TROPICAL RESOURCES

The Bulletin of the Yale Tropical Resources Institute

2004 Volume 23

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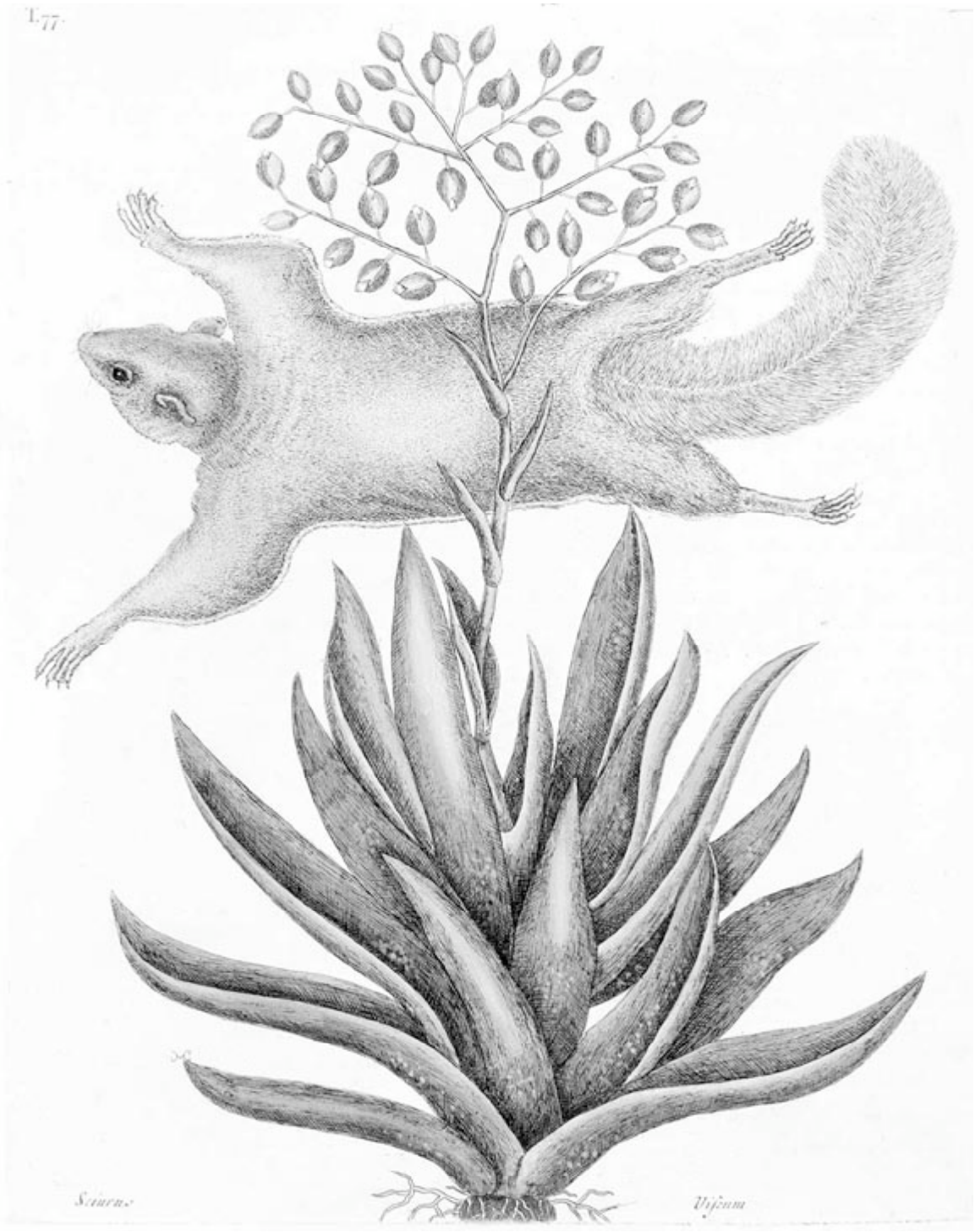
Articles



"Flying squirrel"
In The Natural History of Carolina, Florida, and the Bahama Islands. *By Mark Catesby. London, 1731-43. Beinecke Rare Book and Manuscript Library, Yale University.*

Dear Readers,

Welcome to the 2003-04 Tropical Research Institute (TRI) Bulletin, which showcases TRI-funded research projects conducted by students at the Yale School of Forestry & Environmental Studies(F&ES). The papers published within cannot be adequately summed up in any one theme; rather, their diversity and individual style reflects the range of disciplines and interests that research on tropical environmental issues encompasses nowadays. Hence Nikhil Anand's paper on the politics and discourse of India's biodiversity policy process is included alongside Ken Shono's analysis of mahogany regeneration rates in Belize and Robin Barr's survey on Kenyan household agroforestry strategies. As editors, we have attempted to ensure that papers reflect the geographic as well as thematic scope of tropical research, with work conducted in Asia, Latin America, and Africa.

Perhaps it is precisely the diversity of this year's Bulletin that provides our central theme. There is a growing awareness in contemporary environmental studies of the complexity of achieving conservation goals. Such complexity necessitates that problems be approached from multiple disciplinary angles – forestry, anthropology, political science, economics, and beyond. Corinna Steward's work on soy landscapes in Brazil, or Sarah Davidson's study of NAFTA's impacts on a Mexican community forestry operation, demonstrate the profoundly interdisciplinary way in which we have come to understand environmental issues. Complexity also demands that research be carefully situated within the unique environment in which it is embedded. Alexandra Ponette's article, integrating historical, economic, and natural processes in a discussion of tropical montane cloud forest conservation in Mexico, provides an example of this contextualization.

A consideration of research process is also evident, suggesting the gradual paradigmatic shift in the academic community towards a more reflexive interpretation of the researcher's role. Rather than scientific "detachment" or "objectivity," contributors have attempted to clearly delineate their standing in the context of the field site, articulating a nuanced and individual perspective. Raji Dhital's eloquent piece on Nepali farmers finely illustrates this approach. Several authors explicitly wrestle with the ethical, methodological, and epistemological implications of research, asking important questions about the contested process of knowledge production. Betony Jones meditates on understanding the complexity of ethnobotanical knowledge, while in Kevin Wood's article on violent development, even the act of writing involves personal decisions with respect to disclosure and content.

Also included in this year's Bulletin is Leigh Baker's piece on the 2003 World Parks Congress, and a distillation by Andrea Johnson of a student workshop held at the 2004 World Social Forum. At each event a delegation of Yale F&ES students attended both as observers and as active participants. Their reports provide a global and contemporary context in which to situate the ideas explored within the individual student research projects presented here.

On a personal note, we would like to thank Dr. Amity Doolittle, who has been an extremely patient and responsive overseer of our somewhat haphazard working schedule, and Judy Karbowski-Hall without whose layout skills this Bulletin would never have materialized. Finally, we are cognizant of the dedication and commitment that our contributors exhibited in preparing their pieces for publication and feel that their efforts have been rewarded in the quality of this year's Bulletin. We were not always the gentlest of editors, but we hope that the process of writing for TRI was instructive and beneficial. We certainly enjoyed the opportunity to learn from and collaborate with all involved.

Victoria Critchley and Andrea Johnson

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Dear TRI Community,

It is my sincere pleasure to dedicate this 20th anniversary TRI volume to Dr. Bill Burch and Dr. Herb Bormann (2003 winner of the Blue Planet Prize). We held a warm and lovely tribute to our past in April with Drs. Ramachandra Guha, Katherine Snyder, Daniel Nepstad, and John Parotta returning to campus to toast (and roast) our colleagues and their illustrious careers and contributions.

The legacy that Bill and Herb have helped, with much support, to create leaves me with a deep sense of gratitude. This wonderful institute is a credit to the many people who have been instrumental in its formation and development. The commitment and passion for interdisciplinary tropical studies at the Yale School of Forestry and Environmental Studies (F&ES) is evidenced by the over 350 F&ES students who have conducted research in 60 countries in the past twenty years.

In its anniversary year TRI has had yet another productive and diverse year. To give just a few examples, we have expanded our collaborations with international non-government and academic institutions, received additional funding from a diversity of sources, as well as expanded our international environmental justice program. Important areas of excellence and research that have been made available by the generous support of our funding partners include a Video Center (donated by the Class of 1980), Compton Foundation research grants, and World Agroforestry Center (ICRAF) support for student research in Africa. In addition an anonymous donor has donated the resources to establish a highly successful film and speaker series.

In this regard, special thanks must go to Program Director Dr. Amity Doolittle, whose leadership in program development, student professional training, and fund-raising has been exceptional. TRI also owes a particular debt of thanks to F&ES Graduate Diane Russell. She has been an active promoter and sponsor of TRI not only within ICRAF, but also in assisting us to forge new partnerships with Dr. Chimère Diaw from CIFOR, and Dr. Peter Brosius from the University of Georgia Department of Ecological and Environmental Anthropology. We are particularly excited about ICRAF supporting our publication of six working papers under the ALAM partnership. These will be based on previous research by F&ES and University of Georgia students in collaboration with ICRAF.

Another major development this year is that TRI will be joining the International Union of the Conservation of Nature (IUCN) as a voting member. To launch this exciting new role, Achim Stiener, General Director of the IUCN, addressed F&ES with his keynote on "Conservation and Environmental Governance." During his visit an MOU was signed with Dean Gustave Speth. A delegation of faculty and students from TRI has been organized to attend the World Conservation Congress in Bangkok in November 2004. We greatly appreciate the efforts of Aban Kabraji, fomer McClusky Fellow at F&ES and Regional Director of IUCN Asia, for promoting and making this connection possible.

Expanding our tropical offerings this spring were Drs. David McGrath and Daniel Nepstad from the Woods Hole Research Center (WHRC) & Instituto de Pesquisa Ambiental da Amazônia, Brazil (IPAM), who with Dr. Stephan Schwartzman (Environmental Defense, Washington, D.C.) were regulars on campus, teaching a seminar on Conservation and Development of the Amazon. In addition, a consortium of scientists from the New York Botanical Garden offered Tropical Plant Systematics with a field component to Costa Rica over spring break. We

appreciate the efforts of our WHRC, IPAM, and NYBG colleagues and partners to be active on campus and provide practical training opportunities for our students.

Students were equally active this semester. A highlight was the dynamic conference "People in Parks: Beyond the Debate: Achieving Conservation in Human-Inhabited Protected Areas" by the International Society for Tropical Forestry (ISTF) at F&ES. With over 25 speakers and 150 attendees (from academic institutions, NGOs, and governmental agencies) this interdisciplinary event stimulated tremendous discussion and debate. The student organizers are to be commended for their professional skills in organizing this highly successful event.

The TRI bulletin has been greatly improved, not only by the excellent range and quality of student submissions, but by the hours of careful editing and formatting by our editors, Victoria Critchley and Andrea Johnson, and by the care and attention to layout and design provided by Judy Karbowski-Hall. David Kneas has been tireless in his efforts to establish a professional and state-of the art video editing center at TRI, thanks to the gift from the Class of 1980. This facility will be of tremendous use for TRI students, and others in the FES community, who wish to incorporate video and documentary research into their projects.

In closing, I trust you will enjoy this 20th anniversary TRI bulletin. We would enjoy hearing from you and appreciate any suggestions, potential collaborations, or additional opportunities for students as we continue to expand our programmatic reach.

May the forest be with you,

Lisa M. Curran
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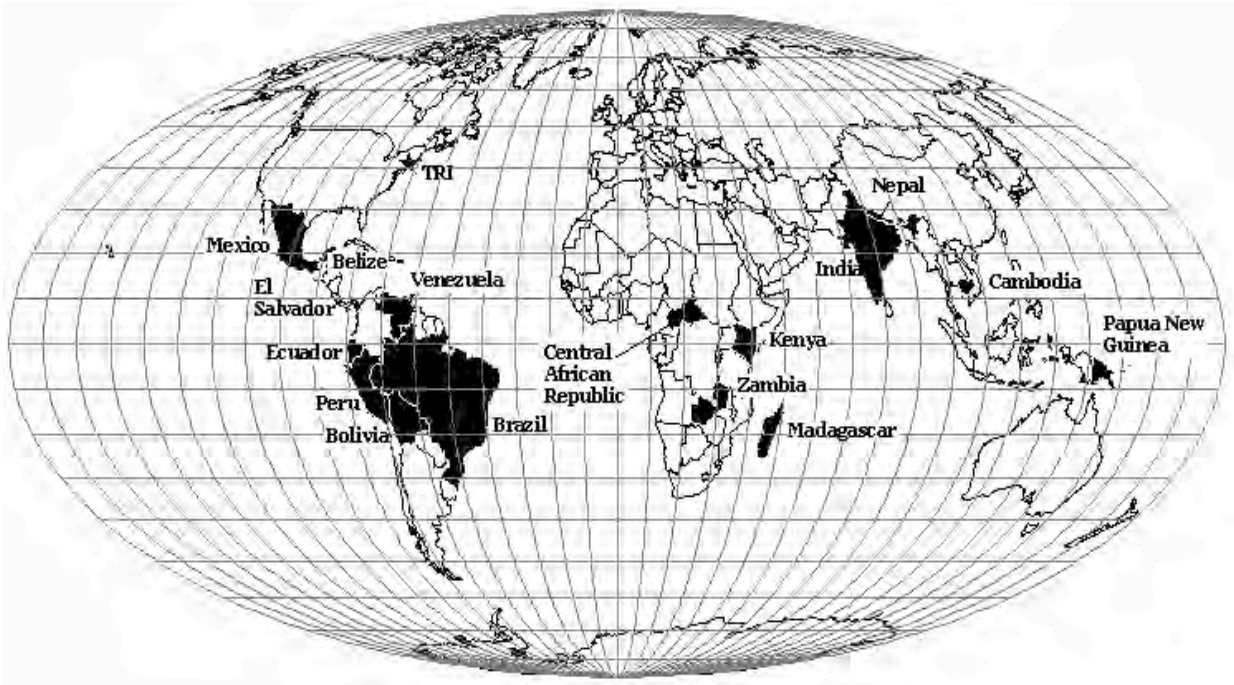
TRI 2003 Fellows



Belize: Ken Shono
Bolivia: Maria Teresa Vargas
Brazil: Christian Palmer • Corrina Stewart • Daniela Vizcaino
Cambodia: Jonathan Padwe
Central African Republic: Vincent Medijibe
India: Nikhil Anand • Fulton Rockwell
Kenya: Robin Barr
Madagascar: Misalalation Andriamihaja • Yusuke Taishi • Jennifer Vogel
Mexico: Cecilia Blasco • Sarah Davidson • Alexandra Ponette
Mexico/USA: Helen Mills
Nepal: Raji Dhital
New Guinea: Libby Jones
Peru: Jonathan Cook • Heather Wright • Hillary Young
Venezuela: Jennifer Balch
Zambia: Susan Matambo

Yale Tropical Resources Institute: Envisioning Synthesis and Synergy

Mission

The Mission of the Tropical Resources Institute is the application of interdisciplinary, problem-oriented, applied research to the creation of practical solutions to the most complex challenges confronting the management of tropical resources worldwide. Lasting solutions will be achieved though the integration of social and economic needs with ecological realities, the strengthening of local institutions in collaborative relationships with international networks, the transfer of knowledge and skills between local, national, and international actors, and the training and education of a cadre of future environmental leaders.

Vision

The problems surrounding the management of tropical resources are rapidly increasing in complexity, while demands on those resources are expanding exponentially. Emerging structures of global environmental governance and local conflicts over land use and environmental conservation require new strategies and leaders able to function across diversity of disciplines and sectors, and at local and global scales. The Tropical Resources Institute aims to build linkages across natural and social sciences and among government agencies, academia and practitioners, enabling the formation of successful partnerships and collaborations among researchers, activists and governments. The Tropical Resources Institute seeks to train students to be leaders in this new era, leveraging resources, knowledge, and expertise among governments, scientists, NGOs, and communities to provide the information and tools this new generation will require to equitably address the challenges ahead.

"Cardinal"
In The Natural History of Carolina, Florida, and the Bahama Islands. *By Mark Catesby, London, 1731-43. Beinecke Rare Book and Manuscript Library, Yale University.*

World Parks and Protected Areas:
The Impact of Young Conservationists at the Fifth IUCN World Parks Congress

Leigh A. Baker, MEM 2004

The atmosphere at the opening ceremony of the Fifth World Parks Congress in Durban, a port city on the southeastern tip of Africa, was as lively and charged as a South African drumbeat. Once every ten years, world leaders in the conservation field gather to debate the future of the earth's protected areas and chart the course of protected areas management into the next decade. Nelson Mandela, Congress Patron and former president of South Africa, opened this decade's conference saying, "You may very well be a little curious to hear what an old man without a job, office, power or influence, and with his roots far in the past, is going to say about challenges in the future! The future is after all, in the hands of the youth." Mandela further inspired the senior conservationists in attendance, whom he jokingly referred to as the "gray heads," by stating, "the under-representation of youth is a matter for concern…and without the involvement of youth, the future cannot be secured. I am therefore particularly gratified and impressed to note the importance that this Congress has attached to engaging youth."

Mandela's words had particular resonance for the twelve Yale School of Forestry and Environmental Studies graduate students who stood amidst 3,000 of the world's foremost conservation leaders. We were present to explore the very question raised by Mandela: How can young conservationists influence the future of protected areas worldwide? If we are to meet our goals for twenty-first century conservation, a real need exists to increase opportunities and create better frameworks and resources in this regard. Congress organizers had explicitly acknowledged this need by inviting the attendance of young people active in the conservation field.

Our student group had been invited to attend the World Parks Congress in order to diversify the constituencies represented and to promote the Congress theme, "Benefits Beyond Boundaries." The Congress' main objective was to transcend both the physical and conceptual borders of national parks and clearly show the relevance of protected areas to economic and social as well as environmental agendas. Our group sought to break down the boundaries placed between generations in the field of protected areas conservation by providing an interactive space for young professional voices to be heard. The Yale School of Forestry and Environmental Studies (F&ES) increasingly strives to be a global school, a place where our communal intellect, passions, and skills are channeled to influence environmental decisions from corporate boardrooms to remote communities. The World Parks Congress provided an ideal forum to share and exchange our views with other young conservationists from around the globe. Our goal was to ensure that the thoughts and concerns of young professionals were considered in the drafting of the Durban Accord, the vision statement and principle output of the World Parks Congress.

Preparations to attend the Congress began with a special course taught at F&ES that explored the perceptions of young conservation professionals on the future of protected areas. Over 130 people from 52 countries responded to a survey designed and implemented as part of this course. For purposes of the study, young conservationists were defined as those between the ages of 20 and 35 working in the state, private, or non-governmental sectors. The survey, consisting of six open-ended questions, was

written in French, Spanish, and English and distributed via email based on a participant list provided by the Congress organizers.

Six central themes emerged in its analysis:

(1) The majority of survey respondents believed the overall justification for protected areas to be the conservation of biological diversity.
(2) Respondents found the greatest challenges for protected areas in the future to be in the social realm.
(3) Young conservationists believed that community-based conservation and education are the two greatest tools for addressing these social challenges.
(4) Overwhelmingly, young professionals seek increased learning and networking opportunities to gain professional skills in their field.
(5) Education is believed to be our best tool for engaging youth in the conservation of protected areas.
(6) There is a wide range of opinions among young conservationists with respect to the best way for protected area management and conservation to progress in the future.

The overall results of this survey made it clear that not all young professionals share the same beliefs about protected areas management. However, we do share a uniform respect for the work of the people that came before us, as well as a desire to forge connections between all levels of our profession.

The ultimate product of this survey and course was a document entitled "Young Conservationists and the Future of Protected Areas Worldwide: A Call to Discussion at the Fifth World Parks Congress, Durban, South Africa, September 2003." This document served as a tool to guide workshop discussions organized and led by our Yale delegation on the second evening of the World Parks Congress.

Over 100 Congress delegates attended the workshop and openly shared their views, hopes, and challenges as students and young professionals in impacting protected areas management regimes. Of those who attended the workshop, many were doctoral students studying protected areas issues, faculty members just starting their teaching careers, and young professionals working with local, regional, and international government agencies, NGOs, or as private consultants.

One main theme that emerged was the need for benchmarking, evaluation, and adaptive management of protected areas. Challenges mentioned by participants included the need for professional development and for mechanisms to utilize and share scientific data. Moreover, the need for increased communication between generations as well as across disciplines was voiced as a pressing issue.

Recommendations from the workshop were summarized and presented to our Youth Representative, Susan Matambo (MEM 2004), who negotiated in sometimes heated discussions to have these points incorporated into the final drafting of the Durban Accord. Susan described her experiences on the Durban Accord Drafting Team as highly rewarding: "It was a valuable experience to debate with other constituency groups to get our youth and young professional views heard…It is really easy in negotiating to just give up and say 'Just write whatever!' But to really impact the language of a document such as this and get everyone to agree was incredibly challenging. I learned so much!"

The Durban Accord, subtitled "Our Global Commitment for People and Earth's Protected Areas," is legally non-binding and represents the collective ideologies and intentions of the Congress participants. It was created as a flexible working document to direct positive action for protected areas throughout the world. As a result of the Young Conservationists' participation at the Congress, the Durban Accord acknowledges our needs and concerns as future leaders in this field. The Durban Accord recognizes younger generations as stakeholders in the stewardship of protected areas, and voices a concern that the capacity of younger generations is insufficient to actively contribute to

the new protected areas agenda. The Accord therefore urges commitment to engage and enlist this constituency, deeming the input of younger generations in decision-making, strategic planning, and programming essential in securing the sustainable future of protected areas. Mechanisms mentioned in the Accord for increasing the capacity of young conservationists include increasing financial resources for building professional capacity, identifying local opinion leaders as targets for information outreach, and establishing a Task Force on Intergenerational Integration within the IUCN.

Since the Congress, a Younger Generations Network has been initiated by Yale F&ES and will serve as an internet-based forum to share new ideas and influence policies at global, national, and regional levels. The momentum to incorporate young professionals in global decision-making continues as Susan Matambo represented Yale F&ES at the Seventh Conference of the Parties on the Convention on Biological Diversity in February 2004 in Malaysia. Additionally, a collaborative effort between F&ES and the World Conservation Union may bring more young professionals to the negotiating table at the World Conservation Congress to be held this November in Thailand. It is an exciting time to be entering the field of international conservation, and the opportunities to actively participate in global decisions are at our doorstep.

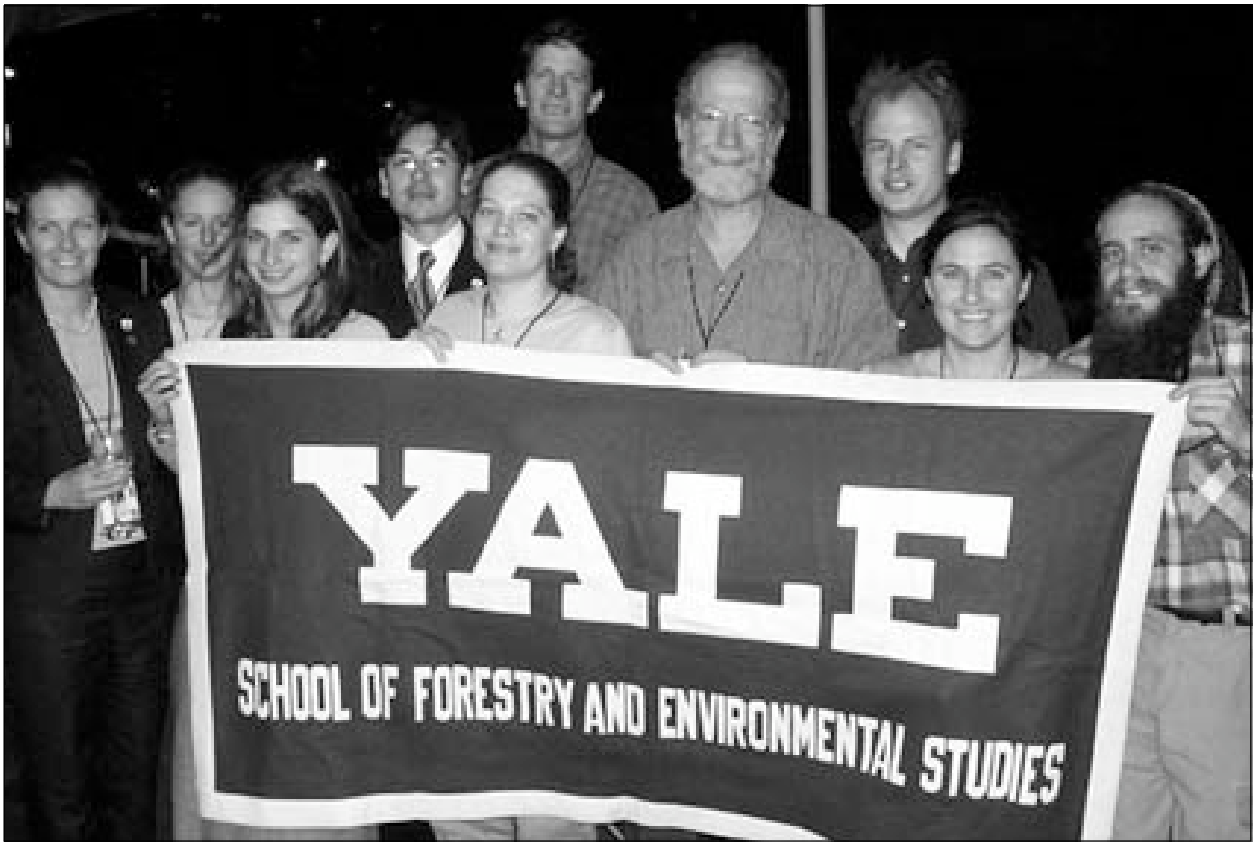


Figure 1: *Yale students, faculty and alumni at the World Parks Congress in Durban, South Africa. Photo courtesy of Charles Brunton (F&ES '03).*

The Soybean Frontier: Polarized Agriculture and Contested Landscapes in the Brazilian Amazon

Corrina Steward, MESc 2004

Introduction

The Amazon is the new frontier in Brazil's economic development plans to increase soybean production for export. In the Amazonian municipality Santarém, in the state of Pará, soybean mono-crops are transforming both forests and the agricultural landscape. Among the dramatic changes are the large extent of smallholder farmers (*colonos*) selling their land to soybean farmers; the increasing number of *colono* communities with schools, community centers, churches, and water supplies being abandoned; and the rising rates of deforestation of secondary and primary forest for grain cultivation (soy, rice, and corn). The Brazilian government advocates soy production as an axis of economic development to generate revenue for debt reduction and to efficiently utilize Brazil's land area.

