri Lanka. Mahendrarajah, S. ; Warr, P.G. *Journal of agricultural economics*, 42(3):309-324, 1991.



# TRI NOTES

## HIMALAYAN CONFERENCE

Students from the Yale F&ES chapter of the International Society of Tropical Foresters (ISTF) organized and hosted a two day conference: Conservation for Development: Bottom-up Strategies from the Roof of the World on the 17th and 18th of October.

The conference addressed developmental and ecological problems in complex mountain environments. Focussing on the Himalayan region, over a hundred participants grappled with a wide set of interlocking issues in a series of presentations and workshops. Topics included forest tenure rights, encouraging local traditions of forest management and protection, the role of women in conservation, biases in research and conservation agendas, integrating the often conflicting policy agendas of NGOs and governments, and crafting a global agenda for mountain research and development at UNCED.

Drawing on a wealth of students from Tibet, Nepal, Bhutan and India, and others with interest and experience in the Himalaya, the organizing committee brought together a highly qualified group of speakers to address the conference and lead the workshops. The speakers

included **Ajit Banerjee**, the forestry specialist for the World Bank's Asia division; **Barbara Brower**, from the Geography Department of the University of Texas, Austin; **Gabriel Campbell**, the director of Asian Environmental programs for the Woodlands Mountain Institute; **Chandra Gurung**, the director of the Annapurna Conservation Area Project, Nepal; **Jack Ives** from the Geography Department of the University of California at Davis; **K.K. Pandey**, the founder of the Jara Juri Trust, Nepal; **Shanta Pandey** of the George Warren Brown School of Social Work at Washington University, St. Louis; **Ugyen Tshering**, the permanent representative of Bhutan at the United Nations, New York; **Richard Tucker** a forest historian at the University of Michigan, Ann Arbor; and **David Wright**, the principle technical advisor to the Global Environmental Facility, UNDP.

The event was sponsored by the Tropical Resources Institute along with ISTF, the Yale International Relations Program, the United States Department of Education, the Kempf Memorial Fund and the United States Department of Agriculture - Tropical Forestry Program.

## COOPERATOR NOTES

### ROSEWOOD (*DALBERGIA SPP.*) CONFERENCE

**Rosewood (*Dalbergia spp.*) - Multipurpose and High Value Timber Nitrogen Fixing Tree** is the title of an international workshop to be held in Hetauda Nepal from May 31 to June 4, 1993.

Sessions will cover: Taxonomy, Biology and Ecology, Establishment and Management, Utilization and Socio-economic Aspects, and Case Studies of the genus. Appropriate information on any *Dalbergia* species is welcomed. Presenters should submit a letter of interest, an English abstract of the work they wish to present and copies of publications of their work with the genus to:

James Roshetko,  
Nitrogen Fixing Tree Association  
1010 Holomua Road  
Paia, Hawaii 96779 USA.

Phone: 808 579-9568  
FAX: 808 579-8516  
Telex: 510100 4385.

The deadline for initial contact is January 31, 1993. Abstracts must be received by February 28, 1993.

### NATURAL RESOURCES PROGRAM AT UNIVERSITY FOR PEACE

The following courses will be offered by the University for Peace, Costa Rica. They are taught in Spanish and are designed for persons involved in development, university and technical school professors, conservationists, and resource planners.

**Enhancing the Value of Tropical Forests through Non-Timber Products and Services.** March 1-17, 1993.

**Buffer Zone Management for Protected Areas.** April 19 - May 7, 1993.

**Trees and Sustainability: Biological, Economic and Social Benefits.** May 31 - June 19, 1993.

**Conflict Resolution in Natural Resources Management.** September 20 - October 8, 1993.

For more information, please contact:  
Mr. Felipe Matos  
University for Peace  
Apdo. 138  
6100 Ciudad Colon, Costa Rica

**For more information about the Tropical Resources Institute contact:**

Florencia Montagnini  
The Tropical Resources Institute  
Yale School of Forestry and Environmental Studies  
(203)432-5116

#### **TRI STAFF**

*Director*  
Florencia Montagnini

*Assistant to the Director*  
Brad Auer

#### **TROPICAL STUDIES COMMITTEE**

Mark Ashton, Michael Balick, Steven Beissinger,  
William R. Bentley, Graeme Berlyn, Robert Mendelsohn,  
Florencia Montagnini, Alison Richard, Thomas Siccama

#### **TRI NEWS**

*Managing Editor*  
Timothy Wohlgenant

*Assistant Editors*  
Jonathan Garen  
Andreas Eicher

*Literature Editor*  
Joseph Miller

#### **Acknowledgements**

Logo design by Sujata Guha  
Logo modified by John Musinsky

Illustrations by Erin Girdler

---

The Tropical Resources Institute  
Yale School of Forestry and Environmental  
Studies  
205 Prospect Street  
New Haven, CT 06511 USA