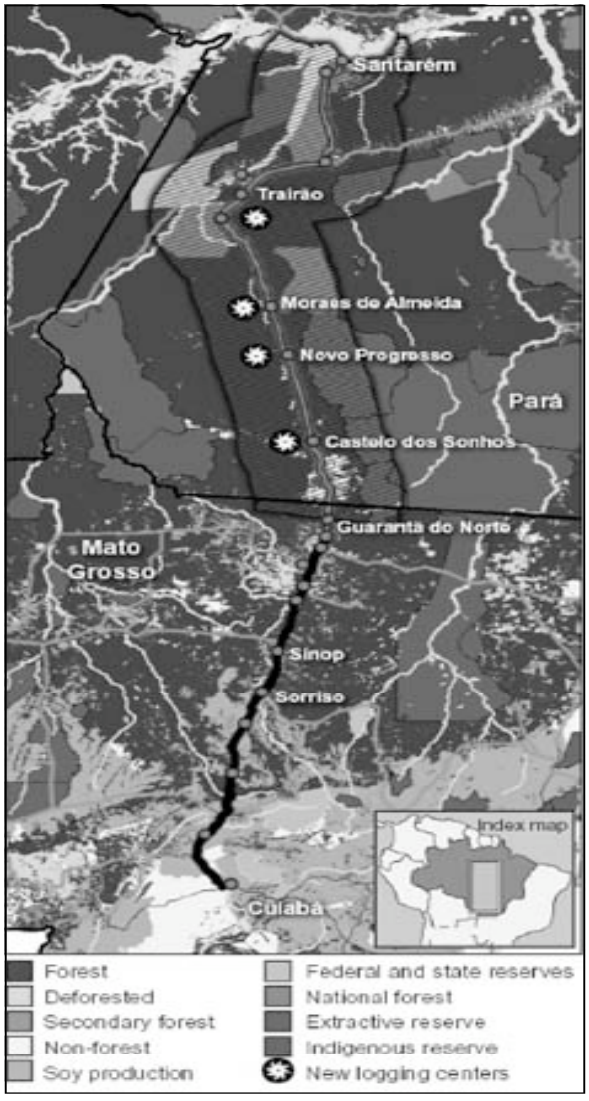
Amazonian frontier development literature identifies environmental impacts such as deforestation resulting from Amazonian development schemes (e.g., Laurance et al. 2001; Nepstad et al. 2001), but it does not examine how development programs construct the socio-economic and ecological value of the landscape to legitimize their projects, while de-legitimizing alternative land uses. My research conducted from June-August 2003 investigates the agro-industrial model's environmental and socio-economic reading of the landscape with respect to forests, environmental degradation, and the viability of *colono* and mechanized agriculture activities in the Santarém landscape. This article will outline my research findings regarding (1) these discursive constructions with respect to soybean development, (2) the way in which state-sponsored maps legitimize soybean farming in Santarém, and (3) the environmental and socio-economic consequences of the agro-industrial development model for Santarém's forests and communities.

Background

The Santarém region experienced several economic boom and bust cycles around commodities such as rubber, gold, and jute. Today, the majority of the region's population relies on fishing, logging, and agricultural activities for income.

National land-reform programs in the 1970s established agricultural settlements for *colonos* that migrated from southern and northeastern Brazil. *Colonos* live in Santarém's rural areas where they practice slash-and-burn agriculture for commercial[1] and subsistence crops and manage secondary forests for fruit and extractive products.[2] For *colonos*, a landscape in different stages of succession ensures the fertility of future agricultural lands and maintains a diverse and lucrative agro-system (e.g., Unruh 1988; Padoch et al. 1985). *Colonos'* land-use therefore affects forest dynamics of deforestation and re-growth (Walker 2003). Shifting cultivation by colonist families, however, "is not likely to clear much land given household constraints" (Ibid). Walker's forest dynamics model predicts between 20 and 90 hectares of net deforestation per family. These anthropogenically maintained secondary forests, in addition to their socio-economic importance, provide ecological functions such as carbon sequestration, forest fire prevention, and corridors and habitats for many species (Brown and Lugo 1990).

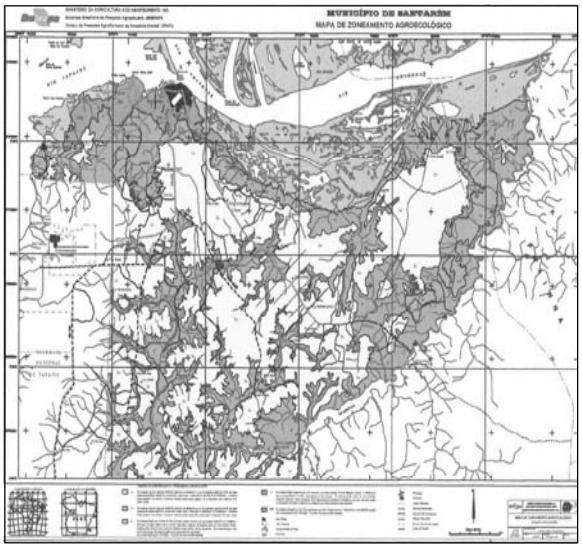
Development projects like highway paving, or in Santarém's case, the onset of soybean farming, displace colonists and spur increased forest clearing as they move into new areas (Walker 2003). The Amazon's increasing urbanization is also attributed to development schemes (Browder and Godfrey 1997). Santarém became closely linked with national development interests in 1995 with the unveiling of an enormous infrastructural development program[3] that includes paving the Cuiabá-Santarém Highway, BR-163 (see map 1). BR-163 links the burgeoning soybean producing state Mato Grosso with the Amazon River in Santarém.



Map 1: *The BR-163 connects Santarém with Cuiabá, the capital of Mato Grosso, one of Brazil's most productive soy states (source for map: Nepstad et al. 2002).*

Anticipating BR-163's completion, the multinational agricultural corporation Cargill built a port on the Amazon River in Santarém in 2000. But well before Cargill's arrival, Santarém laid the groundwork for agro-industrial development. In 1996 the governor of Pará hired the consulting agency Agrária Engenharia e Consultoria, S.A. to do a study on Santarém and neighboring municipalities' potential for commercial agriculture.[4] Based on Agrária's recommendations, the local municipalities implemented a soy pilot project[5] and formed a co-op to solicit money from the state to develop soybeans.

Armed with the results of the soy pilot project and state-produced maps[6] highlighting the feasibility of mechanized agriculture for the Santarém region (see map 2), local government officials and Santarém businessmen traveled to the state of Mato Grosso to convince soy producers to invest in the region. Beginning in 1997, a group of agribusiness entrepreneurs that now constitute the foundation of



Map 2: *Map showing the agro-ecological zones produced by the federal agricultural agency, EMBRAPA, and the Mineral Integration Program in Amazon Municipalities, PRIMAZ.*

Santarém's mechanized agriculture sector, including grain buyers, agricultural technicians, agricultural input suppliers, and land dealers, established agricultural land holdings in the region.

By 2003 there were approximately 200 mechanized grain farms in the Santarém region. As soybean expansion grew, local farmers' unions and non-governmental organizations (NGOs) raised concerns that mechanized farming threatens *colonos'* livelihoods. Reports of high numbers of smallholders selling their land to soybean farmers, sometimes through coercion, and moving to primary forest regions or to urban centers, established a strong divide between the mechanized sector and *colonos* and their advocates. In July 2003, a campaign, launched by the Rural Workers Union (O Sindicato dos Trabalhadores Rurais, STR) and sponsored by several NGOs and unions,[7] called on *colonos* to refuse to sell their land to soybean farmers.

Site Description, Research Objectives and Methods

Santarém municipality sits at the confluence of the Amazon and Tapajós Rivers in Western Pará (see map 3). The urban population is approximately 200,000, and the rural population is 45,000 (IBGE 1996). My research was multi-sited including areas of secondary forest generated by *colonos* and cattle ranchers, dense *terra firme* forest,[8] the city of Santarém, and the Cargill office.

To investigate how the agro-industrial development model represents the landscape and the socio-economic and environmental implications of this particular representation, I explored the following questions: (1) who the key agricultural actors are; (2) how the expansion of soy cultivation alters land-use practices and *colonos'* socio-economic well-being; and (3) what the agricultural actors' perceptions are of the socio-economic and ecological viability of agricultural practices and development models. I conducted semi-structured interviews to "study up and down" the region's agricultural actors (Pierce 1995). Interviews were with the following persons, institutions, and businesses: soy producers, *colonos*, community leaders, Cargill and local agri-businesses, farmers' unions, the national environmental protection agency (IBAMA), agricultural agency (EMBRAPA), and land settlement and titling agency (INCRA), Banco da Amazonia (BASA), and various NGOs.[9]

Map 3: *Santarém municipality sits at the confluence of the Amazon and Tapajós Rivers in Western Pará.*

Results

Subjects and goals of development

My research identified three key agricultural actors that constitute the foundation of Santarém's agro-industrial development: agribusiness, soybean farmers, and local and national government (see fig. 1).[10] The current expansion of mechanized agriculture depends on the relations between these actors. There are six agribusinesses focused on the sale, production, and purchase of grain in the region—Cargill, Mato Grosso Cereais Ltda., Tapajós Arroz Ltda., Rech Machinery, Stefanelo Seeds, and Quinco Ltda.[11] The majority of Santarém's soybean

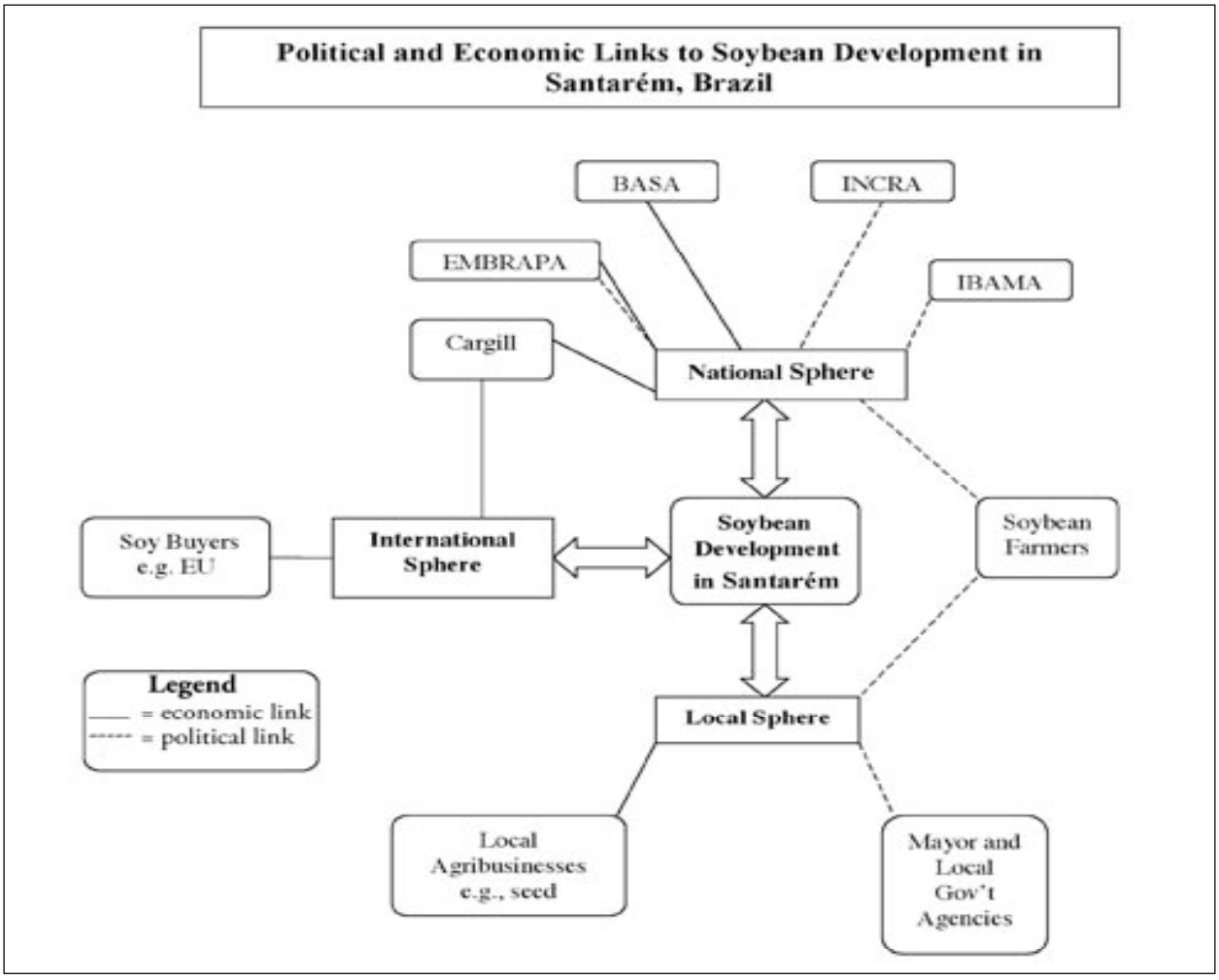


Figure 1: *Each sphere supports soybean development in Santarém. For instance, the international demand to increase soybean production prompted Cargill's port on the Åmazon and local government's development plans for mechanized agriculture.*

farmers have migrated to the region from Mato Grosso, Rio Grande do Sul, and Paraná with the hope of establishing larger landholdings and farm production than in their former localities.[12] Government actors include both national agencies such as EMBRAPA and the local municipal government like the mayor's office.

Each mechanized agricultural actor has a specific role in establishing agro-industrial development that is distinct from, yet dependent on, the others. Agribusiness provides a commercial 'buying and selling' component.[13] Grain farmers' role is to connect the national soybean agenda with the local development agenda both literally and symbolically. Soy farmers view themselves as fulfilling national economic goals when they purchase land, clear and prepare it, and cultivate grain to sell for export – as one articulated to me, the soybean farmers are national heroes. The federal government's role, via the national agricultural agency EMBRAPA, is to supply agricultural research, products, and information to soybean producers and agribusinesses. Local government's function is to ease the expansion of mechanized agriculture by providing local political support.[14] Representatives of Cargill's Santarém branch

explained that the local government upholds mechanized agriculture as the ideal economic activity for the region. The agricultural actors interact at local, national, and international scales to support the local production of mechanized farming.

The soybean actors believe that mechanized agriculture is the only way to establish the baseline for regional economic growth, and it is the primary tool for improving local residents' economic well-being. They assert that without mechanized agriculture, the Santarém region would be economically linear or unstable, continuing to follow boom and bust enterprises. In contrast to this opinion, regional *colonos*, STR, the agricultural workers' union (FETAGRI), and several NGOs point to the region's agro-diversity and native agricultural goods made from this diversity as the region's economic (as well as social and cultural) strength. STR is designing an agro-extractive reserve that would be modeled from rubber extractive reserves and would protect *colono* land rights, encourage a diverse agro-system, and market *colono* agricultural products.

Socio-economic and environmental reading of the landscape

My interviews revealed several dominant themes in the mechanized agricultural actors' environmental and socio-economic interpretations of the Santarém landscape, with respect to forests, environmental degradation, social groups, and mechanized and non-mechanized agricultural activities. Soy actors' discourse, land-use practices, and the state-sponsored maps that delineate Santarém's agro-ecological zones, soil types, and forest cover all reflect these interpretations.

The majority of the mechanized agriculture actors interviewed explained that 550,000 hectares are available in the Santarém municipality for grain production. This number was calculated from data collected for the agro-ecological zoning map, which defines zones appropriate for mechanized agriculture as lands heavily degraded by anthropogenic uses, either from smallholder slash-and-burn agriculture or cattle ranching. The agro-ecological zones categorize all areas of secondary forest, regardless of succession stage, as most suitable for mechanized agriculture.[15] The region's agribusinesses and grain farmers rely on the maps to determine where to establish grain production. When new soybean farmers arrive at Cargill to procure regional information, Cargill's soybean buyers point to the soil and agro-ecological zoning maps to indicate suitable areas for cultivation. Cargill highlights secondary forest and cattle ranching lands as ideal for soy cultivation and, otherwise, without value to the region's development objectives.

When informed of my research objective to understand economic development models for the Amazon, a high-level manager for Cargill-Brasil exclaimed, "What economics? There are only trees here!" The agro-industrial model of development espoused by Cargill bases the landscape's economic value solely on grain production. Moreover, by not acknowledging local uses of the mechanized agricultural zone for small-scale farming, cattle ranching, agro-forestry, and non-timber forest product extraction, this model literally erases these uses from the map, expunging them from local government's development plans, soybean farmers' land-use considerations, and agribusinesses' conception of Santarém's socio-economic and environmental needs.

The agro-ecological zoning map formulates an environmental reading of the landscape based on the value of secondary and primary forest for the agro-industrial development model. When asked if there are any negative environmental effects from soybean production, all mechanized agricultural actors declared that one of the most advantageous aspects of this form of Amazonian development is that it does not require deforestation. Interviewees noted that, in fact, there are 550,000 hectares available to be exploited for grain production without deforesting the Santarém landscape. These actors' rhetoric for describing the mechanized agricultural zone marks secondary forest as *non*-forest suitable

for grain cultivation. There is no regard to the fact that producing soy on the 550,000 hectares would require dislocation of the majority of Santarém's *colonos* who are currently cultivating the land.

Primary forest also takes on a particular economic and environmental value. Brazilian law restricts Amazonian land-use by requiring 80 percent of one's landholdings to remain in reserve (i.e., as forest) and 20 percent in productive activities such as grain cultivation. Interviews revealed that, in the Santarém municipality, local officials and IBAMA largely overlook soybean farmers who do not abide by the land-use law. Soybean producers' interviews disclosed that many producers either assign areas of primary forest, sometimes hundreds of kilometers from their soybean farm, as their "reserves," or abide by the law for Brazil's savannah region, which requires a smaller reserve. In keeping with the agro-ecological zone map, primary forest remains in reserve. Several anecdotes regarding soy producers' plans to extract timber from their reserves to prepare the land for grain production demonstrate that the reserves are seen as future grain production areas.

Though the maps do not display them, the agro-ecological zone earmarked for mechanized agriculture is primarily occupied by *colonos* (Futemma and Brondizio 2003).[16] *Colonos'* exclusion from the map and the local development model is also reflected in mechanized agricultural actors' description of the region's agricultural activities before and after the soybean industry's arrival to Santarém. When asked about previous development efforts, agribusiness representatives and local and national government officials describe only the rubber and gold mining eras and identify them as unstable economic growth that left the Santarém region economically decimated. With respect to agriculture, the mechanized agricultural actors stressed that before the presence of agro-business, *colonos'* products such as manioc and local fruits offered little to no economic benefit. Santarém's smallholder farming areas are viewed as uneconomic and valueless to the region's economic growth. In addition, all mechanized agricultural actors agree that *colonos'* agricultural methods environmentally degrade the landscape, a notion that the agro-ecological zoning map supports by calling these areas "anthropogentrically degraded."

In direct contrast to the perceived economic and ecological value of *colonos'* agricultural activities, the mechanized agricultural actors argue that soybean farming actually restores the landscape, ecologically and economically. A Cargill soy buyer asserted that agro-industrial development upholds a more stable pattern of development because it is linked to the global agricultural market where soy has great product versatility and a lucrative world price. Mechanized agricultural actors believe that agribusiness' expansion to the Santarém region signals an upward economic growth trend, one in which all of Santarém's citizens will benefit. One soybean buyer described the region's development trend as embodying a new, "hopeful expectation." This description stands in vivid contrast to the reports *colonos* gave: 50 to 100 percent of *colonos* selling land to soy farmers in at least ten agricultural colonies; the loss of hard-won community infrastructure such as schools and drinking water when one to a few soy farmers buys a whole community; *colonos* returning to their previous communities fruitlessly seeking new arable land after finding no opportunity in the city or other rural areas; the increasing pressure to sell land as soy farms surround their fields; produce lost and children sick from pesticide spraying; and the diminishing or completely destroyed water sources resulting from agricultural machinery that causes erosion and sedimentation (see photos 1 and 2).

Discussion

Frontier development and constructing landscapes

The argument that large-scale agricultural activities can transform the Amazonian frontier into an economically productive and environmentally valuable landscape is not a new one. Agricultural development plans from the 1960s through the

1980s advocated commercial agriculture (mostly cattle ranching) and agrarian reform programs to ease population pressures in northeastern and southern Brazil. Critics of these programs assert that they lead to deforestation and national policies heavily invested in agribusiness (e.g., Laurance et al. 2001; Nepstad et al. 2001; Fearnside 2002).

In contrast to previous agricultural projects in the Amazon such as cattle ranching, soybean development is closely linked to the global market.[17] The socio-economic and ecological landscape constructed by the state-made maps and institutions like Cargill and the local government provide a case for globalizing the region's agricultural resources. In describing the local ecological landscape as best suited for mechanized agriculture, the maps naturalize the land's comparative advantage for mechanized grain production over other economic activities. A growing body of literature examines the power of maps to construct landscapes for natural resource exploitation and economic control over a region (e.g., Harley 1992; Scott 1998; Peluso 1995). Scott argues, "[Maps]…are always far more static and schematic than the actual social phenomena they presume to typify…[maps] consider only the dimension of land and its value as a productive asset or as a commodity for sale" (1998: 46-47). The regional maps and actors' discourse provide an economic analysis of Santarém's landscape and draw boundaries around land suitable for soy (e.g., secondary forest) and not (e.g., primary forest). The result is rigid, static agro-ecological classifications that simplify land-use into compartments. To guarantee a return on their socio-economic and political investment, the mechanized agricultural actors must construct a *soy landscape*, a landscape that begs to be cleared, mechanized and cultivated with soy. No other landscape (e.g., a smallholder farming landscape) appears economically or politically logical.

Photo 1: *A* colono*'s abandoned home sits on the border of the soybean frontier transition. In this town, fifty families sold their homes of 25 years to one soybean farmer and either formed new communities deeper in the forest or abandoned rural life for the city.*

Photo 2: *Protected by law, a lone brazil nut tree stands in a field being prepared for soy. Before the land conversion, this town was home to fifty* colono *families, an elementary school, and a diversity of agricultural crops and fruit trees.*

Consequences of the agro-industrial development scheme

Simplified prescriptions for land-use such as zoning ignore the dynamic social and ecological forces of landscapes (Zimmerer 2000). As noted, research suggests that *colonos'* land-use practices add ecological value to the landscape through agro-biodiversity and carbon sequestration. However, their land-use is not easily defined as "agriculture," "forest management," "cattle ranching," etc. McMichael (2000: 173) explains, "smallholder agriculture is 'multi-functional' in protecting

biodiversity, enabling food security, anchoring rural social development, and preserving cultural heritage." *Colonos'* complex land management system contrasts with homogeneous, rigid zones. The agro-industrial development model is unable to acknowledge dynamic landscapes, because it rationalizes landscapes with respect to their economic return.[18] While *colonos* yield little national capital gain, studies on smallholder farming in Southeast Asia and the Amazon indicate that landscapes absent of smallholders are less biologically diverse and often result in unintended degradation (Dove, Sajise, and Doolittle, *in press)*.

Beyond implications for biodiversity, agro-industrial development and its reading of the landscape have very real consequences for Santarém's rural and urban landscape and communities. The most notable consequences are: increased deforestation and urbanization, land ownership concentration, decreased agricultural diversity, and socio-economic and political marginalization of smallholders. In July 2003 Brazil's National Institute for Space Research released the latest Amazon deforestation rates; it reported a 40 percent increase from the previous year and attributed the increase to soybean production (Gazeta de Santarém 2003). By placing no socio-economic or ecological value on secondary forest areas absent of grain production, soybean development systematically destroys secondary forests and the communities living in these areas (see photos 3-4). Despite the soybean industry's direct role in forest clearing, *colonos* are often blamed as the deforestation perpetuators (e.g., Browder 1995). As indicated, smallholders' displacement from secondary forest areas by soybean farmers results in some *colonos* migrating to primary forest regions to prepare new communities. In the future, as some soybean farmers reported, these areas will be transformed to secondary forest and deemed appropriate for grain production. *Colonos'* marginalization from the region's economic activities allows them to be

Photo 3: *Aerial photo of the emerging soy landscape with accompanying deforestation and fragmentation. Note the contrast between smallholder farming (bottom right) and adjacent mechanized soy fields.*

Photo 4: *A soybean farm being constructed complete with soy fields, grain dryer and silo, a gas post, family home, and statue of Jesus.*

blamed for the area's deforestation and overlooks the soybean industry's contribution to the process of forest conversion.

Increased marginalization in the rural landscape also encourages *colonos* to migrate to cities. Gutberlet (1999) describes smallholders' increased social exclusion, poverty, and marginalization in Mato Grosso following the introduction of mechanized agriculture. In Santarém, this is evident when *colonos* sell land in communities with existing basic infrastructure. Newly established *colono* communities in primary forested areas have no

infrastructure and are further isolated from markets and government services. Urban settings, whether in Santarém or Manaus,[19] are little better. Recent rural migrants lack basic services, live in shanty towns where water contamination and water-related health problems are prevalent, and find it difficult to procure work due to high unemployment rates and the adjustment from rural to urban life (Browder and Godfrey 1997).

With increasing urbanization, the rural agricultural landscape transforms from smallholder-based to mechanized agriculture, and smallholder agriculture becomes increasingly difficult to market. Smallholders I interviewed spoke of decreasing incentives to maintain an agricultural livelihood. One smallholder who had sold all of his land to a soybean farmer explained that he was tired of struggling to make a living and that soybean insurgence in the region, coupled with family conflicts, had demoralized him until he lost interest in farming. Perversely, the arrival of large-scale soy production can lead to the "lack of production of food for local consumption because crop land used for subsistence agriculture is taken over by soybeans" (Fearnside 2001: 24). Gutberlet (1999) notes that the arrival of soy farming in Mato Grosso resulted in an overall decrease in rice, bean, and manioc cultivation. While it is too early in the agro-industrialization process to say, similar food security and agro-diversity trends could occur in Santarém.

Conclusion

Transforming Santarém's landscape from a myriad of smallholder farms and cattle ranches to medium and large agro-industrial farms establishes an unsustainable development model. It threatens *colonos'* livelihoods without providing alternate forms of economic gain; accelerates the urbanization process; contributes to secondary and primary forest degradation, and devalues the socio-economic and ecological importance of non-mechanized agricultural activities.

Through the active creation of a soy landscape (with the help of maps and the key soy actors), Cargill was certain of Santarém's soy development future. A high-level manager explained that despite political uncertainties regarding paving BR-163, "We felt that if we built the port, then it would convince the national government to support paving the highway."[20] As Brazil moves rapidly forward with Amazon infrastructure projects that support soybean development, this research points to the environmental and socio-economic consequences if a different path is not forged. An alternative path lies in redefining the landscape from a 'frontier' void of national economic importance to one rich in socio-economic and ecological attributes valuable to national development. This article demonstrates the necessity for a new interpretation of the Amazonian landscape as dynamically shaped by complex human-nature relationships (e.g., Stokstad 2003; Balee 1989; Denevan 1992). Additionally, 'development', from the perspective of both Brazil's local and national governments, needs to be re-examined with respect to who benefits from agro-industrialization.

Considering a reinterpretation both of the landscape and of development calls for several concrete steps forward: (1) on a national and local government level, recognition of the ecological and socio-economic value of *colonos'* economic activities; (2) on levels local to international, encouragement of diverse agricultural practices that meet both the needs of national development and local economic and environmental sustainability; and (3) local and national support for small-scale agriculture through provision of technological assistance and transportation, active creation of markets, and ensuring basic infrastructure in *colonos'* communities. By investing in both forms of agriculture, and integrating *colonos* in local and national development objectives, 'development' can benefit all. Without progress in these areas, the soybean frontier threatens to be just that—soy.

Notes

[1] *Colonos'* commercial crops consist primarily of manioc, corn, rice, beans, black pepper, tomatoes,

pineapple, oranges, watermelon, and squash.

[2]There are several social groups practicing smallholder agriculture in the region: *colonos* (the main focus of this research), *caboclos* (people of indigenous, African, and Portugese descent that live and work the region's flood zones) and extractivists in rubber and non-timber forest product reserves along the margins of the Tapajós River.

[3]The development program is the multi-million dollar "Plano Brasil de Todos" (formerly Avança Brasil), with several phases and goals. Among the major infrastructure projects are hydroelectric dams, natural gas and oil pipelines, and railroads.

[4]This account of the history of soybean development in the Santarém region is compiled from interviews with agribusinesses, the Instituto Cultural Sena Biblioteca (Cultural Institute and Sena Library) in Santarém, and local government.

[5]The pilot project was conducted on private land owned by a cattle rancher and agribusiness entrepreneur who now rents land to soybean farmers and buys grain (soy, rice, and corn) from mechanized agricultural farms.

[6]Maps were produced by the federal agricultural agency, EMBRAPA, and the Mineral Integration Program in Amazon Municipalities, PRIMAZ.

[7]The sponsoring organizations are Saúde e Alergia (Health and Happiness), Conselho Nacional dos Seringueiros (National Council of Rubber Tappers), Organização das Associações da Resex Tapajós-Arapiuns (Association of the Tapajós-Arapiuns Extractive Reserves), the agricultural workers union FETAGRI, and Comissão Pastoral da Terra (Pastoral Land Commission).

[8]*Terra firme* consists of forested and agricultural areas not within the margins of rivers. These dry land areas comprise 98 percent of the Amazon's forests (Pires and Prance 1985). Ecological features of *terra firme* that influence land-use practices typically include low soil fertility, high tree species diversity but low species density, soil erosion and compaction of cleared lands (Wambeke 1992; Bawa 1992; Grubb 1995).

[9]My findings are based on 40 interviews, three weeks of participant observation at Cargill, several field excursions to soy farms and *colono* communities and extended stays with *colono* communities.

[10]A fourth actor, financial supporters of soy such as the Banco da Amazonia (BASA), is also relevant and noted in the political and economic linkages diagram. For instance, BASA provided loans to all of the soybean farmers I interviewed. Without BASA's financial support, most soy farmers would not be able to establish in Santarém. Investigating their relationship further goes beyond the scope of this article.

[11]All of the businesses, with the exception of Quinco Ltda., are new to Santarém.

[12]Grain farms in the Santarém region ranged from 500 to 1500 hectares of productive land and, generally, at least twice as much land in reserve (i.e., forested and/or uncultivated). Smallholder farmers typically own 100 hectares and cultivate 20-30 hectares annually.

[13]Mato Grosso Cereais Ltda. and Tapajós Arroz Ltda. both insisted that they were doing "[their] part for local development" by establishing businesses that can buy grain.

[14]The Santarém municipality's political platform is anchored by the slogan "Santarém, the land of development." The government's investments and activities make clear that "development" means soybeans and mechanized agriculture.

[15]Other land uses such as forest management and extractive activities are reserved for forests in the Tapajós National Forest and areas of continuous dense old-growth forest.

[16]While the land titling and settlement agency, INCRA, states that less than 30 percent of *colonos* have formal title to their land, *colonos* know their land boundaries, which are generally respected by fellow community members and INCRA (i.e., the agency does not attempt to give formal title to other *colonos* where it is believed *colonos* already live). There is a property grid for the region that was drawn up in the 1970s and is being updated by a

University of Indiana research team through interviews and GIS/GPS.

[17]Fearnside (2001: 26) points out that soybean expansion contrasts with previous land use practices in the Amazon such as cattle ranching, which was largely motivated by "land speculation, land-tenure establishment, and fiscal incentives."

[18]Research shows that *colonos'* agricultural practices typically provide basic economic subsistence, and attributes their persistent poverty to institutional and market failures (e.g., Barbier and Burgess 2001; Cattaneo 2001; Vosti 2003).

[19]Manaus is located in Amazonas state at the confluence of the Rio Negro and Amazon rivers.

[20]As of June 2003, the Brazilian government guaranteed the financing of paving BR-163 through private and public sources (*A Cidade* 2003 and *Gazeta de Santarém* 2003).

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"Map of Brazil"
From Venetia: Nella Stamperia de' Giunti. *By Giovanni Battista Ramusio, 1565. General Collection, Beinecke Rare Book and Manuscript Library, Yale University.*

Growth of Big-leaf Mahogany (*Swietenia macrophylla* King) in Natural Forests in Belize

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Introduction

Big-leaf or Honduras mahogany (*Swietenia macrophylla* King) is a species of grand and majestic proportions, sometimes exceeding 45 m in height, 25 m to the first branch, and 1.8 m in diameter (Weaver and Sabido 1997). Highly valued for its attractive reddish color and superior physical characteristics, big-leaf mahogany has been for centuries the most commercially valuable timber species in the neotropics (Lamb 1966; Weaver and Sabido 1997; Snook 1998). Despite an extensive natural range, from Mexico to the southern Amazon basin of Brazil, Bolivia, and Peru (Lamb 1966), forest loss and timber harvesting over the last 300 years have depleted mahogany populations, leading to concern for the future of the species and its commercial trade. As a result, in 2002, big-leaf mahogany was listed on Appendix II of the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).[1]

Background

Mahogany timber for the international trade is still obtained, as it has been for centuries, from natural forests in Latin America (Blundell et al. 2002). Past experiences with mahogany plantations in its native range have proven unsuccessful due to the attack of the *Hypsipyla grandella* shootborer. Mahogany harvests from natural forests are typically managed according to polycyclic systems (Gullison et al. 1996; Weaver and Sabido 1997; Snook 1998; Grogan 2001). In a polycyclic system, removal of selected trees is conducted in a continuous series of felling cycles that are shorter than the time it takes the trees to reach harvest size (Whitmore 1998:132).

At Belize's Rio Bravo Conservation and Management Area, the production forest is managed on a 40-year felling cycle with a 60-cm minimum cutting diameter. The forest area is divided into multiple compartments. Harvests are carried out on compartments totaling one-fortieth of the production forest area each year, and trees over the minimum diameter limit are extracted at each harvest. Trees smaller than the minimum cutting diameter are left in the forest to grow to harvest size in the interval between felling cycles. This system will provide for sustained yields if harvested trees are replaced by the growth of existing residual trees and sufficient regeneration is established in each annual cutting area, either naturally or artificially (Snook 2003).

Research Objective

In spite of mahogany's commercial importance, management options for sustainable harvest are insufficiently tested and documented. This research examines the growth of mature mahogany trees in the study area, and evaluates the sustainability of current harvesting practices. The research was conducted in Belize as part of a major ongoing project on sustainable mahogany silviculture initiated in 1995. Its primary objective is to determine how best to ensure mahogany regeneration.

Site Description

This study was carried out near the Hill Bank Research Station (88° 42'W, 17° 36'N) in the Rio Bravo Conservation and Management Area in Orange Walk district northwestern Belize (see fig. 1). The area is classified as the Subtropical Moist

Figure 1: *Rio Bravo Conservation and Management Area (RBCMA)*

Zone, according to the Holdridge classification system (Lamb 1966). The seasonal tropical forest of the region is composed of over 100 canopy species, with an average canopy height of 20-25 m (Snook and Negreros-Castillo 2004). There is a three month dry season from February to April, typically including drought conditions in April and early May. Highest rainfall occurs in June and October, during the wet season. Annual rainfall in the area is approximately 1600 mm, however, total annual precipitation and seasonal distribution of rainfall varies widely from year to year (Whitman et al. 1997). Occasional prolonged dry seasons and hurricanes are the major climatic events that impact the Belizean forests. Alluvial calcareous soils derived from porous limestone found in the area are moderately deep and well drained, with a slightly acidic to slightly alkaline reaction (Weaver and Sabido 1997). Topography of the region is mostly flat.

The 260,000-acre Rio Bravo Conservation and Management Area (RBCMA) is managed by a Belizean non-profit organization, the Programme for Belize (PfB), for the combined purposes of biodiversity conservation, education, recreation and tourism, and research in ecology, archaeology, and forest management. It is the largest private reserve in Belize. Approximately 80 percent of the RBCMA is managed as a strict nature reserve for the protection of biodiversity and natural habitats, while 20 percent is designated as a surrounding buffer zone. It is within this buffer zone that timber harvesting is carried out, along with complementary forestry research. Income from the timber harvest is used to help pay for the conservation costs of the RBCMA.

Methods

Collection of field measurements

This study analyzes diameter measurements obtained yearly from permanently marked mahogany seed trees from 1999 to 2003. The trees are located in two 100-hectare logging compartments: Punta Gorda (PG-01), to the northwest of Hill Bank Research Station; and West Botes (WB-20) located southeast of the research station. Before the commercial logging of PG-01 in 1997, 20 seed trees were selected from among the population of mahogany trees in the compartment, by using a GIS map of all commercial timber trees to determine which individuals would have the most trees of other species extracted downwind of each potential seed tree. Then the harvest was carried out, leaving the 20 mahogany seed trees. A total of 183 trees of 15 species were removed from the 100-hectare compartment (Robinson 1998). In WB-20, commercial logging was conducted in 1998. In 1999 and 2000, an additional 60 seed trees were added to the original data set of 20 seed trees in order to ensure that seed production was sampled for all mahogany trees that might shed seed on experimentally treated regeneration areas. Data was obtained from 31 seed trees starting in 1999 and from 75 seed trees from 2001-2003. Seventeen of the seed trees are located in WB-20 and 58 are in PG-01.

Diameter measurements were taken with a diameter tape each year in May or June at either 1.3 m, or 20 cm above buttresses. Measurement heights were indicated with paint marks, but some trees had multiple paint lines on them, meaning that not all diameter measurements were taken at the same height. However, the height of each diameter measurement was recorded, and in some years, measurements were taken at all paint marks as well as at the standard DBH height of 1.3 m. This permitted comparison of four years of diameter measurements.

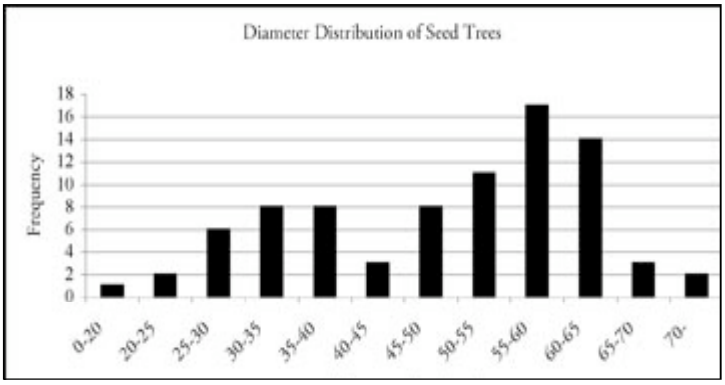

Figure 2: *Diameter class distribution of mahogany seed trees.*

Data analysis

Annual diameter increments were calculated by subtracting the diameter each year from the diameter for the same tree the previous year. Diameter measurements from the year 2000 were not used in this analysis because they lacked corresponding height measurements for each diameter measurement. In order to include this period, we assumed equal annual diameter growth between 1999-2000 and 2000-2001, and estimated annual diameter measurements by dividing by two the diameter increment between 1999 and 2001.[2] DBH measurements were also used to calculate basal area and volume of the seed trees in each year, and their annual increments. A single-tree volume equation derived from plantation-grown mahogany in Sri Lanka was used for calculation of tree volume (Mayhew and Newton 1998):

$$V = 0.056\text{-}0.01421(DBH) + 0.001036(DBH)^2$$

This formula represents the overbark volume of the main stem to a 10-cm-top diameter, or to the last 2 m log, excluding the branches.

A one-way analysis of variance (ANOVA) was used to determine the statistical significance of annual variation in growth rates. Regression analyses were performed to evaluate relationships between diameters and parameters of growth.

Results

Figure 2 depicts the diameter-class frequency distribution of the seed trees. It is noteworthy that the size-class distribution is not balanced. This reflects the fact that the initial cohort of seed trees was obtained from among the mahogany trees of commercial size (i.e. > 60 cm). Subsequent sample trees were selected according to their location with respect to experimental treatment areas, and so represent a broader spectrum of diameters.

Diameter increments were highly variable among the individuals in different size classes (see fig. 3). Regression analysis revealed that diameter was only a marginally significant predictor of annual diameter increment ($p = 0.005$). The overall mean annual diameter increment among all seed trees was 1.01 cm/year.

It was not surprising that absolute annual increments in basal area increased from one size class to the next, culminating in 157.28 cm^2 of annual basal area growth in the largest diameter class. Absolute annual volume growth also increased from 0.0317 cm^3 in the smallest diameter class to 0.1945 cm^3 in the largest diameter class. Annual percent volume growth, however, decreased with increase in size (see table 1). This probably reflects the fact that as volume increases, the proportion of volume laid down each year is smaller, in relation to that initial volume. Growth rates varied considerably among years (see table 2). A one-way ANOVA confirmed that variation in growth among years was significant, and that

Diameter Class (cm)	n	DBH Increment (cm)	Basal Area Increment (cm2)	Volume Increment (m3)	Volume Growth (%)
20 - 30	6	0.86 ±0.17	34.41 ±7.16	0.0317 ±0.0071	9.89 ±1.91
30 - 40	14	0.90 ±0.10	48.12 ±5.56	0.0507 ±0.0059	6.96 ±0.86
40 - 50	8	0.75 ±0.15	51.98 ±8.93	0.0631 ±0.0098	4.25 ±0.88
50 - 60	24	1.00 ±0.07	83.12 ±5.28	0.1118 ±0.0061	4.61 ±0.31
60 - 70	20	1.16 ±0.07	109.26 ±5.56	0.1236 ±0.0065	4.49 ±0.24
70 -	3	1.38 ±0.27	157.28 ±29.18	0.1945 ±0.0349	4.30 ±0.84
Average	13	1.01 ±0.10	79.29 ±6.90	0.0983 ±0.0078	5.37 ±0.60

Table 1: *Annual mean diameter increments, basal area increments, volume increments, and percent growth by diameter class.*

Year	n	DBH Increment (cm)	Basal Area Increment (cm2)	Volume Increment (m3)	Volume Growth (%)
99 - 01	31	1.13 ±0.09	99.99 ±8.6	0.1139 ±0.0100	5.11 ±0.55
01 - 02	71	1.21 ±0.07	93.13 ±6.3	0.1083 ±0.0076	6.69 ±0.50
02 - 03	68	0.69 ±0.05	55.47 ±5.4	0.0691 ±0.0064	3.63 ±0.27
Average	57	1.01	79.29	0.0983	5.37

*Values given for 99-01 are annual averages for the 2-year period. Annual basal area and volume increments for year 99-01 are greater than the other years since the sample size in year 99-01 was smaller and larger trees accounted for a greater proportion of the sample.

Table 2: *Annual mean DBH increment, basal area increment and percent, and volume increment and percent by year.*

growth in 2002-2003 was significantly lower than growth in 2001-2002 ($p < 0.001$).

Discussion

Several studies have reported on growth rates of mahogany in natural forests. These data, including results from this study, are presented in Figure 4. Growth has been found to vary by age (Snook 2003), and by size class (Gullison et al. 1996; Grogan 2001). In addition, annual amount and seasonal distribution of precipitation was found to exert significant influence on mahogany growth in Quintana Roo, Mexico, with annual diameter increment averaging 0.20 cm in a dry year and 0.65 cm in a wet year (Whigham et al. 1998).

Growth rates of mahogany revealed in this study were greater overall than those reported in other studies carried out in Mexico, Bolivia, and Brazil. This variation may be due in part to differences in study methodology. Among the studies, sample sizes varied and samples

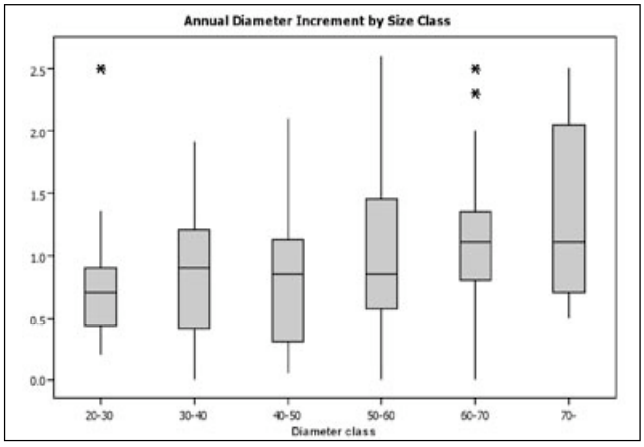

Figure 3: *Annual diameter increment by diameter size class. * Tops and bottoms of the boxes indicate 75 and 25 percentile. Whiskers indicate maximum and minimum values, and stars indicate outliers. Lines inside boxes indicate median values within each diameter class.*

were selected using different parameters. Some of the study sites had been logged, and the intensity of logging varied. Study period as well as size of study area also differed from one study to another. It is possible that growth of these mahogany sample trees was stimulated by the removal of other canopy trees. Logging on PG-01 only opened 2.4 percent of the canopy, but 6 percent, on average, of the downwind seed shadows (Robinson 1998). However, it is worth noting that a sub-sample of trees growing in a pasture-like open environment and in a forest heavily logged for secondary species in Brazil had lower growth rates than found in this study. Subsequent silvicultural treatments on this compartment completely removed the vegetation on the quadrants downwind of 10 of the mahogany seed trees, and girdled the residual trees downwind of another 5 seed trees. These subsequent treatments may have also stimulated the growth of these seed trees.

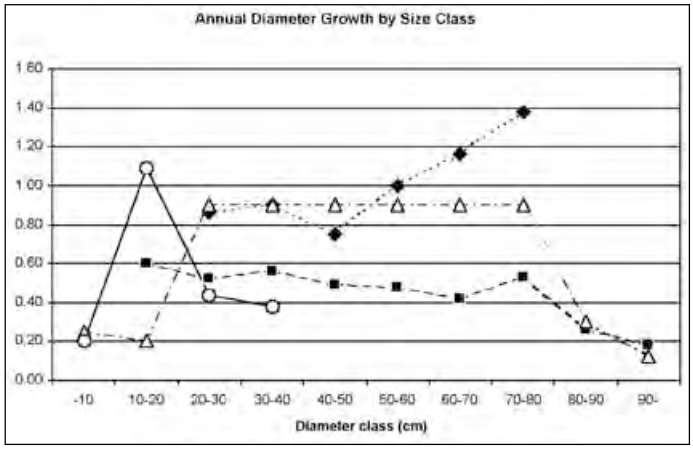

Figure 4: *Growth rates of mahogany in natural forests. *Belize data is from Shono & Snook (2004) (this study). Brazil data is from Pará, in Grogan et al. (2002). Bolivia data from Chimanes in Gullison et al. (1996) was originally grouped into 2.5-10, 10-20, 20-40, 40-80 and 80-160 cm diameter categories. In order to include data from Quintana Roo, Mexico (Snook 2003), in which sample trees were grouped by age, each age group was assigned to a diameter class based on their average diameter. Average annual precipitation in each of the study sites were; 1300 mm in Mexico, 1600 mm in Belize, 1800 mm in Brazil, and 2166 mm in Bolivia.*

Growth differences may also reflect differences in regional precipitation patterns and soil properties. In Pará, Brazil, the highest density of mahogany trees was found in the most fertile soils adjacent to first-order streams, and planted mahogany seedlings performed best on soils with high levels of exchangeable cations (Grogan et al. 2003). Climate and physical conditions in northwestern Belize, including calcareous soils with generally favorable nutrient status, seem to present optimal conditions for mahogany development in a natural forest formation. Additionally, the provenance of mahogany found in the region may be a fast-growing variety.

Inter-annual variation in growth rates is probably explained by the variation in annual amount and seasonal distribution of rainfall, as was reported in nearby Quintana Roo, Mexico (Whigham et al. 1998). Biotic and abiotic factors such as size and position of the tree crown, competition from other plants, microsite differences in soil drainage and nutrient status, and genetics of individual trees, resulting in a wide variability.

Conclusion: Implications for Sustainability

Based on the average growth rate for each diameter class revealed in this study, the majority of the residual trees from the first cutting cycle in the 20-60 cm diameter class will reach commercial size by the time of second harvest 40 years later. Eighty years from the first harvest, in the third cutting cycle, most of the harvest will be dependent on new regeneration that became established after the first harvest. Fast growing individuals can reach the 60 cm diameter limit in 60 years, assuming a sustained growth rate of 1 cm/year. Thus new seedlings that begin at the time of first harvest in year 0 should provide the next generation of harvest trees by the third cutting cycle in year 80. However, field observation shows that naturally occurring mahogany seedlings and saplings are rare in the forest today, so it seems likely that artificial regeneration must be established on each cutting area at each harvest.

Because mahogany is a light-demanding, large-

gap species that regenerates after catastrophic disturbances (Snook 1996), ensuring regeneration in a closed forest represents a challenge. Implementation of appropriate silvicultural treatments is required in order to provide the necessary conditions for recruitment and seedling growth, namely high light levels and reduced above- and below-ground competition (Grogan et al. 2002; Snook and Negreros-Castillo 2004). Experiments have shown that mahogany seedlings grow best on clearings of 5,000 m^2 or more, and that natural regeneration and growth of planted seedlings can be enhanced by clearing vegetation using methods that prevent sprouting, such as burning (Snook et al. *in press*). It has also been demonstrated that treefall gaps do not provide favorable conditions for sustained growth of mahogany seedlings (Grogan et al. 2002).

Growth rates of mahogany trees by size class can be combined with data from complete stock surveys of the logging compartments to calculate annual production of mahogany from this area. Sustained yields of mahogany at the RBCMA are premised on the successful recruitment of new regeneration and harvest level that is balanced by the rate of growth. This research on regeneration and growth will contribute to the development of a sustainable mahogany management plan in the conservation area. It is hoped that successful implementation of such a management plan will ensure the continued utilization and preservation of this valuable resource.

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Notes

[1]Under the regulations of the U.N. sponsored treaty, CITES, exporting countries of species listed on Appendix II must issue export permits that verify that each shipment was obtained legally and that its harvest was not detrimental to the survival of the species (Blundell 2002).

[2] Because the study evaluates annual diameter increments averaged over the four year period, this assumption does not bias our results. Growth during this two year period was not used in evaluating inter-annual variation.

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Reconfiguring Discourses: National Transformations of the Global Convention on Biological Diversity

Nikhil Anand, MESc 2004

Introduction

Approved at the Rio Earth Summit in 1992, the Convention for Biological Diversity (CBD) has been widely heralded as a landmark in the establishment of a global environmental governance regime. While the United States is still to ratify the CBD, over 188 nations are now party to it. The CBD requires national governments to put in place national and regional plans for the conservation of biodiversity. This article makes some observations about this process in India, based on fieldwork I conducted from June through August 2003.

Motivated by the imperative to conserve genetic diversity, the CBD draws on an intellectual tradition of environmentalism that emerges from critiques of industrialization.[1] This discourse of conservation is predicated on the need for careful science to protect nature from human destruction. Within its narrative, a particular notion and valorization of 'indigenous peoples' is also constructed.

Non-government organizations (NGOs) working on India's national biodiversity action plans adopted the uncritical valorizations of indigenous peoples embedded in the CBD. However they also placed at the forefront the roles of Indian farmers and others in the creation and propagation of agricultural biodiversity – a constituency missing from the language of the Convention. In so doing, global ideas of conservation that had traditionally separated people from nature were critically reconfigured.

Global Conservation Discourse

The Convention for Biological Diversity emerges from a Northern environmental tradition that Guha (2000) characterizes as a "response to modernity" – a rebuttal of industrialization. The Articles of the Convention can be categorized into three distinct components. The first privileges and expands the activities of a global pool of trained conservationists (Articles 7, 8, 9, 10, 12, 14). The second focuses on a set of strategies centered on education, training, awareness building, and local-level conservation incentives (Articles 11, 12, 13). And the third (Articles 5, 15,16,17,18,19) governs the transfer of genetic resources across national borders.

The first two components of the CBD are based on the premise "that biological diversity is being significantly reduced by certain human activities" (CBD Preamble 1992). Focusing primarily on forested areas, effective biodiversity conservation is implicitly envisioned as a process that attempts to scientifically manage and distribute the benefits of a productive and fertile nature. Behind its language on the need for awareness building and education is the presumption of unenlightened popular cultures that are destructive to biodiversity and that need to be controlled for its preservation.

This is not to say that the CBD does not reference local people in a positive light in respect to nature and biodiversity in its text. It recognizes "the close and traditional dependence of many indigenous and local communities *embodying traditional lifestyles* on biological resources" (CBD 1992, emphasis added). That these particular categories of people have been described as close to nature (while many others, such as agriculturalists, remain invisible) is not accidental. In *Modern Forests* (2002), Sivaramakrishnan urges us to

examine distinctions that have placed environment in the public domain while agriculture remains the private concern of agriculturalists. Zimmerer (2000) also urges our attention to system boundaries that, as conceptual constructions, determine what is and what is not considered part of the environment.

Categorized as 'traditional' and completely divorced from modernity, indigenous peoples have often been idealized as 'natural' allies of the environment.[2] Environmental organizations frequently ask their audiences to make connections between images of the indigenous and those of a pristine nature, battling against the destructive programs of state-led 'development'. "The use of the term environment to represent autonomous nature, divorced from the agrarian landscape, facilitates dichotomous understandings of a Northern produced industrial ethic of destruction, and Southern, 'indigenous', pre-industrial populations in balance with nature" (Agrawal and Sivaramakrishnan 2000: 7). As manifest in the CBD, the global discourse of conservation maintains these dichotomies. Consequently, it reinforces the divide between nature (and the indigenous people that are part of it), and all other people, including non-indigenous farmers, who cannot but act against it.

Conklin (1997) shows that these essentialisms both fix indigenous people within certain landscapes as well as give them a platform from which to argue for particular privileges and rights. This is reflected in the exceptional visibility of indigenous people in the CBD (and also in the Indian National Plan). At the same time, the CBD renders farming communities invisible. Though people have been selecting and breeding crop varieties for generations, there is little space in the Convention for those whose lifestyles encompass both biodiversity and engagement with the modern market economy. Manifest in the first two sections of the CBD, therefore, is a discourse that is not sympathetic to a majority of India's agrarian populations. Furthermore, it negates the creative roles that these populations have played in the existence and multiplicity of agricultural biodiversity.

As a large international agreement, the Convention consciously asserts that biodiversity "is a common concern for humankind," thereby placing it as a resource in a global commons to be managed by global experts (CBD Preamble 2002). With most biodiversity in the global South, governments in these countries worry that this language of the commons will be used by transnational interests to claim common heritage and thereby rights to the biological resources contained within their borders.

Arguably, some of the more commercially valuable biodiversity resources are in agricultural crops. The Indian state is allied with its agriculturalists in arguing for national regimes of property within the global discourse of conservation of agricultural resources. It has recently fought a series of high profile cases in international and U.S. courts on the appropriation of patent rights by private industries with respect to rice, turmeric, and neem. In these cases, Indian farmers and the State have used the language of national development to argue for a fair share to the benefits of biodiversity.

A dynamic tension therefore emerges between the language of the global commons and that of national sovereignty. The third section of the CBD, which describes the protocols for transnational transfer of biological resources, is thus critical because it provides ways in which nation states like India can re-territorialize their resources. It marks a small moment of rupture in the language of a global commons, as it delineates the need to regulate and compensate countries and peoples that have created and managed these resources.

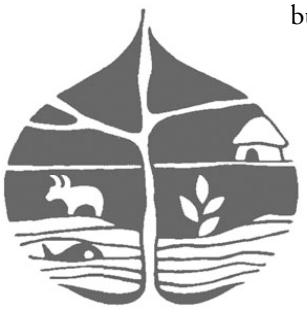
Conservation Conventions in India

In 1999, the Indian Ministry of Environment and Forests (MoEF) handed over the coordination of the National Biodiversity Strategy and Action Plan (NBSAP) to Kalpavriksh, a non-government organization long engaged in people-centered environmental projects. There are a number of reasons that may have prompted the ministry to take such a step, one of which is the increased trend

towards decentralization in planning and a parallel rise in the influence of NGOs in India.[3]

This shift towards decentralization emerges from demands by local and global contexts for greater transparency and participation in state functioning. These demands come as much from those arguing for free market capitalism managed by 'good governance' as from widespread populist struggles against neoliberalism itself. However, the expanding discourses of democracy and participation across the political and economic spectrum are the subject of a different study. For our purposes here, it would suffice to say that state bureaucrats, as participants in these local and global processes, are simultaneously influenced by these discourses.

The NBSAP process provided a suitable test case for state actors to examine the effects and impacts of a decentralized and NGO-coordinated process. In comparison to other state plans, biodiversity is relatively low on the agenda, and the Ministry of Environment and Forests is weaker than most other state ministries. Even within the ministry, other interests, like forestry, are far more important than biodiversity.



Indian National Biodiversity Strategy and Action Plan logo

This set of factors was appropriate to situate the biodiversity plan as a state 'performance' of democratic and transparent plan making (Ajay Gandhi, *pers. comm.*). Significantly, it was showcased at the World Summit on Sustainable Development in Johannesburg. In a report prepared for the summit, the Ministry of Environment and Forests described the NBSAP as "India's biggest environment and development planning process" (MoEF 2002a: 1). Central in its presentation of the NBSAP was that, "for the first time, government has handed over the responsibility of developing this entire plan to a non-government organization" (Ibid: 1). In a different report, also prepared for the meeting in Johannesburg, entitled *Empowering People for Sustainable Development*, the Prime Minister's foreword reads, "I hope that the document would serve as a useful input into the pursuit of sustainable development in India – and be of some use to other countries as well" (MoEF 2002b). The audience for India's policy processes therefore, is not only the Indian public, but also a larger transnational public such as the one present in Johannesburg.

To both publics, Kalpavriksh is an organization with considerable credibility. It first emerged in the early 1980s as an urban youth movement to conserve Delhi's urban forest, but has since taken radical positions on a variety of development and environment projects. It engages with a considerable network that spans state bureaucracies, conservation foundations, human rights organizations, and social movements, both in India and around the world. Kalpavriksh committed itself to a decentralized process of plan formation. Rejecting the idea that a single plan could comprehensively address the different regions and dimensions of biodiversity, it identified the need for over seventy plans at sub-state, state, ecoregional, and thematic levels, though all seventy could also be considered as stand-alone documents. For each of these plans, a nodal coordination agency was identified. In some cases, this was the Forest Department; in others, it was an NGO or a university.

A Technical and Policy Core Group (TPCG) was convened to facilitate the communication and coordination of state plans, as well as to draft language for the national plan. Constituted by Kalpavriksh in consultation with the Ministry of Environment and Forests, the TPCG also contained tribal activists and other representatives from movements that find the term 'conservation' very contentious.[4] To engage with these, and other human rights groups, the TPCG was very clear that neither livelihood security nor ecological security would be compromised in the plan. Moreover, they insisted that biodiversity was not contained solely in

forests, and that its value went beyond the aesthetic values of charismatic large mammals or the ecological services of natural systems.

The decision to include agriculture in the process was made by the TPCG soon after it first convened. For the coordination of the ecoregional, state, thematic, and substate plans, nodal agencies were given guidelines by the Group. Prominent in these guidelines are two subsections: the first dealing with "wild biodiversity" and the second with "domesticated biodiversity" (livestock breeds and crop varieties). Thus, the TPCG created a space in which the importance of livelihoods and biodiversity could simultaneously be considered. By recognizing a biodiversity commons, and those protecting it (such as indigenous peoples), the TPCG criticized Forest Department programs that did not recognize the land rights of these groups. In this respect, it drew from and enhanced the global biodiversity discourse that is manifest in the CBD.

But the Technical and Policy Core Group also picked up elements of a national development agenda that valorized the creativity, initiative, and value of agrarian populations in biodiversity conservation. Thus in India, the TPCG interpreted the Convention with a range of actors and actions that had previously been ignored by the international biodiversity community. The NBSAP recognized the relationship between natural and wild diversity by placing human resource systems in relationships with both domesticated and wild biodiversity. For example, the National Plan proposes strategies such as "understanding the links between cultural diversity and biodiversity" (Chapters 7.1.1.3 and 7.2.1.4, MoEF 2004) and "secure tenure over natural resources" (Chapters 7.1.5.1 and Chapter 7.2.5, Ibid).

At the state and sub-state levels, the planning process was more creative. Coordinating the process in this region, the Deccan Development Society organized bullock cart biodiversity *yatras* (festivals) where native seed varieties were on display. Their success at interacting with farmers about agricultural biodiversity gained tremendous media coverage. Other plans, like those made in Munsiari, Uttaranchal state, listed different livestock breeds threatened by state-managed animal husbandry extension programs (Foundation for Ecological Security 2003). The sub-state plans of Nahikalan and also the plan in Munsiari provided detailed descriptions of agricultural practices that demonstrated important ways in which human communities actively create and propagate biological varieties. The Nahikalan Sub-State Plan describes the state agricultural and livestock extension programs, in which indigenous breeds are replaced with unsuitable exotic varieties and chemical inputs, as a threat to agricultural biodiversity (Vividhara 2003). The Plan argues that this policy has resulted in nutritional deficiencies and livelihood insecurity in Nahikalan village. In doing so, the Nahikalan Plan, like the national and state plans, selectively draws on and critiques different dimensions both of global conservation efforts and of government actors.

By broadening its understanding of 'environment' to incorporate agriculture, the National Biodiversity Strategy and Action Plan envisions and represents a peopled nature. In so doing, the Plan makes a vital link between India's mountains and forests (which is where biodiversity was isolated in the human imagination) and the densely populated agricultural heartlands of the country (see Agrawal and Sivaramakrishnan 2000). As a result, the NBSAP in effect reconfigures the divide between nature and culture whose artificiality has been the subject of recent critical attention in social ecology (see Tsing 2003; Dove 2003).

By assuming that forests were not the only repositories for biodiversity, the national discourse of biodiversity conservation provided an important space for non-government organizations and farm workers to make strong critiques against industrialized agriculture.[5] Rejecting state agriculture development paradigms that favor monocultures, fertilizers, and pesticides over multi-cropped organic landscapes, the NBSAP argued for market and institutional incentives for non-chemical-based polyculture farming.

Given the strong criticisms directed at it, it is not surprising that the Ministry of Agriculture did not respond. This lack of political support from the Ministry for the implementation of the national biodiversity process highlights both the practical and the conceptual limits of participatory planning. Those pushing the NBSAP were constantly required to negotiate compromises with powerful bureaucracies. To do so they used the planning processes of the Indian state itself, and the global commitments that the Indian state had made to biodiversity. Yet, when the biodiversity plan itself did not fit in with the priorities of the Ministry's vision of agricultural development, the agency could not be forced to participate.

Conclusion

As a global environmental regime, the CBD envisions a professionalized conservation, implemented by international and national bodies of conservation and management experts. Supportive of the state's sovereign claim to biodiversity contained within its borders, Indian non-government organizations took the opportunity of the Convention's national planning process to make explicit the existence and significant value of domesticated biodiversity. In so doing, they highlighted the roles of modernizing, agrarian populations in the conservation of agricultural biodiversity – thereby blurring the boundaries of nature and culture.

Non-government organizations were also using the 'ecological tribal' of the global environmental discourse to secure rights and entitlements for local agrarian populations, such as the right to practice livelihoods and land rights within state forests. Thus we can see these Indian civil society groups selectively employ the global imaginaries of the sustainable indigenous person to critique state processes of marginalization and eviction. At the same time, Indian non-government organizations use the language of nation states to critique the notion of the global commons – thereby securing rights of farmers to their seeds. The NBSAP was a process through which, by mixing up tribes and peasants in the same plan, indigenous people made claims to land rights and social justice, even as peasants made claims of customary forest and biodiversity management (see Tsing 2003 for an example of this in Indonesia).

Though the Ministry of Environment and Forests found the process too contentious for its liking, its desire to be seen by the international community and its domestic constituencies as an agency that respected biodiversity and participation made it difficult for the ministry to reject non-government organization efforts entirely. Therefore, when presenting the process to the international community, the ministry took ownership of the effort as a landmark process, signaling its acceptance of a state process that was critical of itself, while simultaneously making visible for the international community a reconfigured national biodiversity discourse that included both people and nature.

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Notes

[1]Emerging from a Foucauldian perspective, I understand discourse to mean a particular language of knowledge through which only particular things can be said or even imagined.

[2]For examples of pre-modern/anti-modern

writings on indigenous peoples, see journals such as *Cultural Survival Quarterly*, *The Ecologist*, and also the thrust of different environmental campaigns by groups such as Rainforest Action Network.

[3] This trend has been much critiqued in recent literature. Decentralized plan making might, for example, also be read as an effective way for the state to cut costs (Mosse 1997). However, there is an inherent danger in ascribing unity and purpose to state actions (Starn 1999). The actions of state actors are better understood when placed in the context of multiple and competing discourses of environment, governance, and development in which state officials are also situated through their participation and engagement with both citizen populations and transnational actors. As such, states are more a "set of practically mediated relations" than "a coherent imposition" (Sivaramakrishnan 2002: 78), or, as I would prefer to argue, a practically mediated set of impositions.

[4] Globally, there is a significant history of displacement of indigenous peoples from areas deemed to have conservation value.

[5] It is important to note the absence of these critiques from the CBD.

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Coffee, Cattle, and Colonialism: Historical Effects of Markets and Agricultural Policies on Cloud Forests in Central Veracruz, Mexico

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Introduction

Conservation of tropical montane cloud forest (TMCF) fragments in Mexico is vital for the protection of watersheds, soils, and biological diversity (Hamilton et al. 1995). These unique forest types provide human settlements and adjacent fields with valuable environmental services, such as water capture, storage and filtration, soil preservation, and erosion and flood control (Bruijnzeel and Proctor 1995; Vogelmann 1973). Currently restricted to just 1 percent of the country (Rzedowski 1996), TMCF face many conservation challenges.

Nowhere are the challenges greater than in human-dominated landscapes where population growth, agricultural expansion, and urbanization simultaneously contribute to forest loss and fragmentation. Highland Veracruz, for example, illustrates the synergistic effects of these processes on the spatial distribution and abundance of montane forests. Once an area that harbored the fourth largest proportion of TMCF in Mexico, today cloud forests in Central Veracruz remain as small isolated patches in a matrix of shade coffee plantations, cattle pasture, sugar cane fields, and urban areas. Major drivers of this large-scale environmental transformation include: (i) colonization and settlement of the town of Xalapa and environs in the sixteenth century; (ii) historical dependency of local communities on global export markets for livelihoods; and (iii) implementation of policies favoring agricultural industrialization over traditional practices.

How should forest conservation efforts proceed in landscapes with a historical legacy of human use for agriculture? In highland Veracruz, the most feasible and cost efficient way to retain forest remnants as integral components of the land mosaic is to involve local communities in the management of cloud forests and the surrounding agroecological matrix. For this to occur, it is key to have an appreciation of how inhabitants of Central Veracruz have viewed and interacted with TMCF patches into the present day. As this case study will demonstrate, a general understanding of the social, economic, and political factors affecting human-environment interactions is needed to realistically assess possibilities for future conservation. This multi-step process of 'contextualization' involves detailed assessment of societal goals, historical trends and conditions, and future scenarios and alternatives (Clark et al. 2001). Applying this approach to the case of cloud forest fragmentation in Central Veracruz reveals how knowledge of regional environmental history can aid scientists in designing research questions and forest management plans that are place-based and relevant to conservationists and the needs of local communities.

This article reviews the historical drivers (i.e., trends and conditions) of landscape change in Central Veracruz from pre-colonial time to present. It tells the stories of two land uses, coffee and cattle, that directly compete with cloud forests for human valuation and space, with a view to demonstrating the role of markets and agricultural policies in land use/land cover trajectories. An interpretation of past events and their effects on current and future conservation efforts are also discussed.

Study Description

The Xalapa-Coatepec region lies between 900 m. and 1500 m. above sea level (asl) along the eastern

slopes of the Sierra Madre Oriental mountain range in Central Veracruz, Mexico (see fig.1). The environment is characterized by frequent cloudiness, cool temperatures, rugged topography, steep slopes, and deep narrow canyons (Siemens 1990).

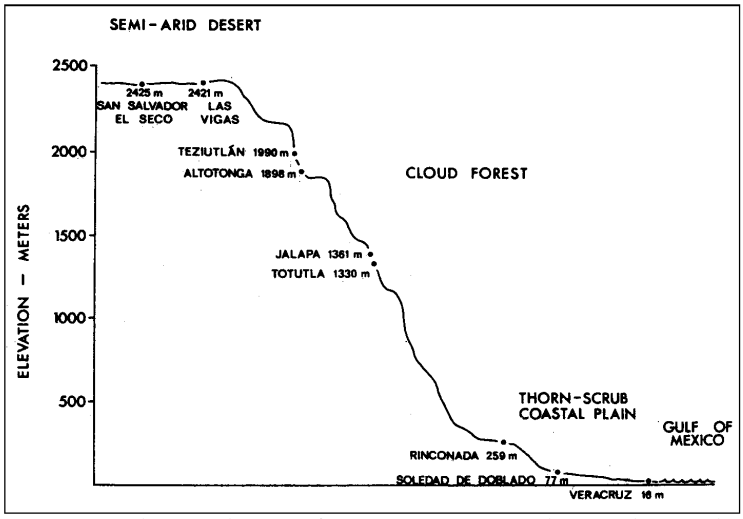

Figure 1: *Schematic diagram of main vegetation types along an elevational gradient from lowland to highland Veracruz. Source: Vogelmann 1973.*

Land Use and Land Cover Changes in Central Veracruz

Pre-Columbian land-use

Old-field relics indicate that native peoples inhabited the lower piedmont zone prior to Spanish arrival in 1519 (see fig. 2), coping with difficult environmental conditions by adapting their agricultural systems (e.g., shifting cultivation) and developing advanced farming technologies such as terraces and vertical zonation of crops (Whitmore and Turner 1992). More detailed knowledge of pre-colonial land use in and around cloud forests is scarce, although recent evidence that Aztecs exacted tribute in the form of resplendent quetzal feathers (*Pharomachrus mocinno*) and sweet gum resin (*Liquidambar styraciflua*), both cloud forest species, suggests that forest extraction was practiced (Peterson and Peterson 1992). Furthermore, in a nearby TMCF region, paleoecological data points to three phases of human occupation, deforestation, and erosion, and two phases of abandonment and regrowth during the late Holocene (Conserva and Byrne 2002). These studies suggest that Mesoamerican highland forests were not 'pristine' during the pre-Columbian era; early on, their structure and composition were modified by human as well as by natural disturbance regimes.

Spanish conquest and the introduction of cattle (1521-1810)

The arrival of Hernán Cortés to the Port of Veracruz in 1519 marked the beginning of widespread agricultural change in Veracruz. As the Spaniards traveled through the lowland, piedmont, and highland regions of the Sierra Madre Oriental, over the Mesa Central and on to Mexico City, they transformed the pre-Columbian landscape materially and conceptually (Sluyter 1999). Spanish introduction of disease, exotic plants and animals (e.g., cattle, sugar cane), and new systems of land and labor organization were key factors in the rapid conquest of indigenous groups and environmental modification (Whitmore and Turner 1992).

From 1521 to 1619, the Spanish crown granted land titles to Spanish soldiers in lowland Veracruz. Soldiers converted abandoned fields to pasture and practiced transhumant ranching (the movement of

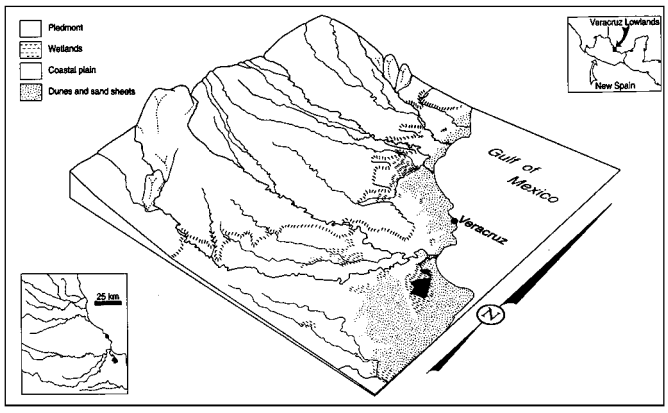

Figure 2: *The coastal plain, wetlands, and piedmont regions of lowland Veracruz. Source: Sluyter 2002.*

livestock to different grazing grounds with the changing of seasons). Internal demand for tallow and hides stimulated the rapid growth of herd populations and ranch expansion. Consequently, semi-wild cattle roamed freely, destroying native agroecosystems, and causing soil compaction, erosion, siltation, increased flooding, and harvest loss (Sluyter 1996). Along with cattle, the Spaniards also introduced sugar cane, cotton, and tobacco; these crops were cultivated extensively with Amerindian and West African labor (Sluyter 1996).

Some European immigrants found respite from the heat and disease of the harsh lowland environment in the highlands. The town of Xalapa, located on the major travel route between the Port of Veracruz and Mexico City, evolved as an ideal location for settlement, trading, and commercial activities (Siemens 1990). The arrival of European settlers to Xalapa fueled the growth of agriculture in its environs and the replacement of cloud forest areas with farms.

The institutionalization of cattle ranching and plantation agriculture in colonial Veracruz shaped future social dynamics and largely determined subsequent land use and land cover trajectories. First, the Spanish divided lands into large blocks fit for grazing cattle and cash crop monocultures, setting a precedent for future tenure arrangements. Second, transhumant ranching in New Spain displaced native populations and agroecosystems (Sluyter 2002). In addition, dramatic native population declines from smallpox and typhus epidemics between 1600 and 1800 enabled Spanish settlers to appropriate abandoned lands. Ranches and farms expanded through a process of land accumulation and appropriation that created an inequitable distribution of wealth and degraded vegetation, soils, and wetlands. Third, because ranches were exclusive to Spanish elites, they were associated with values of power, prestige, and wealth (Montagut-Gonzalez 1999). By contrast, the benefits of traditional agriculture, including wetland cultivation and the use of fallow lands, were unacknowledged or unappreciated. Fourth, markets for European goods fostered the early settlement and development of commercial towns like Xalapa in Central Veracruz. Colonial social, political, and economic institutions shaped the region's land management decisions and paved the way for post-colonial and present day land-use and policy trends (Sluyter 1999).

Mexican independence, revolution, and agrarian reform (1821-1925)

Mexico achieved independence from Spain in 1821, but the legacy of colonial land use in Veracruz continued into the postcolonial period. Towards the end of the nineteenth century, increasing export crop production of sugar cane, coffee, cotton, and tobacco led to the establishment of large *haciendas* or estates and the exploitation of peasant labor on lands previously controlled by Spaniards (Barrera and Rodriguez 1993). Mexico City's booming population and increased demand for milk and meat also supported a growing market for cattle (Montagut-Gonzalez 1999). With financial support from the government, Veracruzan ranchers acquired smallholder farms and created new grazing areas. As pastures occupied more and more land, smallholders moved upslope, cutting into areas occupied by cloud forest.

The Mexican Revolution (1911-1925) signaled a time of political, economic, and social change. Rural peasants fought for land reform. Social conflict between ranchers and peasants peaked in violence between 1928 and 1932, with *haciendas* expropriated from powerful landowners and redistributed among poor rural farmers in the form of communally-owned farms or *ejidos* (Ginzberg 1998).

Growing internal and external markets for milk, meat, and Old-World crops, supported the expansion of cattle ranching and plantation agriculture in Veracruz during the post-colonial and post-revolution eras. Although the Mexican Revolution led to significant land reform and *ejido* establishment, control of extensive farm and grazing areas remained concentrated in the hands of large

hacienda owners during the twentieth century. This position was supported by new federal and state government legislation such as the law of unproductive land, which facilitated the appropriation of smallholdings and forest clearing.

In actively promoting cattle and tropical crop export industries, the government encouraged processes of land concentration, social conflict, and forest loss strikingly similar to those engendered by their Spanish predecessors. Land scarcity and violence encouraged smallholder peasants to migrate to higher elevations, resulting in the increased utilization and conversion of cloud forest ecosystems.

Coffee growers compete with ranchers (1920-1989)

In the 1920s, when land reform and the organization of *ejidos* were nascent processes, marginalized groups established the first small domestic coffee farms in Veracruz. The Veracruzan highlands were optimal for smallholder cultivation of *Coffea arabica*. Mid to high elevations (900-1200 m asl), frequent cloud cover and rainfall, warm temperatures, and fertile soils allowed for the production of high quality coffee on steep slopes. Moreover, diversified shade coffee farms simultaneously provided poor households with subsistence and commercial goods.

Worldwide increase in demand for *Coffea arabica* beginning in 1954 and regulation of coffee prices shortly thereafter fueled enormous growth in the export market for coffee (Nestel 1995). Throughout the 1970s and 1980s, rising coffee prices, coupled with Mexico's national policy of agricultural modernization (Krippner 1997), precipitated a second major land-use transformation in Central Veracruz, one of the most important coffee-producing regions in the country.

The Mexican government's policy of increased state intervention in the production process led to the intensification and expansion of coffee lands. The Mexican Coffee Institute (INMECAFE) encouraged farmers to incorporate new lands into production, to modify the physical structure of farms, and to adopt advanced technologies. Specifically, INMECAFE promoted the employment of agrochemicals, reduction or complete removal of shade trees, increased density of coffee trees per unit land, and utilization of high yield varieties. As a result, forests and other land-use systems (e.g., sugar cane) were substituted with plantations of *Coffea*, and diversified coffee farms were simplified and homogenized.

Of course, the motivation to 'modernize' plantations in Veracruz was to increase yields and meet the escalating demand for coffee. Yet because land areas optimal for coffee-growing were occupied by montane rainforest, the coffee bonanza was a major driver of deforestation (Challenger 1998). Further, the vegetationally and structurally diverse coffee matrix was simplified, with unknown consequences for adjacent cloud forest ecosystems (see photo 1). An estimated 30 percent of farms in Veracruz were transformed from polycultures to monocultures, and an average of 22 percent received technical assistance (Nestel 1995).

After 1954, growth in the coffee sector forced Veracruzan smallholders to compete with larger landowners. The latter entered the coffee market and increased yields with technological packages provided by the government. For instance, in the Coatepec region, there is evidence that during the

Photo 1: *An intensively managed and simplified coffee farm near Coatepec.*

coffee boom land concentration occurred (Nestel 1995), causing some smallholders to occupy marginal forested lands and to create grazing systems within TMCF. As with the cattle industry, the Mexican government encouraged a highly polarized production structure – that is, small versus large farmers.

Trade liberalization (1989-present)

Liberalization of agricultural trade in Mexico began in the mid 1980s and had a remarkable impact on the cattle and coffee industries of Veracruz. During his term (1988-1994), President Carlos Salinas de Gortari encouraged policies of privatization and decreased market intervention by the state. Subsidies on most agricultural inputs were eliminated or reduced, guaranteed prices set for agricultural commodities were removed (except for maize and beans), crop insurance programs were eliminated, state bank credit programs to peasants were suspended, and Article 27 of the Mexican constitution was changed to allow the sale of communally-owned *ejido* lands (Krippner 1997).

These government policies played a key role in precipitating an agrarian crisis in Veracruz. First, low prices for cattle, lack of available land for ranch expansion, subsidy elimination, and a national economic crisis that reduced by half Mexico City's demand for meat, together contributed to the husbandry crisis of the 1980s (Montagut-Gonzalez 1999). Second, deregulation of world coffee prices in 1989 and state withdrawal from the industry caused a world and national 'coffee crisis'. After 1989, coffee prices fell by fifty percent, and between 1989 and 1993, the incomes of Mexican coffee growers dropped by 70 percent. Simultaneously, production and total output fell by 35 percent, and growers' debts to INMECAFE and other lending agencies skyrocketed.

Unsurprisingly, the husbandry and coffee crises have fostered interest in alternative land use systems and contributed to widespread land use/land cover change. For instance, in Central Veracruz, where coffee cultivation is one of the dominant land-uses, alternatives have included conversion of plantations to sugar cane fields, pasture, organic farms, as well as land abandonment. For the most part, however, shaded coffee polycultures and monocultures are being replaced with unshaded monocultures. Given the importance of cloud forests in the capture, storage, and filtration of water for the Xalapa-Coatepec region and the proliferation of plantations on steep slopes, the large-scale removal of trees from coffee farms will affect neighboring cloud forest ecosystems as well as agricultural fields downslope.

Conclusion

A synopsis of the past 500 years indicates that cloud forest ecosystems in Central Veracruz have been subject to intense human disturbance since colonial times. Historically, the factors that have primarily influenced landscape evolution have been high population densities, early establishment of plantation agriculture and cattle ranching, Xalapa's location along a major route linking the Port of Veracruz and Mexico City, global market forces, and government land use policies. All have contributed to the significant disturbance, loss, and fragmentation of cloud forest ecosystems.

Furthermore, existing land tenure regimes, market dynamics, and government policies shape and constrain possible visions for conservation and management of tropical montane cloud forest fragments. Inequitable distribution of land, the booms and busts of the cattle and coffee export industries, and agricultural industrialization have fueled migration of rural peoples to and escalating pressure on forested lands (Halhead 1992). As a result of these processes, little value has been placed on the goods and services provided by cloud forests.

On a positive note, local communities have recently expressed their concern about the fate of cloud forest fragments, which are unprotected and vulnerable to conversion as widespread replacement of shade coffee plantations with sugar cane fields (personal observation) and proposals to construct a federal highway through the region's largest and

least disturbed fragments demonstrate. Conversion of steep, high-elevation cloud forest may have serious consequences for urban areas and the productivity of adjoining agroecosystems by increasing soil exposure and runoff, slope instability, and altering temperature and moisture regimes.

Research studies aimed at conserving TMCF will benefit from asking and answering the following questions: What products are extracted from TMCF? When and where are cloud forests most susceptible to conversion? What are the effects of conversion on the productivity of agricultural systems downslope? What are the alternatives? Cultivating plant species commonly removed from forests, improving the diversity and efficiency of agroecosystems, quantifying forest removal impacts on agricultural productivity, and creating financial incentives to maintain patches and shaded coffee systems may help in decreasing pressure on remnant forests.

Envisioning cloud forest conservation and management in Central Veracruz requires both historical context and an acute awareness of the immediate goals and needs of inhabiting populations. History shows that the Xalapa-Coatepec landscape is highly dynamic in space and time due to its strong links with the global market. Strategies to maintain tropical cloud forest must incorporate management plans for fragments as well as for surrounding agricultural areas. Researchers must actively participate in a policy process that advances support for the traditional agricultural sector and the protection of tropical cloud forest fragments.

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Three Forms of *Amorphophallus lambii* and Three Forms of Rungus-Dusun Plant Expert Knowledge

Betony Lee Jones, MESc 2004

Ethnobotany, the study of relationships between people and plants, is a lifestyle for wanderers and a discipline for wonderers, but it also offers some of the most promising, powerful, and practical rationales for the conservation of cultural and biological diversity. Ethnobotanical literature ranges from adventure tales, to practical manuals for plant use and conservation, to theory-bound academic writing. I went to Borneo inspired by all three. From June to November 2002, I worked with the Rungus-Dusun ethnic group of northernmost Sabah (see map 1) to document and study their plant knowledge.[1]

Map 1: *Kudat Peninsula of Sabah, Malaysia.*

In this essay I focus the ethnobotanical lens on just one of the 500 plants and mushrooms I studied in Sabah. By illuminating the mythical, practical, and theoretical forms of local Rungus knowledge about *Amorphophallus lambii* I reflect on the often overlooked complexity in the processes and purposes of indigenous knowledge. Ethnobotanists and other professionals working with knowledge systems other than their own must recognize and understand this complexity if we expect to effectively target prevention and mitigation of social and environmental degradation in a way that empowers traditional knowledge holders.

Forms of Rungus Plant Knowledge

One evening in my second month of fieldwork in rural Sabah, Malaysia, as I practiced my Rungus speaking skills with some sunset village visitors, I began to notice the strong smell of sewage. My distraction grew with the strength of the stench, and I checked the bottoms of my shoes, glanced around for signs of a dead animal, and made a trip to ensure the toilet was still intact. Unable to stand it any longer, I finally apologized and asked, "what *is* that smell?" Neither my embarrassment nor my guests' hearty laughter could be contained any longer. Sordin[2] had brought the *maja-raja* flower to show me, and as a joke, had set it under my house. We were breathing in the fecal aroma of its huge fleshy spadix enveloped by a characteristic floppy spathe (see photo 1). In what I had soon learned was his typical style, Sordin launched into a detailed but silly tale about the *maja-raja*, shedding some light on the origin of its name, but otherwise serving simply to entertain.

Photo 1: Maja Raja *inflorescence.*

Weeks earlier, we had encountered the fruiting stalk of *maja-raja* – an eighteen-inch mottled shaft with a saffron-colored knob-covered head, standing erect from the leafy forest floor (see photo 2). My temptation to collect the Dr. Seuss-like stalk was curtailed by an urgent warning. Backing away in deference, I inquired about the majestic structure. It has no leaves and no use, another Rungus colleague, Mostip, told me, but if you touch *maja-raja,* your skin will itch.

Maja-raja is not a rare plant in the forests of the Kudat peninsula in Malaysian Borneo. Over six months of fieldwork, I encountered the mysterious plant at least a dozen times, and Mostip seemed to be right: never did leaves accompany the fruits or flowers.

Photo 2: Maja Raja *infrutescence.*

Whereas *maja-raja* with its golden crown and putrid smell reigned over the forest floor, *sogkong* was among the most inconspicuous of the plants we collected. We never found the herbaceous plant in flower, and when my Rungus colleagues told me that it never flowers or fruits, I settled for the sterile specimen (see photo 3). Of the 475 plants we collected, there were 15 whose fruits and flowers were never seen by the plant experts with whom I worked. These plants were either very rare, cultivated through vegetative propagation, or were trees or climbers that flowered high up in the canopy.

Sordin and Mostip, two locally-renowned plant experts, did not say they had never *seen* the fruits and flowers of *sogkong*, they said it *produced* none. *Sogkong* is a relatively common lowland plant. Mostip said the very young shoots can be eaten as a vegetable, but because the leaves are very irritating to the skin, few use the plant this way. Sordin told me that if you pull the plant up with the tuber, it is a sign that you'll become wealthy. He also said that in the past, if young men wanted white patches on their skin, they would lash themselves with the stem, which is itself mottled with white patches. Mostip relayed the practical use and Sordin knew the mythical information about *sogkong,* but neither could explain how it reproduces without fruits and flowers.

Photo 3: Sogkong.

Then another plant expert, Litab, the village headman, shared his hypothesis about *sogkong's* reproduction. He suspected that *sogkong* and *maja-raja* represented different stages of the same plant. His rationale was three-parted: first, both the fruiting stalk of *maja-raja* and the mature leaves of *sogkong* irritate the skin in the same way; second, although they are never seen together, one will appear where the other had grown months earlier; finally, his hypothesis made sense of the anatomical absences of both plants: *sogkong* was *maja-raja's* other half. All three men knew that *sogkong* has a tuber, and all three said it is related to taro (they are in the same family, Araceae), but neither Sordin nor Mostip agreed with Litab's theory that *sogkong* and *maja-raja* were the same plant.

Months later, scientific knowledge confirmed Litab's theory. In the Linnean classification system

maja-raja and *sogkong* represent different phases of the life cycle of *Amorphophallus lambii* (Araceae). All *Amporphophallus* species have a dormancy period in nature that may take place in two parts of the species' growing cycle. When the leaf dies down after a regular growing season, the tuber rests for three to seven months, after which a new leaf emerges. When the plant is mature enough to flower, the resting period is considerably shorter, however a second period of dormancy sets in after flowering and fruiting. Because of this, the fruiting plants of *Amorphophallus lambii* and all other Asian *Amorphophallus* species are never found with leaves.

	Sordin	Mostip	Litab
Type of expert plant knowledge	Mythical	Practical	Theoretical
Method of transmission	Story-telling; lore	Demonstrating	Explaining
Livelihood	Plantation worker and swidden farmer	Village headman and swidden farmer	Village headman, rubber and fruit trees, swidden farmer
Age	Mid-50s	Mid-50s	Mid-50s
Literate	No	Semi, self-taught	Semi, self-taught
Religion	Traditional Rungus	Traditional Rungus	Christian
Children's plant knowledge	Significant	Negligible	Negligible
Stated source of plant knowledge	Parents, aunts and uncles, and grandparents	Parents, aunts and uncles, and grandparents	Parents, aunts and uncles, and grandparents

Table 1: *Comparative profiles of three Rungus botanical experts.*

Given the complexity of the *Amorphophallus* life-cycle, Litab's knowledge is certainly impressive. But while this anecdote points to the wealth of accurate indigenous knowledge about tropical ecosystems, it does not specify how that knowledge can be tapped. Furthermore, scientific verification of Litab's knowledge does not make the other types of botanical knowledge less valid. For example, Mostip was the only local expert who knew that the young parts could be eaten, and Sordin was the only one who remembered the myths associated with this plant. The biology, the uses, and the stories of *Amorphophallus* and plants in general are equally important components of the Rungus expert knowledge system.

Who, then, are the plant experts and how do they develop such different relationships with *Amorphophallus* and other plants? How is expert plant knowledge generated and transmitted? You don't arrive at wildly different destinations by traveling the same path. It is not just details that render Sordin, Mostip, and Litab's bodies of plant knowledge different; rather, it is fundamental thought processes, modes of inquiry, and patterns of memory registration that lead to their different conclusions, and this makes the Rungus indigenous knowledge system as epistemologically complex as our own.

Attentiveness to the multiple forms of indigenous expert knowledge is the first step toward protecting the full knowledge systems and their processes rather than specific isolated information. 'Folklore' is not an appropriate synonym for 'indigenous knowledge', as the lore only appears in mythical knowledge. Likewise, indigenous knowledge is not necessarily transmitted orally; practical indigenous knowledge is more effectively shown, not spoken.

When asked how they acquired their wealth of plant knowledge, all three experts say that the knowledge was passed on from their related elders. They know more about the forest than other people, they say, because they were curious children and asked many questions. This alone makes the point that the transmission of botanical knowledge is not a passive activity for the learners; however, it does not neatly explain the process of knowledge transmission. Even though these men refuse to claim agency in the generation of plant knowledge by telling me that it is age-old information, passed on through family lineages, my observations and active participation in the processes of knowledge generation and transmission

contradicted this simple explanation. Instead, the acquisition of plant knowledge, particularly regarding the classification and ecology of plants, is a carefully iterative, on-going, and collaborative process. Ideas are continually clarified and reconfigured to accommodate new observations, experimental results, and inconsistencies.

A final point is that even among a cohort of middle-aged male Rungus plant experts, significant variation in knowledge exists. Rather than attributing this variation to mildly different life histories and experiences (see table 1), I suggest it results in part from the diverse ways each of these men engages with their environment and information about it.

Forms of Ethnobotanical Knowledge

The Rungus explanations of the morphological peculiarity of *maja-raja* and *sogkong* parallel the attempts of outside ethnobotanists to make sense of the confusing variation of indigenous knowledge systems. In both cases, some people create stories, others have patience only for practical information with utilitarian value, and still others try to envelop complexity with simpler, more robust theoretical explanations. The heterogenous literature on ethnobotany and indigenous knowledge takes several forms embodying these three different *ways of knowing* – mythical, practical, and theoretical – that parallel Sordin, Mostip, and Litab's *Amorphophallus* knowledge.

Myth

In the process of knowledge generation, myth is the form and the phase responsible for inspiration, reproduction, intimacy, creativity, and meaning. One form of literature on indigenous knowledge is the mythical adventure or mystery story.

> As soon as I heard his name, I almost dropped the glass jar. I had been about to give a plant lesson to the best-known Maya medicine man in Central America. Great and terrible stories circulated about this old Maya doctor-priest. Some spoke of near-miraculous healings, cured diseases, and numerous saved lives clutched from death's bony hand…

The above excerpt is from Rosita Arvigo's book, *Sastun: My Apprenticeship With a Mayan Healer* (1994: 7), a tale that inspired many young ethnobotanists to pursue the field academically. Mark Plotkin's *Tales of a Shaman's Apprentice* (1994), popular news magazine articles about Paul Cox's work in Samoa (e.g. Hallowell 1997), and National Public Radio stories featuring Wade Davis's journeys through the tropics (Chadwick 1998) serve the same purpose: they are dramatized and personalized ethnobotanical narratives that have spread awareness of the value of indigenous knowledge and have inspired many forms of investigation.

Writers who rely on narratives and myths to describe and explain indigenous knowledge may exhibit less concern for empirical truth than for the perpetuation of the political story contained within. Brosius (1997, 1999) highlights how Western environmentalists constructed Penan knowledge about, and relationship to, their local ecosystem in Sarawak, Malaysia. This indigenous group has been held up as an icon for environmental activism in part to create a high-profile campaign against destruction of biocultural diversity worldwide.

But myth is far more than a useful tool in ideological struggles. Because mythical knowledge is local and contextual, it supplies the historical and cultural framework necessary for the creation of more analytical levels of knowledge, granting knowledge holders insight into the present by providing perspectives of the past. This richer conceptualization of the present allows for greater self-determinate explorations of alternative explanations and more complex levels of analysis of events and phenomena (Dove 1999). Mythical knowledge also serves as a rhetorical device for conveying culturally-specific meaning and value.

Utility

Utilitarian knowledge is universally valuable because it is easily consumed and measured. It is an asset that can be lost, saved, discovered, and extracted from the context in which it was created.

For this reason, the Western/outside world has often elevated it above other forms of knowledge. The ways in which we discuss the loss or disappearance of traditional knowledge, and our attempts to protect it, reflect the ways in which useful knowledge has become commodified and privatized.

Practitioners have articulated the demand for globally appropriate and practical protocols for assessing, understanding, using, and saving indigenous knowledge for conservation, sustainable development, or bioprospecting purposes. The American Association for the Advancement of Science has published a handbook "designed to make intellectual property protection issues and options more understandable to traditional knowledge holders…and professionals working with local and indigenous communities" (Hansen and VanFleet 2003). Abundant examples of similar handbooks have resulted from the Convention on Biological Diversity and the World Trade Organization Agreement on Trade Related Intellectual Property (TRIPs).

We might ask ourselves, what is the impetus for protecting this cultural knowledge diversity? If biocultural diversity is preserved *ex situ* in its translocal, utilitarian form, then it becomes input for a global scientific or economic system that seeks to use and control it. Utilitarian information, such as medicinal plant or wild food preparation, is powerful, not in a knowledge-based context,[3] but because it can be easily mobilized, extracted, and reconfigured for generic use, and is amenable to neo-classical economics. Utilitarian knowledge then becomes an asset that, if not actively managed and conserved, will be lost, and when actively managed and conserved is inevitably modified.

Theory

Indigenous knowledge literature also takes a theoretical form, particularly prolific in academic circles where definitions are discussed and discourse is created. For example, numerous scholars theorize about and attempt to demonstrate the utility or adaptive nature of different societies' mythical complexes, using robust evolutionary principles to make sense of the perpetuation of myth in indigenous knowledge systems. Explanations about the ecological rationality of sacred cattle (Harris 1966) or bird augury (Dove 1996) provide two examples of this academic genre of indigenous knowledge literature.

Theory is fundamental to knowledge generation because it allows for more syncretic conceptual analysis; the creation of ideas, vocabulary, and discourse, and ultimately sense-making. An understanding of the epistemological origins and processes of dynamic knowledge systems is more empowering, validating, and legitimating than a record of the knowledge as data or information, but this understanding alone lacks the economic value that attracts funding necessary to do the research in the first place. Furthermore, this understanding, though empowering, is not intrinsically useful; neither is it accessible to a wide audience the way myth and lore is.

It is necessary to see and understand the trends of our thinking and data collection so that we can consciously improve them. Theory is the necessary foundation for participating in the discussion and decisions about what the issues and concepts are, and how to fix or manipulate them toward different ends. Only in evaluating our work do we have the perspective to do as Litab did – toss out old paradigms and make room for new and more appropriate ones. Recognizing the role of theory in our own knowledge system should encourage acceptance of complex conceptual understanding in indigenous knowledge systems.

Conclusion

In her introduction to the book *Ethnoecology: Situated Knowledge, Located Lives,* Virginia Nazarea defines ethnobotany as "a serious attempt toward the understanding of a local point of view about a realm of experience" (1999: 3). She writes:

> We have been distracted long enough, our energies diverted toward deciphering or imagining regularities and uniformities when in fact the irregularities and variations are infinitely

> more powerful and relevant. We have been forcing our ideas and those of our informants and collaborators into paradigmatic monocultures—into some form of hypercoherence—when in fact it is the variability, in our concepts as well as in theirs that constitutes the challenge (1999: viii).

The point is not to make myth consistent with the tenets of global science or market economics by demonstrating the utility of it, or to make all theoretical conjectures practical,[4] but rather to recognize the distinct forms of inquiry and phases of knowledge generation.

Mythical, practical, and theoretical knowledge have different roots and different uses, but they are all authentic. To say they are authentic, however, does not make these forms of knowledge commensurable, nor does it imply that they are equally arbitrary, relative, socially constructed, and political interpretations. When indigenous knowledge holders are portrayed as icons of the environmental movement, myths and rituals such as Sordin's, passed on through oral tradition, become the most powerful forms of knowledge. When indigenous knowledge is considered as a resource that can be tapped to contribute to translocal scientific knowledge for sustainable development, environmental management, drug discovery, or other entrepreneurial ventures, Litab's and Mostip's knowledge become the commodities because their understanding is scientifically accurate and therefore translocally applicable. In elevating one form of knowledge over another, however, we simplify and restrict the epistemological complexity of the indigenous knowledge system. Agarwal writes:

> Indigenous knowledge research therefore appears to contribute to the accumulation of exotic ethnographic documentation and databases which are sterile and undynamic from a development perspective, even potentially disempowering people by representing their knowledge in ways inaccessible to them and beyond their control and perhaps infringing their intellectual property rights (1995: 234).

Such simplification reiterates and reinforces the very political problems and power imbalances that the literature on indigenous peoples and knowledge systems has been at pains to illuminate (Sillitoe 1998; Baviskar 2000).

The more proficient we become at understanding different forms of knowledge in our own system, the more adept we will be at appreciating different forms of indigenous knowledge – an appreciation of endogenous knowledge and resource management systems that, as Sillitoe (1998) points out, is vital to facilitating effective interventions. Efforts at biocultural conservation will be more likely to succeed not only if the mythological and technological worth of indigenous knowledge is successfully established, but if the epistemological complexity of indigenous knowledge systems is realized. This requires maintenance of peoples' capacity to both reason through and emotionally experience the conservation and development decisions that they adopt, something that happens not through disembodied preservation and stagnation of practical indigenous knowledge but through maintenance of the processes by which knowledge is generated.

If *Amorphophallu lambii* were threatened, like indigenous knowledge systems are, and we sought only to protect the leaves because they are edible, or the fruiting form because it inspires funny tales, we would fail in our efforts to save it. Each of its forms represents a fundamental phase of its life-cycle. If we see the entire plant for one of its three forms, we do not even begin to appreciate its fascinating complexity. If I had ignored Sordin's practical joke with the stinky flower, or if I had failed to ask Litab about *maja-raja's* reproduction, I would have left Borneo with inadequate respect for Rungus plant knowledge.

Acknowledgements

This essay emerged from ethnobotanical research, the success of which I attribute to the persistent dedication and support of many people. First and foremost, I thank the Rungus community and plant experts in Muttungung, Sabah, for the dedication, flexibility, wisdom, insights, and senses of humor that made this research both feasible and

fun. Thanks also to George and Laura Appell for their vision of biocultural protection and for inviting me to take part in this important research. I wish to express considerable appreciation to the editors of the 2004 TRI bulletin for their patience, persistence, and perceptive comments and to Peter Taylor and the spring 2003 F&ES 759 class for engaging, stimulating, and reflective conversation about knowledge generation and collaborative processes. Finally, this research was made possible by generous funding from the Firebird Foundation, the Tropical Resources Institute, the Agrarian Studies Program, and the Council for Southeast Asian Studies at Yale University.

Notes

[1]I primarily use the term indigenous knowledge throughout this essay when referring to expert and traditional knowledge about the local northern Sabah ecosystem.

[2]Names have been changed.

[3]In fact, utilitarian knowledge is more often skills than concepts (see Sillitoe 1998: 229) and might not even be considered knowledge.

[4]The last sentence of Sillitoe's (1998) generally well-received paper states: "We shall be assessed, in the spirit of the age, against the reliability and usefulness of the information we collect" (235).

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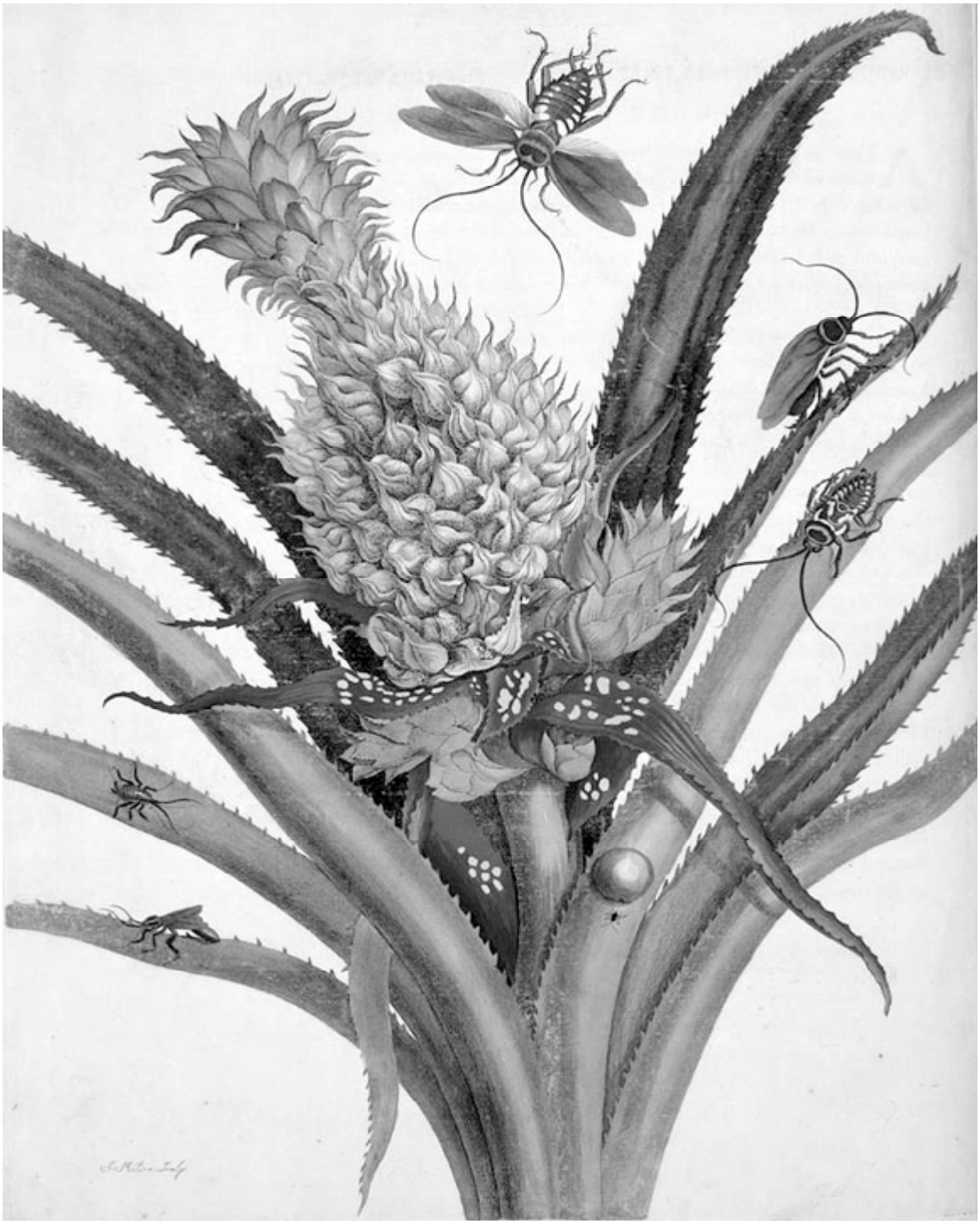

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Ethnographies of Territorialized Terror: Research Within Violent Environments[1]

Kevin Woods, MESc 2004

Introduction

This paper presents ethnographic research without reference to place. My original draft documented an ethnic minority's emerging environmental struggle against an encroaching national government after a recent ceasefire agreement.[2] Upon revision, I decided that fully disclosing where I was, what I was doing, and the information on local resistance could potentially harm my informants, their movement, and my research agenda, were the original version to catch the eye of the wrong government official. Employing this experimental ethnographic style by not referring to place acts as one example of the distinct challenges a researcher encounters when working within a site of terror. In this essay I will explore some of these challenges of methodology, ethics, and representation.

My research examines the environmental effects of shifted political alliances among local ethnic minority leaders, cross-border businessmen, and local/national government officials after a ceasefire agreement was brokered between the ethnic minority political organization and the national military dictatorship.[3]

I borrow from the disciplines of political ecology and anthropology of violence to understand how these shifting political, commercial, and military boundaries map onto natural resource flows. The situation studied here shows a counter-intuitive relationship between ceasefires, the resulting 'peace', and environmental degradation. Ostensible peace, I assert, has paradoxically paved the path for ecological destruction and 'violent development'.[4]

Political Economy of Ceasefire Concessions

My research site is located along a violent national border area lying within resource-rich Country A. This nation is controlled by a military dictatorship and is adjacent to Country B, a politically strong nation with high economic growth and friendly diplomatic relations with A's military dictatorship. Both Country A's endogenous militarized conflict and Country B's strong influence on its neighbor are inextricably linked to the processes of 'violent development'.

The relatively long border has been incorporated into Country B's economic development plans, especially since a recent logging ban and the inception of a national campaign to develop its poor land-locked provinces, one of which borders country A.[5] Country B is seeking to realize economic gains, while addressing national and international environmental concerns, by relocating the ecological and social costs of development across national borders. Thus, cross-border development becomes realized through clear-cutting forests and extracting valuable minerals from Country A's ethnic minority state. This situation also provides expedient employment and investment opportunities for unemployed loggers as well as for logging and infrastructure companies from Country B. None of these activities benefit the local ethnic minority as they are marginalized from any economic activity in resource extraction. The timber, once past border check-points, becomes distributed to Country B's major urban centers to be sold for the booming domestic market and to feed global timber demand.

The national government in Country A applied coercive economic measures in the early 1990s to

persuade the ethnic minority into a ceasefire agreement, largely by granting logging and mining concessions to the ethnic minority business elites at the expense of local ethnic minority control.[6] For example, prior to the ceasefire, mineral extraction funded the ethnic minority insurgency. However, after the ceasefire agreement, the national government gained territorial control over the mineral mines and subsequently sold extraction rights to wealthy businessmen across borders while excluding the local ethnic minority. This, in turn, shifted the ethnic minority's principle income generation activity to selling timber to cross-border businessmen, since their remaining territorial claims were still relatively abundant with valuable tropical timber. This alteration of the ethnic insurgent economy, which has led to drastic increases in the deforestation rate, reflects a re-territorialization by the national military government following the ceasefire agreement.

In Country A, I assert, the national military regime's desire to establish ceasefire agreements with the multitude of ethnic minorities comprising the nation is a sub-text to its project of violent nation-state building. Absolute control of national territory enables the national government to liquidate the natural resources contained within the newly acquired territory, in order to access foreign currency needed for perpetuation of its authoritarian control through arms purchase and expansion of the military.

The national government attempts to justify and legitimize its seemingly apolitical resource exploitation by claiming that development will replace the now deforested landscape.[7] However, the ethnic minority often complained to me about the relative lack of promised development in exchange for heavy natural resource extraction. One ethnic minority source commented, "[t]he development in our state is not for our people. It is for the leaders on both sides." By "both sides," the informant meant not only the elites of both the ethnic majority and minority in Country A, but also business leaders in Country B. Another ethnic minority informant lamented, "[b]ut no benefits from the agreement have come to our community. It is put under the development program, but development for whom?" Ceasefire logging concessions represent 'structural violence' in which violence has been transformed from physical force into territorialized mining and logging concessions. As such, any natural resource extraction and development projects brought into the ethnic minority state by the national military regime remain bound to 'violent development'.

Modified Methodologies to Match Transformed Violence

Conducting research within a region of political unrest necessarily shaped my research methodology, the data that I collected and what I am able to publish. Ethnographic methodologies often artificially separate the culture of political violence from the research data extracted. The American Anthropology Association's (AAA) "Code of Ethics" and "Principles of Professional Responsibility" assume violence is "symptomatic of some social pathogen that is to be circumvented while maneuvering about the field" (Kovats-Bernat 2003: 212). But violence is an underlying attribute embedded within social interactions that evades methodological isolation and subsequent removal from analysis. Research methodology, therefore, must recognize that violence should not just be "treated as a surface effect of (its) origin" but rather be seen as a "condition of its own reproduction" (Feldman 1991: 20).

Violence manifests in different forms for different people within various political, economic, and social structures. This characteristic is exactly what enables violence to be transformed from civil war violence to ceasefire structural violence. David Keen describes the transition from conflict to relative peace as "representing a realignment of political interests and a readjustment of economic strategies rather than a clean break from violence to consent, from theft to production, or from repression to democracy" (2001: 38-9). Keen

succinctly captures the idea of 'violent development' in declaring that "violence has its roots in the political and economic processes of 'peace'," and suggesting that we look for "the violence inherent in the development and political consolidation of 'peace-time'" (1997: 67).

Violence is an inseparable aspect of culture, and cannot be dissected out in order to examine a 'pure' specimen or culture. Therefore, just as my research methodology cannot be isolated from violent conditions, development promised by a military regime cannot be separated from the repression that is its genesis. For the ethnic minority state, the ceasefires have facilitated further entrenched structural violence into ethnic minority territory, increasing ethnic disparity and ecological destruction. Violence and development, in this context, can be understood as mutually related and overlapping processes. Peace accomplished through non-democratic, non-participatory methods forced by economic coercion results in further instability, penetration of structural violence, and thus non-sustainable peace. Critically lacking is any attempt by the national government to address the sources of dissent that originally triggered the conflict.

Dilemmas of Ethnographic Representation in Conflict Areas

Conducting research on an emerging ethno-ecological movement raises serious issues of ethnographic representation. The ethnographer must take into account how the 'subjects' become portrayed and therefore articulated in the media, how this may influence the course of the movement, and the intended and unintended consequences of 'for whom' and 'about whom' the ethnographer writes (Brosius 1999a, 1999b; Dove 1999).

Conducting research in violent places challenges positivistic anthropological methodological notions of researcher control and ethnographic authority at the field site. Violent environments dictate that the field, and therefore the techniques to acquire data, remain elastic, unpredictable, and beyond the control of the ethnographer who must, for instance, rely upon local trackers for protection. In this way, the "premise that ethnographers inescapably exercise textual and social authority over the people they study" becomes blurred (Pierce 1999: 94).

Research in conflict areas may also include, at times, acts of deception, misrepresentation, and clandestine research, with the researcher invoking multiple identities dependent on varying field circumstances. Jennifer Pierce, an anthropologist interested in the complex operations of gender and power in the field, uses the term outlaw to describe the ethnographer's shifting position in the field. She claims that the "outlaw position is a multiple and discontinuous identity whose movement between positions proves to be a critical advantage in uncovering the 'regimes of power'" (1999: 96). By interviewing both ethnic minority elites and subordinates, I was able to better understand the external and internal ethnic politics of the struggle for independence.

While Michael Dove persuasively argues that "we need to worry less about the unintended consequences of our study of local organizations and movements, and to worry more about the intended consequences of our relative lack of study of central institutions of power" (1999: 225), conflict areas present a particularly complex situation in this regard, given the potential for and severity of the "unintended consequences". Engaging with a newly emerging social struggle embedded within a violent environment in a foreign country quickly becomes fraught with dilemmas, which is why in fear of harming either my informants or myself I decided not to refer to my research site by name in this paper. The problem with this decision, however, is that in doing so I negate the possibility for positive outcomes from my published writing, to the extent that empowerment of the ethnic minority remains a central objective of my work.

Even if fear of violent reaction to my work were not a consideration, my representation of the ethnic minority and their struggle could become a source of conflict (although this may be exaggerating the possible effects my own student research may have

on the conflict). It may be problematic to provide information about a struggle within contested territories, even with the intention of empowering the oppressed, when it could in fact lead to informing the oppressive party on the weaknesses of the oppressed.

Working in a landscape of 'violent development' has necessitated a deliberate shift from the notion of ethnographer as 'detached' observer. In order to better represent the power imbalance manifested in political and economic inequities between the governing dictatorship and the ethnic minority, I feel it is important to establish an overtly partisan position as I analyze and write up the results of my research. Thus I criticize state development projects that jeopardize local ethnic minority livelihoods and ecological integrity, but I choose not to problematize the ethnic minority struggle in my published writing. In keeping with providing a supportive representation, I am critical only of those ethnic minority leaders that conspire with the current government. This does not mean to imply that the ethnic minority does not exhibit similar power struggles or is in itself monolithic. I do not, however, delineate the internal ethnic minority power struggles, their own violent tendencies, or weakening in the movement from the post-ceasefire internalization of violence, since this detracts from their solidarity and therefore strength.

Ethnographic Methodology Carved out of Safe Spaces

My own fieldwork was dramatically modified as a result of doing research within ethnic conflict areas. In order to conduct research on this topic I took on the identity of a tourist when dealing with government authorities. While I never deceived my interviewees of my real identity and intentions, I have known people to employ alternative methodological tactics in order to extract information from others who they feel might give information to government authorities or would not provide information given the researcher's true identity. These tactics include having business cards displaying different identities to be used depending on the situation, such as a prospective financial investor in the logging industry.

In two major urban capitals of Country A my informants repeatedly notified me that they were under surveillance, and that we could only meet briefly so as not to alert military intelligence. I remained vigilant when traveling to interviews to make sure I was not being followed and stayed in hotels that I had been informed were not owned by, or on the radar of, the national military. I kept my coded contact information on my person at all times, and hid scribbled English interview notes without reference to time, location, or informant. I did not take any pictures of any informants or the location of interviews.[8] Also, none of the interviews were audio taped for fear of confiscation.

In Country A, the national government largely restricts the movement of foreigners to a few urban towns, with some possibility to adventure into the countryside with a hired driver and vehicle. The national military refused foreigners entry into territory aggressively controlled by ethnic minority insurgent groups. However, ethnic insurgent groups recently placated through ceasefire agreements usually permit foreigners to visit the major urban regional centers. In the particular ethnic state where I conducted my research, I was only permitted to visit three towns, one of which remained beyond reach due to monsoon rains. This of course constrained my data collection by limiting my interviews to relatively educated, urban, non-farmers living within locales directly under national military control. The only political leaders to whom I had interview access were ethnic leaders granted freedom by the national military to travel between national and ethnic-minority-controlled territory.

At times, these constraints perversely facilitated my research. Military personnel not only restrict the movement of people, but also monitor packages crossing borders. For this reason, I often volunteered to deliver packages for work friends within and outside Country A when traveling to and from the ethnic minority state. This served to put

me into contact with senior ethnic minority leaders, since it not only provided them information from friends outside, but also showed them that I was willing to help.

Within these constricted elements, I strove to maneuver within locally appropriate and appropriated avenues by relying more heavily on the "local ethic" (Kovats-Bernat 2002). Operating within local spaces carved out from the militarized environment becomes a daily practice as local people create elaborate systems of avoidance. For example, in the ethnic minority state there has been a displacement of politics into the religious sphere where they operate a relatively strong grassroots resistance. These inner religious circles greatly supported my research endeavors by leading me into their sacred spaces, even though this restricted my interviewees to ethnic religious leaders and their youth supporters.

Another way I was able to get access to the countryside was by legally traveling on public pick-up trucks and riverboats between towns accessible to foreign tourists. Although I was not allowed to wander around when traveling between these foreigner-permitted towns, I was able to roughly assess tree cover and general species composition, government reforestation efforts (such as fruit and valuable hardwoods plantations), infrastructure projects (such as roads and bridges), and location and quantity of ethnic-minority- and national-military-controlled road check points (which infers relative power, often shared, over specific territory). This limited visual access provided a general understanding of the degree of national government penetration into areas that had formerly been under the sole control of the ethnic minority, and its consequential effect on land use and ecological integrity. For example, all along transportation routes secured by the national military, such as the railway, swaths of forest have been clear-cut on both sides, often replaced by a few unmanaged valuable hardwood trees and national religious temples.

Conclusion

As resources become relatively scarce in stable, developed regions, there is an increasing demand for raw materials from less-developed countries that have retained the majority of their natural resources. However, I believe that as more countries become industrialized in the 21st century, natural resource repositories which the 'global North' has relied upon will become increasingly scarce in the 'global South'. This, in turn, will lead industrialized countries to seek these valuable capital inputs from new regions not as yet well-integrated into global natural resource extraction networks. As my case study illustrates, conflict areas are likely to be among these source regions, since they have not previously had the political stability, institutional capacity, or infrastructural development conducive to resource extraction.

Targeting violent territories for natural resource extraction often aggravates violence by providing funding mechanisms to fuel the conflict. Ethnic territories, which become valuable to outsiders for their rich natural resources, often encourage national and transnational actors to, at worst, conquer the territory through warfare or, at best, introduce coercive economic measures to gain access to the territory. However, as this article has outlined, extracting natural resources from conflict areas does not bring sustainable peace or economic well-being to the indigenous people. Instead, the intrusion perpetuates the conflict by not addressing the underlying cause of the violence.

This case study, despite the absence of references to place, can elucidate the ways in which 'peace for development' has failed by exacerbating ethnic disparity and ecological violence. Research in such sites is valuable in that greater understanding of the dynamics of these violent spaces can contribute to theoretical perspectives on the links between conflict, development, and conservation, which may provide lessons for more progressive peaceful solutions. Methodology, however, must correspondingly adapt in order to follow these new paths that researchers are traveling.

Notes

[1]I borrow the term "violent environments" from Nancy Peluso and Michael Watts' edited volume *Violent Environments* (2001).

[2] Since I cannot refer to the name of the ethnic minority, I will refer to them simply as 'ethnic minority', whereas I will refer to the ethnic majority ruling the military government as 'ethnic or national majority'. Although I will treat these categories as a single grouping, I do not mean to imply that these groups represent a monolithic entity. I apologize for any confusion or difficulty in reading that this may bear on the reader.

[3] The "cross-border businessmen" refer to those businessmen facilitating trading of resources across the border, whether they belong to the ethnic minority and/or majority within the country the research was conducted in (Country A), or from the bordering country (Country B). "Local/national government officials" refer to officials representing the ethnic minority state, as well as the national government of Country A and B.

[4] By 'violent development' I mean the deliberate transformation of brute violent force (e.g., warfare, forced labor, rape, etc.) into 'structural violence', or violence which manifests within political and economic structures. The ceasefire resource extraction concessions offered to outsiders by the government represent an example. Another can be seen in the construction of the only bridge crossing the major river from A's still-hostile ethnic minority state to Country B. While government officials claimed this bridge construction to be a gracious symbol of the 'modern development' promised in the ceasefire's wake, to ethnic residents the bridge represents a potent political symbol of domination over their territory, natural resource wealth, and religious devotion. A shrine dedicated to the government's declared national religion stands near the bridge entrance, which witnesses heavy traffic of timber and minerals being transported out of the ethnic minority state across the national border.

[5]Due to extreme discrepancy in development and economic achievement between Country B's relatively wealthy east provinces and the isolated poor western provinces, attention has shifted to target western border towns, such as along the border where I did my research, granting special economic privileges to encourage border development.

[6]The national military dictatorship, known for its human rights abuses, and the ethnic minority living in the far northern periphery of Country A, have been engaged in civil war over issues of democratic representation and ethnic sovereignty for many decades.

[7]See Ferguson (1994) for an account of how development initiatives, despite their purportedly apolitical promise of modernity and poverty alleviation, remain ideological displays for other masked political intentions.

[8]However, a digital camera proved useful in other settings because the memory card can be easily concealed to safely hide all photos recorded.

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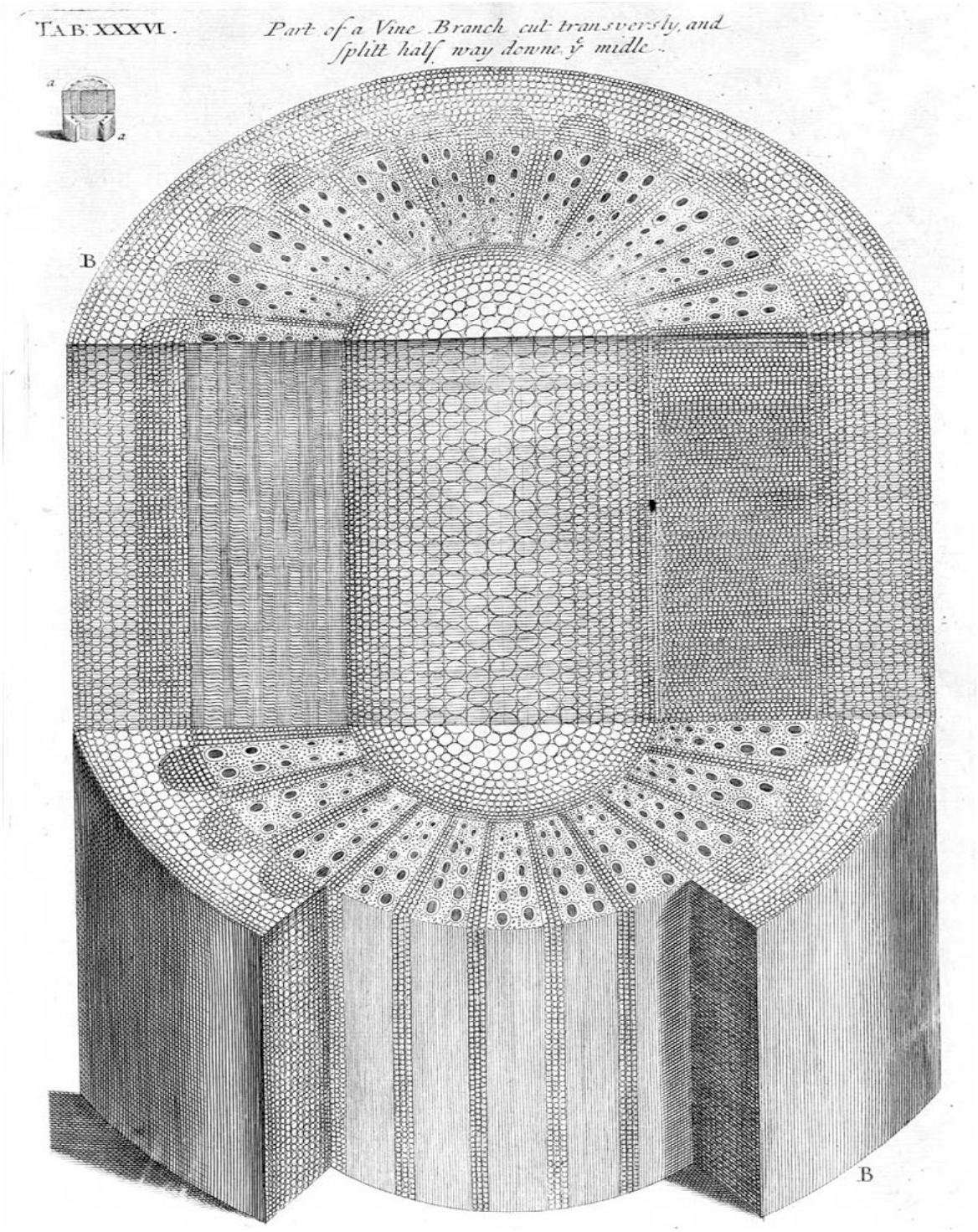

"Vine Branch"
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Agroforestry Strategies over a Lifetime

Robin Barr, MEM 2004

Introduction

Agroforestry and access to local forests play vital roles in the livelihood strategies and land management techniques of smallholder farmers in mountainous areas of Africa. By understanding how smallholders use and view on-farm and off-farm trees, agroforestry and forestry initiatives can be better developed to benefit the smallholder. In addition to providing products to smallholders, trees play an important role in the conservation of agricultural landscapes and the maintenance of biodiversity (Schoeneberger and Ruark 2003). A better understanding of how on-farm trees are managed and used by smallholders is thus not only applicable to poverty alleviation endeavors, but also to conservation efforts. Such information is especially timely since currently the nation of Kenya is re-structuring its forest management policies to be more responsive to local households' concerns.

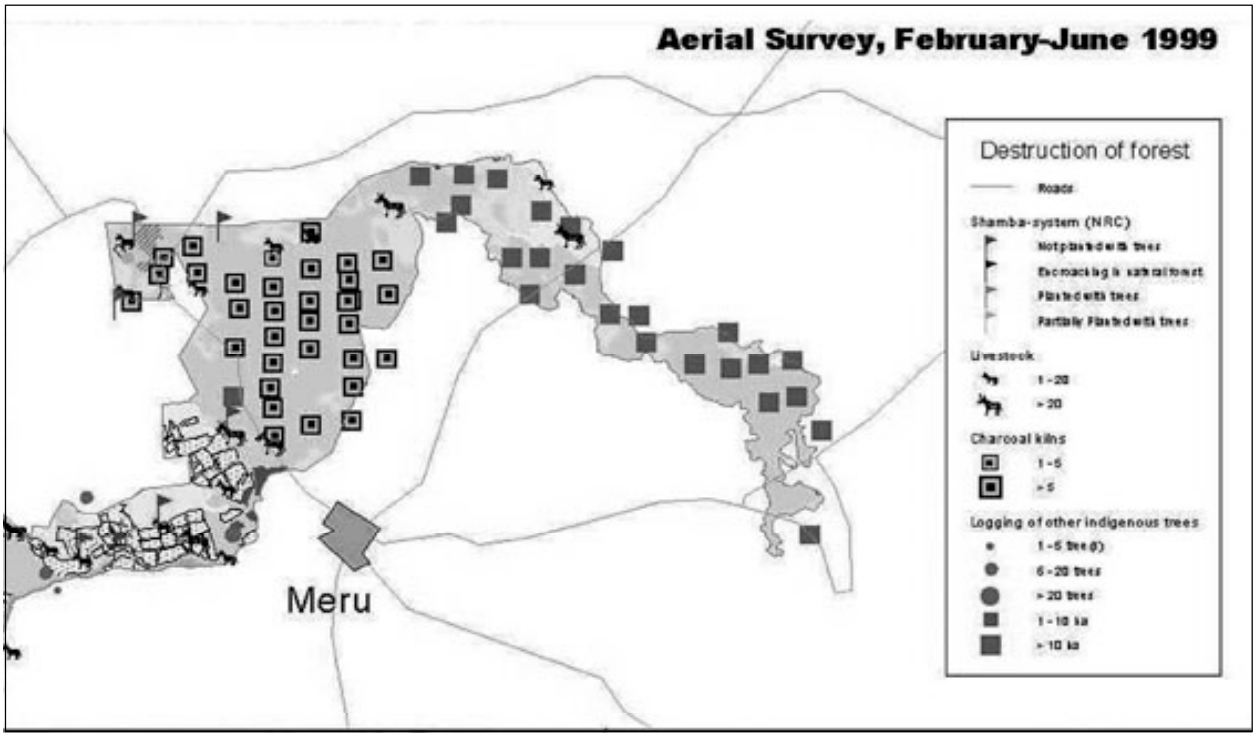
In this study I investigate tree management strategies and forest use of smallholder farmers in Meru District, Kenya. I pay special attention to why farmers plant and harvest trees on their land; what role tree utilization plays in their livelihood strategy, and its relation to smallholder farmers' use of forest resources.

Background and Site Description

Meru Central District[1] serves as an important agricultural center in the production of food and cash crops for the nation of Kenya. Located on the fertile northeastern slopes of Mt. Kenya, the district traverses four agroecological zones. Within this highly heterogeneous environment, annual rainfall ranges from 35-80 inches in the high altitude areas to 15-30 inches at low altitudes, with great variability from year to year (Bernard 1969). The area's economy is dominated by small landholders (Bernard 1969; Dolan 2001), who are involved in the production of a multitude of export crops as well as goods for regional and national agricultural markets. The large variety of agricultural opportunities for small farmers in Meru has resulted in a high demand for land in the region.

In addition to agriculture, Meru contains forest reserves historically managed by the District Forest Office. One of these reserves is Imenti Forest, which is broken into two sections by the Meru-Nanyuki highway running through it. The higher altitude section primarily consists of timber plantations owned by the district but managed by different private interests such as regional tea factories, local sawmills, and Kenya's telephone and electricity companies. Local farmers are often allowed to cultivate small plots in the plantations after the trees are harvested, in exchange for replanting tree seedlings after three years of agriculture on their plots. This system is known as the *shamba* system and is similar to the Indonesian *taungya* system. On the eastern side of the highway, "Lower Imenti" is native forest[2] managed informally by the forest department and local communities. Lower Imenti is reliant on natural regeneration and serves as a source of forest products and grazing areas for surrounding smallholder farmers.

In July of 2000, management of Imenti Forest was transferred from Meru District Forestry Office to the Kenya Wildlife Service (KWS), and the Kenyan Department of Natural Resources placed a complete ban on all cutting and entering of national forest reserves in Kenya, including Imenti Forest.[3] The closure of national forest reserves was in reaction to rampant destruction of Kenya's forests that occurred from 1995 to 2000 (Vanleeuwe et al.



Map 1: *Map of degradation of Imenti Forest based on aerial surveys done by Kenya Wildlife Service, February-June 1999 (Vanleeuwe et al. 2003).*

2003). Kenya Wildlife Service did aerial surveying of Imenti Forest in 1999 and found a high level of destruction due to illegal logging, charcoal burning, clearing of trees for cultivation, and grazing (see map 1). Meru District is currently in the process of reviewing rules governing management and access to the forest in light of recent local and national changes in leadership.

Methods

Findings are based on field research I conducted with a four person inter-disciplinary team in Meru Central District, Kenya from June through August 2003. I used semi-structured interviews with local leaders, key informants, and group interviews with self-help organizations to understand how forest reserves are managed. Interviews were performed primarily in the Kimeru language with the assistance of a translator. In addition, we performed a random survey of 40 households living within one kilometer of Imenti Forest to investigate tree planting and harvesting practices, household use of the forest, and changes in forest use and tree management after forest closure. I used open-ended questions in the survey and allowed myself to probe in unusual cases,

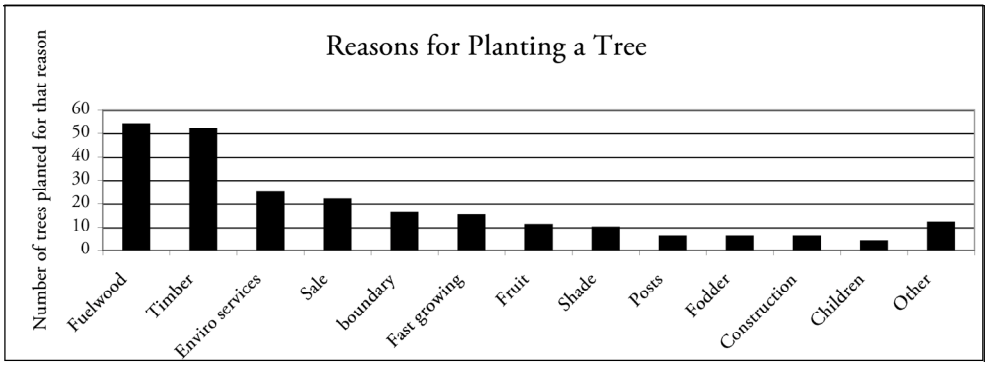


Figure 1: *Responses to open ended questions on why people had planted certain trees in the last five years.*

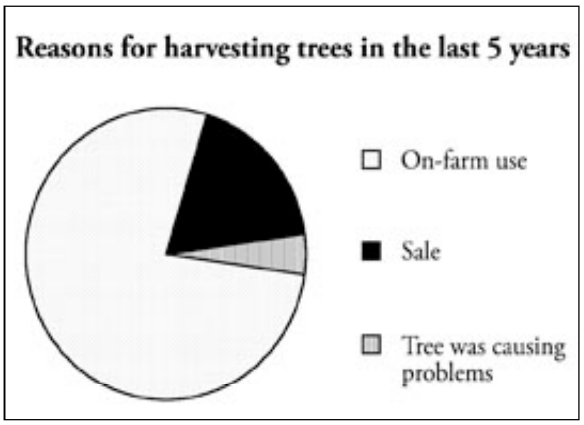
such as households that had planted an unusually high or low number of trees.

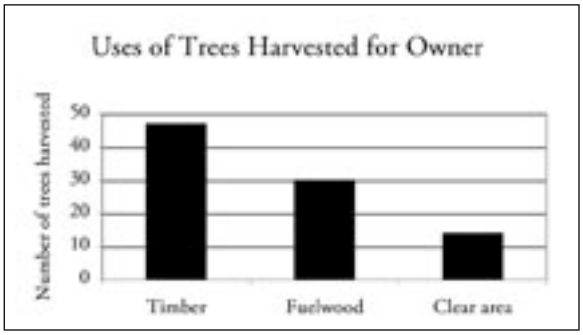
Results

Reasons for planting trees

Open-ended questions regarding why people planted trees on their farms usually rendered a laundry list of potential uses for trees with timber and fuelwood on the top, but no firm plan as to how the specific trees planted would be used (see fig. 1). Although farmers rarely had distinct harvesting uses planned, they were relying on on-going products and services from the trees, such as fuelwood, fruits, and fodder, as well as cultural and environmental services including boundary delineation, shade, wind protection, and increased on-farm moisture.

Ongoing discussions with households revealed a trend in decision-making in on-farm tree management that changed over time and was generally linked with the age of the household. Younger families were more concerned with space availability for trees on their farms than older families. Older families were often more concerned with the labor involved in planting, weeding and watering tree seedlings than younger families.





Figures 2A & 2B: *The Pie Chart in A (above) depicts the reasons given for harvesting each tree in the last five years. The columns in B (below) show how those trees harvested for on-farm use were used by the owner.*

Harvesting practices

The most common reason given for harvesting a tree was timber for building purposes on one's own farm (see fig. 2A and B). Often this involved a parent needing to build a child's home, or an elderly household building an income-generating or labor-saving structure. Such structures included rental houses, zero-grazing units,[4] chicken coups, and cow sheds. Tree harvesting among younger families typically occurred during the process of clearing additional land for crop-planting or was done to generate fast cash through charcoal production.

Tree harvesting was also commonly associated with changes in land use and ownership. For example, subdivision of land usually involved clearing trees from new areas for planting. Absentee landowners who rent out their land often had to clear sections of the property of trees so that those renting might have space to cultivate.

Uses of the forest

The most common uses of the forest before closure were fuelwood gathering and grazing (see fig. 3). Younger families seemed to rely on the forest for products more than older families and women used the forest more than men. This gender difference is largely due to the difference in tree use by men and women in Meru District. Men are primarily involved in uses of trees for construction or sale, while women use trees in an on-going manner for fuelwood, fruits, and fodder.

Since fuelwood is the most common use of the forest, women's activities were affected most by forest closure. Two women, in particular, reported that the forest closure had made them unable to cook beans for their families, due to the larger amount of fuelwood that beans required. Additionally, younger women were affected more

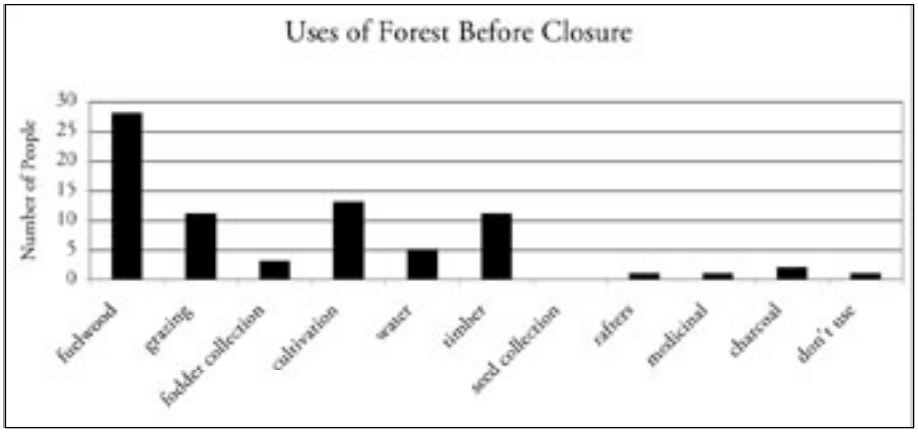


Figure 3: *Uses of the forest before closure and the number of people who reported using the forest in this way.*

than older women, as most older women got their fuelwood from on-farm trees. Two older women pointed out that this was a luxury they did not have when their family was young.

Discussion: Agroforestry Life Strategy Observed

The study revealed a culture of tree management in Meru that was largely intertwined with local perceptions of household lifecycles. This was a finding that was not predicted during survey design, thus the numerical sections of the survey were not designed to test for it. Rather, open-ended questions regarding on-farm tree management, planning, and decision-making revealed that household strategies were justified by farmers based on their own predictions of household trajectories in regard to labor availability, space availability, and resource demand. To better understand this, I will briefly discuss the household life stages as I observed them and as they were explained to me in Meru, and the role that on-farm and off-farm tree management practices played in these stages.

Inheritance and land restructure

When a young couple inherits land, tasks of delineating and establishing land boundaries, building a house, and preparing the land for cultivation are the top priority. This involves clearing trees in fields that will be used for crop cultivation and planting trees along the new boundary lines for delineation. It also involves planting fruit and fodder trees. Since young couples usually are lacking in capital but rich in labor, they tend to put a strong focus on crops as their main initial source of food and income, and rely on the forest for wood products. Shade from trees is believed to reduce the productivity of crops, so most mid-field trees are cleared from the new property. Harvested trees can be used for construction, gathered for fuelwood, or sold for start-up money.

The task of planting trees along the boundaries of the homestead is a labor-intensive, multi-year process. Seedlings of trees for boundary delineation are purchased and planted in large numbers since many planted seedlings reportedly "dry up" in the first year. Subsequent years involve replanting seedlings to replace those that have died. The approach to establishing fruit trees is different. Women are most concerned with fruit trees on the property and will brainstorm with their families which trees they want based on household fruit preferences. A woman will most often plant a seed from purchased fruit in a place that is either near the house or in a section she knows is fertile. Special attention, such as individual weeding, watering, and fertilizing, will be given to young fruit trees so that most will survive. This is because a single, well-tended fruit tree can usually provide plenty of fruit for a household, while many trees are needed to meet the household's boundary-delineation and fuelwood needs.

Land management: household diversification and income generation

As household members continue to manage their land, they begin to build up capital and become more efficient farm managers. As this increase in stability and efficiency takes place, farmers are better equipped to devote more of their

land to trees. Meru farmers perceive trees as sources not only of on-farm products (which reduces the labor requirements involved in going to the forest) but also as insurance and something that improves the overall quality of their land through moisture retention, wind control, temperature stabilization, and erosion control.[5] They also further increase the financial stability of the household since their sale can provide a single large payment of cash to the home. For example, one elderly couple reported harvesting their trees to raise money for unexpected hospital fees. Another man reported harvesting his trees to sell as charcoal during a drought year when the family was in need of cash due to crop failures. In contrast, one man who did not own trees on his land reported having to illegally harvest trees in the forest to pay for school fees. This was a practice he regretted but felt necessary, and he was able to relinquish it when state schools became free in 2000.

Aging households and on-farm tree management

As a household grows older, children become adults and start their own households, causing both expenses and labor availability to lessen. The ability of women to go to the forest is greatly reduced with age. The size of one's property also diminishes as the land is subdivided and passed on to children. For these reasons, elderly households will look for low-labor methods of making money and food from a small amount of land. Trees provide one viable way to do this. Elderly households that have a 'micro-forest' of timber trees can give other cropland to children, while retaining their trees. These trees can be used as secure, near-by sources of fuelwood and fodder, as well as timber. The elderly households interviewed used their timber to build shops, rental houses, chicken coops, or zero-grazing units. Shops and rental houses provide a regular income for elderly households to live on. Chicken coops and zero-grazing units provide low-labor, high-return methods of livestock management, but usually require large initial investments in terms of construction materials, which most young households cannot afford. The sale of timber trees can also provide capital for elderly households to invest in other money-making ventures.

Dynamic factors in household life cycles and agroforestry

The relationship between agroforestry strategies and household life cycles among Meru farmers is a dynamic process that is influenced by changing policies, technologies, and societal transitions. The major changes affecting tree management strategies that I observed in Meru District, Kenya involved the introduction of new, faster growing varieties of trees, a rise in the number of absentee landlords, fluctuating tree markets, and the recent ban on accessing Imenti Forest. The study also revealed that subdivision of inherited land is affecting household tree planting practices. Many people reported clearing trees when they inherited the plot and then, despite escalating demand for tree products, not replanting them because their land was too small now and they needed it all for crops.

Conclusion

In this study of smallholder agroforestry strategies, I found that the life stage of a household plays an important role in determining the on-farm tree planting and harvesting activities in Meru District. The implications of this are that forest policies unevenly affect different segments of the population. A continuation of the forest ban will put increased strain on young families who are already under multiple stresses due to the decreasing sizes of agricultural plots in Meru, expenses in providing for young children, and health concerns such as HIV/AIDS. This study can contribute to the prevention of rural-to-urban migration of young families by providing insight for policy makers on the subsistence strategies and risks of young households regarding forest and on-farm tree management.

Another important point to be drawn from this study is that the lifetime of a household involves a fluctuation in on-farm tree management and reliance on forest resources. This creates a dynamic landscape with temporal and spatial diversity where farm livelihood strategies fluctuate on an individual household basis, but also respond differently to changing policies and economic conditions. Trees from forests and farms play complimentary roles

throughout the household lifetime. This confirms the notion that on-farm trees and local forests cannot be managed as separate entities on the landscape, but must be understood as serving different and complimentary roles in fluctuating household strategies (Croll and Parkin 1992).

Notes

[1]The paper focuses on Meru District, Kenya, not to be confused with Mt. Meru in Tanzania, or the Wameru of Tanzania.

[2]The term "native forest" refers to a forest comprised primarily of native tree species.

[3]Letter from Minister Nyenze dated 14 July 2000; Legal Notice 93 of 24 July 2000; Ref. No. MENR 04/1A.

[4]A zero-grazing unit is a concrete stall (or series of stalls) for cattle that is designed to aid in the collection of manure. Zero-grazing units are usually accompanied by the on-farm planting of napier grass to feed the cows. This saves labor since on-farm fodder does not have to be carried far, cows do not have to be herded to the forest for grazing, and manure for farming is easily collected.

[5]Note that these are environmental services discussed by farmers and have not necessarily been proven scientifically to be the case in Meru.

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Haat Colors

Raji Dhital, MESc 2004

Introduction

Every 75 out of 100 people in Nepal are farmers and the majority are involved in the agriculture market system. Whether in a small *haat* street market or as part of the greater global economy, farmers have to face the uncertainties and complexities contingent on the market system. In a politically and economically faltering nation like Nepal, what does it mean to be a small farmer? The forces that determine the lives of farmers in this tiny landlocked nation between India and China, aptly referred to as "yam between boulders," extend well beyond its borders. How do the farmers in Nepal survive in the face of these forces, forces which they have no power to alter?

The *Haat*

Rangeli glows in an amalgamation of colors as the sun begins to wane in the early dusk. *Rang* translated into English means colors, and colors are the first thing that strike me in this small town. Rangali lies in a flat strip of plain called Terai that lines the southern border of mostly mountainous Nepal. Brilliant red, yellow, and blue saris of women, pure green color of vegetation and bright but gaudily painted shutters in Rangeli create a unique collage of colors.

Every afternoon a small muddy street corner comes alive with hundreds of bustling locals hurrying to get their goods into the street market, called *haat,* at the right time. "Right time," people say, means the "right price." You can get everything here: from local fresh vegetables to Indian "Fair and Lovely" cosmetic cream and cheap Chinese electrical goods. Compared to my hometown, Katmandu, everything seems very cheap, especially the fresh green vegetables. But there isn't enough of a market in Rangeli for all the vegetables produced here and people have to look beyond the *haat.* Biratnagar, the second biggest city, is just 22 kilometers away, but with a lot of competition it is difficult to get the "right price" there too.

A quaint little town on the Indian border, Rangeli is not the sort of place where one goes for no apparent reason. "Why would you want to go to Rangeli," lots of people have asked me. There was a time when Rangeli was the major trade point between India and Nepal. But after the Mahendra highway was built,[1] and Biratnagar became the trade center, Rangeli has become just a colorful town near the great city, a place where peri-urban farmers try hard to survive in the urban market. Rangeli is obscure but it is far from the most rural place in Nepal. I find it hard to describe Rangeli in superlatives: it is poor but not the poorest; it is remote but not the remotest. It just is, struggling everyday, receiving scant attention: one of those villages where poor farmers work to grow food seven days a week, twelve months a year, and sometimes cannot afford to eat what they grow.

The Research

I went to Rangeli hoping to understand what it means to be a farmer there and in places like it. I hoped to get acquainted with farmers' lives, their dreams and expectations, their involvement in the market economy, and how it has affected them. Both Rangeli and Biratnagar share an open border with India. The flow of Indian products and Indian policies has a major impact on almost all of the

market decisions made by its tiny land-locked neighbor, Nepal. Rangeli provided a perfect location for me to study the farmers' positions in the complex system of agriculture marketing from the street market *haat* to the urban markets. I wanted to know their relationship to urban consumers and whether farmers are the beneficiaries or the victims of the agricultural market system.

Though I am Nepalese, I am from Katmandu and this part of Terai is entirely new to me. Yet after spending a year in the U.S.A., I feel great warmth and familiarity in the colors that Rangeli infuse in me. On a sultry July morning I feel comfort in the earth radiating beneath me as I rush to keep my first appointment with the small farmers in a little teashop.

The Farmers

At seven in the morning the teashop is already brimming with activity. The aroma of strong tea wafts from a dusty teapot steaming on a big earthen stove. A young girl with bright eyes rushes back and forth with big cauldrons full of chickpeas. Dark-skinned farmers are clustered in a semicircle on the wooden benches that creak every time someone sits down. The farmers are getting ready for yet another laborious day, but they always seem ready to have an extra cup of tea and talk. "Do you have some time to talk to me?" I ask. "Are you working for the government?" they ask. Luckily, I am not, nor am I a development worker.

I say I am just a student without any paychecks waiting for me at the end of the day. "Like us, labor in the field twenty-four hours a day and no money," someone reciprocates. We have a common ground. Vishwanath Mandal seems to be the most talkative one; his wit and wisdom pleases us all. "What is the most important thing for a farmer?" he asks, answering immediately. "Grains. People think they can just buy them, but we actually produce them." "What about vegetable farmers, I heard that they make more money?" I question. "Money is important for farmers but so is grain; we can never afford to buy them if we don't grow them." His sentences carry a profound meaning. Poor farmers, all over the world, hold subsistence crops sacrosanct. In this part of the world, the majority of farmers plant rice and wheat as subsistence crops, some of which they sell in the market. Small farmers mostly plant vegetables for commercial purposes and a few big farmers plant jute and sugarcane.

The Nepalis

As the morning ripens, two landlords also join the teashop. The difference in status is visible as chairs are pulled out hastily for them and some farmers stand to make room for them. The farmers refer to them as Nepali, from up in the hills. Steaming tea arrives swiftly before Nepali landlords ask, and probably they won't pay for it either. I find it disturbing that the farmers from the plains, themselves referred to as Madhesi, distance themselves even further from their country and their landlords by calling the latter Nepali and not Pahadi, the correct word for people from the hills.

The Madhesi, literally meaning people from the lowlands, comprise an immigrant Indian population that migrated to Nepal in the beginning of the twentieth century. They still share strong cultural and social ties with India. The majority of the lowland region's eleven million people are struggling below the poverty level. Very few Madhesi hold a high government or military post; they are still considered somewhat uncouth and uncivilized by the Nepali elites. Madhesi-Nepali social relations extend one step beyond the regular conflicts between the richer and the poorer. They are poor *and* Madhesi.

The discomfort written visibly on their faces, Madhesi in the teashop now fidget with their food and look towards the Nepali whenever I ask a question. "Why don't you ask them, they own lots of land," Vishwanath says. "Vishwanath, if she is asking you, you must answer her," one of the landlords says before adding, to me, "What is it that you want to know?" His condescending tone reminds me of other Nepali landlords I met the day before. "Nobody can give you more detailed data

than us," they prophesized, "what can these Madhesi possibly tell you that we don't?" That is precisely what I want to know. And the Madhesi, it turns out, have a lot to say.

Vishwanath

Vishwanath, to my gratitude, is very forthcoming. Clad in checked mens' *lungi*[2] and long shirt, he looks like a typical middle-aged Madhesi. His eyes are exceptionally light in color but alert. "I didn't know that you were following us to the fields too," he says showing his caffeine-stained teeth, as we head off together after the Madhesi breakfast: tea, chickpeas and roasted rice. His Nepali is heavily accented and I can't speak Maithili, the language Madhesi speak. With a few Hindi words here and there, however, we manage to get along just fine. He is ready to answer my questions and makes me think of others that cannot be answered easily. Remarks that farmers casually make, like "How will we survive if we don't produce?," hold deeper meaning. I know it is not only they, but we too, in far away Katmandu, who can't survive if they don't produce. But the rural urban gap in this tiny nation is so wide that Kathmandu residents get further and further away from the problems that farmers like Vishwanath face to feed themselves and us.

The Problems

"Ah, ask me what is *not* the problem? Everything is so expensive. Money is a sizable problem. Hunger is a big problem, and this life is the biggest one," Vishwanath says. "Tell me about your life then," I encourage. Like the vast majority of farmers in Nepal, who own less than a hectare, Vishwanath owns just 0.66 hectares (1 *biga*) of land and sharecrops another *biga* from a big farmer. The disparity of landholding in Terai and elsewhere in Nepal is huge; roughly 30 percent of the households own 70 percent of the land, with the richest 2 percent owning about 18 percent. Concentrations of land in the hands of a few elite, and severe exploitation of the farmers through labor expropriation, have long been characteristic of Nepalese political economy (Central Bureau of Statistics Nepal 2000; Karki 2002). Various state-led grants and land tenures have ensured semi-feudal agrarian relations that still determine landlessness and agricultural underdevelopment. Land constitutes not only the predominant source of income but is also a symbol of significant social status and power in Nepal. The small size of landholdings pose a series of problems for subsistence farmers like Vishwanath, who are without any other skills and job opportunities, limiting their chances of raising themselves in the class hierarchy.

Money Matters

Vishwanath plants rice and wheat, the major subsistence crops in his little piece of land, and some lentils and vegetables. He would like to plant more vegetables for commercial reasons but doesn't have the means to do so. Without any kind of government subsidy or support, even planting subsistence crops is very expensive for the Madhesi here. "A farmer needs to invest in labor, fertilizers, pesticides, irrigation pumps and also in seeds for vegetable farming," Vishwanath says, "and everything costs money." Farming patterns are traditional and very labor intensive and traditional. Irrigation facilities are almost non-existent. Most people have to pump ground water by electric pump for irrigation, a substantial cost to small farmers. "I have to rent a machine for Rs. 80 per hour,"[3] Vishwanath says, and "I need around ten hours for a crop." Ironically, electricity for irrigation is the only thing that is subsidized by the government.

Vishwanath meets all production costs through loans, either from a bank with 18 percent annual interest or from the landowners or middlemen, who lend at the rate of 3-5 percent monthly interest. In spite of the higher interest, Vishwanath prefers taking loans from the landowners, because they are more flexible and there is little delay. Oftentimes repayment involves fixing the price of the crop even before harvesting. These conditions distance

farmers from the market economy and greatly favors the middlemen. After the hard work of one season, when Vishwanath harvests the crop, he divides it into three parts: for the middlemen as loan repayment, for the landowner as rent, and the little surplus that is left for his family. "I have a family of five and the grains last only for six to eight months. After that I have to buy the same rice for a much higher price. I feel like I am paying for the rice I labored to grow, but there is no way out. Sometimes I can't afford to eat what I grow." For Vishwanath, stuck with his little piece of land, high production investment, and unfair pricing mechanism, the agricultural market is unable to provide the means to break the debt and poverty cycle. He takes all the production risks without any form of insurance.

Natural disasters make these risks worse. I witnessed Rangeli being flooded in what farmers described as the worst flood in seven years. Tense faces watched with worry as their mud huts, newly planted seedlings, and newly caught fish submerged in water. Farmers scurried to find a relative's house to spend a night, as their own houses lay inside the flood. The colorful town had a look of a smeared painting as the downpour threatened to wash all its colors away. Will Vishwanath endure heavy losses because of the flood? Luckily, he says, the planting season had just started and very few farmers had actually planted the seedlings. Farmers were saved this year but it was a close call. Farmers' own perseverance, sense of community, and close network are all that are keeping them alive through the bad and good times.

Good times are when the production is high and farmers have a surplus to sell in the market, their only source of income. But with very low resources to invest on production, impoverished farmers like Vishwanath have no power to control the price of their product, which is in the hands of middlemen and a few wealthy businessmen.

The Market

My conversation with these wealthy businessmen however reveals that the most influential factor in determining the price is the Indian market. Agriculture in India enjoys better government subsidies and thus Indian farmers can afford to sell their products at a lower price than Nepali farmers. Indians have unrestricted market access to Nepal, so Nepalese domestic markets have to compete with the heavily subsidized products from India. Rising as the hegemonic economic power in South Asia, India controls Nepal by controlling all its trade entry points and water ports. Nepal, limited by its land-locked geography, economy, and chaotic politics, has little power to negotiate the terms and conditions set by its giant neighbor. The state heads of Nepal, eager to appease their big neighbor, have signed and continue to sign treaties that undermine Nepalese market autonomy.

Without adequate support for infrastructure, like irrigation or farming technologies, Nepali farmers have a hard time competing with imports from India, Bangladesh and other countries. While the state is busy contemplating agreements that will give it access to world trade, it is vulnerable and powerless Vishwanath in Rangeli and hundreds like him who stand to lose. Already, they feel they are being pushed towards an unfair market competition where someone else's victory is predetermined. Without giving adequate support to farmers so that the benefits from the market system are equitably distributed, going further into the 'free market' could devastate the Nepalese economy and agricultural production.

The Politics

There have been few instances of peasants' collective movements in Nepalese history; however, peasants have been a strong part of national political movements. From 1960 to 1990, Nepal had an autocratic single party system known as *Panchayat*. In 1990 the people's revolution saw the emergence of a democracy with a constitutional monarch, which ruled Nepal for twelve years until overthrown in 2002 by the King, who assumed all executive

powers. Farmers in Rangeli voice strong dissatisfaction with both democracy and its successor. "Government will do nothing for us," says Vishwanath. "People come to us only when they are campaigning for elections. There is no government for the poor." I ask what he thinks about the present king's action. "I have heard that it is unconstitutional," he says. "Is that good or bad?" I press on. "For me," he replies, "I don't care who is in power as long as the poor are not getting poorer."

The poor are getting poorer however, and pessimism regarding the political parties in power runs high. The previous democratic government has received a lot of flak for its mismanagement, inefficiency and corruption. "The twelve year ruin" is what one old farmer I meet calls the period. The old people even go as far as to reminisce the days of the autocratic *Panchayat* system, recalling fondly the petty bureaucrats called JTAs, an acronym for Junior Technical Assistants. "Earlier the JTAs used to come, talk and distribute things but now no one sees his face," they complain.

I have a hard time trying to find him too. After the third attempt I am finally able to meet with the present JTA. A proud educated young man, politically favored and supported by some of the bigger farmers, his indifference towards small farmers matches theirs towards him. "Ah," says Vishwantah disparagingly, "the JTA comes to our fields and asks for the biggest eggplant to show for the demonstration project for the Asian Development Bank." This gives me a glimpse at the gap between the "agriculture development projects" and the farmers.

It was the Asian Development Bank that coaxed the Nepali government into scrapping subsidies for the shallow tubewells used for irrigation, during the signing of the Second Program Loan under the 20-year Agriculture Perspective Plan. This has hit hard the small farmers, who are left without any access to other irrigation projects and deep tubewells.

The Chemicals

In the past few years government and non-government organizations have offered limited training regarding fertilizer application and integrated pesticide management. These have given a sense of authority to farmers like Vishwanath, and he has tremendous confidence in his ability to apply the right amount of fertilizers and pesticides to his field. However, no soil testing has been done for this area. Without any soil tests, both the JTA and farmers claim to "know" how much fertilizer should be applied. My own observations indicate that, rather than knowledge, it is the money farmers can afford to pay that determines the amount of fertilizers and pesticides used. And what is the result? Soils of Rangeli have a sad story to tell of increasing compactness and declining productivity. Though Nepal is still the country that uses the lowest amount of fertilizers in South Asia and perhaps in the world, concerns are emerging. Pesticide poisoning in people due to consumption of heavy pesticide residues in vegetables is increasing.[4]

Laboratories to check pesticide residues cannot be easily found, though some laboratories have been established for the promotion of soil testing. But for Vishwanath, the ride to the nearest laboratory in Jhumka is a waste of money and the loss of precious time to tend his fields; all for something he claims he "knows".

Without any alternatives, the cut in fertilizer subsidies in the early nineties has led to cheap fertilizers of unknown quality being smuggled from India to the doorstep of Nepalese farmers. Farmers themselves doubt the quality, but it is hard for many to resist the cheap temptation. Smuggling various goods through Rangeli provides such a good income that Indian smugglers recently donated money for road construction in Rangeli when the Nepalese government failed to come up with funds. Road projects often make headlines for their power to miraculously link rural people to market opportunities. True maybe, but this incidence in Rangeli shows whose interests these roads serve here. The deal between Indian smugglers and Nepali government would be laughable had it not reflected such government failure.

The Maoists

I get tremendously disturbed by the older farmers romanticizing the autocratic Panchayat era; for me this is proof of how democratic leaders have miserably failed the people in my own country. Furthermore, at the other end of the spectrum there is the Maoist revolution. Nepal has been struggling for the last seven years with a Maoist insurgency, which has left over seven thousand people dead. Most recruited to the Maoist's 'people's army' come from the poor, lower class families of peasants, not much different from the farmers that I am talking to, not much different from Vishwanath with his light eyes and stained teeth.

Terai region has been relatively free from Maoist activities, since the flat plains do not provide easy hideouts for guerillas, though some flatlands like Bardia are ravaged by the violence. However, as the civil war continues, the plains are getting more vulnerable. Many jokes are made about becoming a Maoist. I flinch when a young Madhesi laughs an empty laugh and says, "There is no hope. Maybe we should all become Maoists now. I hear they pay you Rs. 100 a day." Said in jest, chances of this young man being a Maoist are probably nil, but I am left chilled with the very real words: "no hope," "Maoists," "Rs. 100 a day." You read of at least a dozen Maoists getting killed in 'encounters' everyday. But yet jokes like this are made. Again and again. And political ideologies aside, Rangeli could also turn into the recruiting ground for the so-called people's army of Maoists like the Terai regions of Bardia. The youth in every poor community look for a way out.

Migration

More often than not, the way out leads out of the country. An exodus occurs from the Terai of Nepal to nearby Punjab, Hariyana, Calcutta, Pune, and further to the Middle East, Malaysia, and North Korea. India alone absorbs almost 90 percent of these cheap laborers. "Will you send your son to India too?" I ask Vishwanath during our conversation. "Well, maybe when he is older." He is not opposed to the idea. The labor conditions for such migrants are hideous, but a desire to break free from the poverty cycle drives hundreds of young men to different parts of the world. And it is the rural remittance from such places, especially India, that sustains many rural villages. Sociologists and economists argue that these remittances create a backflow of economy that perpetuates the poverty cycle in Nepal.[5] Indeed, with a constant supply of cheap laborers, India has nothing to lose and everything to gain from the poverty it helps to perpetuate in Nepal.

For Vishwanath though, there are always stories about someone making it big. "If you get lucky, he says, you can even afford to build a house in Kathmandu." Yes, that is a lucrative dream. Almost 90 percent of the approximately 200 farmers I talked to dream of a rich urban life, although some make it a point to say that if you are rich enough, villages are a great place to live too. None of them want their children to end up as farmers, it is too hard a life. But for almost every dream, there is an opposite reality. What is the use of wishing otherwise? "A farmer's son will most probably be farmer," Vishwanath says; "little chance that he will be a doctor, and that is the reality."

Realities

My interactions with Vishwanath and other farmers make it clear that there are layers of complex forces that affect their daily lives: local prejudice, land allocation, decisions of the state, the political quagmire, the global forces of capitalism and market competition. As a farmer of Rangeli, Vishwanath in his own way is trying to resist these forces, looking for ways out and most of all holding on to what is most important to him: to keep producing subsistence crops. He knows that he cannot put both his feet fully in the market, though it is important to him.

I cannot come out of Rangeli without being impressed by the perseverance and faith of the farmers, even in the face of hardship. I also cannot leave without a sense of trepidation for what the

future holds for Vishwanath and his children. As my rickshaw moves towards the Rangeli bus stop, confusion and sadness fill me. Now I know something of what it means to be a farmer in Rangeli, to be stuck in a cycle of poverty no matter how hard you work. I struggle not to lose my hope and my faith as I pass through houses that I surveyed, teashops where I showed up early in the morning to catch the farmers, the bridge that is still broken by the flood not so long ago, and finally the street market *haat.*

Haat Again

I can't resist getting off the rickshaw and walking around the *haat*. The myriad colors and the waft of aromatic tea energize my numbed senses. Do I sense a trace of hope here? Probably I do, because in the far corner I can hear Vishwanath naming a price, his own price for his eggplants and tomatoes. Aren't there lessons to learn here? As I watch Vishwanatah, bustling and bargaining, connecting directly with consumers, I realize how empowering it is for him to be in the markets; fair markets where he gets to fix the price. There are no easy answers as to what will give Vishwanath more control over what he produces, how he produces, and how he markets his produce. No ideologies borrowed from either the West or East can help to uplift the farmers if the markets beyond borders and businessmen beyond the villages govern the decisions, control the agricultural inputs, or dictate the market policies. Perhaps the Nepalese state could start by learning something from Vishwanath: being self-sufficient first, rather than committing to the global market system, where it has no negotiating power. It could start by investing in small traditional farmers, in better-facilitated loans, in better technologies, management, and institutional practices, rather than by emphasizing cheap imports. Bilateral and global markets can wait; first let us strengthen and expand our *haat.*

Notes

[1]Construction of Mahendra Highwa officially started in 1962; it was completed in 1991.

[2]*Lungi* is similar to a wrap, but worn by men too. It is a common outfit in Terai and is typically worn by Madeshi elsewhere.

[3]Nepal uses the Indian Rupee. Rs. 44 equaled approximately $1 in January 2004.

[4]Many newspapers have recently published news about pesticide poisoning in Nepal. See e.g. "13 people die of diarrhea in Bara" (*Kantipur* online, October 25, 2003); "Pesticides' ill effects" (*The Rising Nepal*, January 14, 2003); "Farmers use excessive amounts of pesticides in Makwanpur" (*The Kathmandu Post,* June 16, 2003).

[5]A number of authors have written about the negative feedback of remittance economy in Nepal. See e.g. Blaikie et al. 1980, 2002; Shrestha 1985; Seddon, Adhikari, and Gurung 2002.

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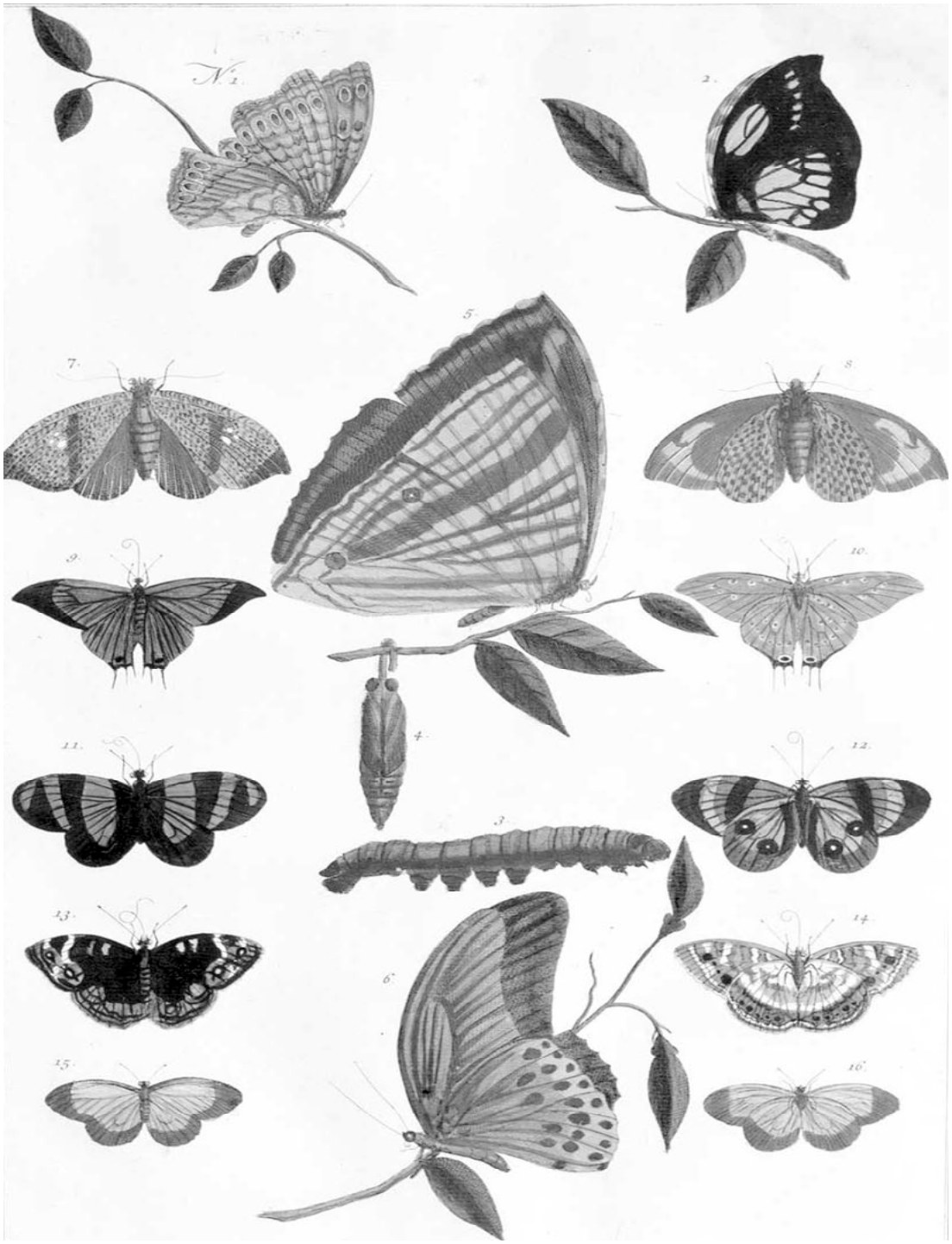

"Butterflies (Table V)"
In Locupletissimi rerum naturalium thesauri accurata descriptio. *By Albert Seba, Amsterdam, 1734-65. Beinecke Rare Book and Manuscript Library, Yale University.*

Community Responses to International Reforms: A Case Study of Nuevo San Juan Parangaricutiro, Michoacan, Mexico

Sarah Davidson, MESc 2004

Introduction

One of the underlying causes of Mexico's current deforestation is the far reaching effects of the current neoliberal economic development model, embodied in policies such as the North American Free Trade Agreement (NAFTA) (e.g., Klooster 1997, 2003; Bray et al. 2003). NAFTA promotes the tenets of economic efficiency and increased productivity through free trade and by opening previously domestic sectors to foreign investment and influence. Although not immediately obvious, these international changes trickle down and have far-reaching impacts, even at the village level, for member countries. The local effects of international reforms on forest management and community structure are the focus of my research in San Juan Nuevo Parangaricutiro.[1]

The indigenous Purepechan community of Nuevo Parangaricutiro, in the state of Michoacan, Mexico, communally owns and sustainably manages 8,449 hectares of pine-oak forest under Forest Stewardship Council principles (FSC 1996 Certificate SW-FM/COC-101). This community-owned forest enterprise provides timber and forest products for domestic and international markets and has been acknowledged as a major success in terms of "scale and level of maturity" (Bray et al. 2003: 673). However, this success has not been without its difficulties, such as those presented by major macroeconomic events like Mexico's signing of NAFTA.

Background

Political context

Political and economic reforms in Mexico began in earnest during the 1980s. External institutions promulgated neoliberal economic development policies designed to stimulate Mexico's recovery from heavy debts accrued during the late 1970s. In 1982, President Miguel de la Madrid, working under structural adjustment stipulations from the International Monetary Fund and the World Bank, pushed Mexico towards joining the General Agreement on Tariffs and Trade (GATT); this agreement allowed currency to leave the country and removed price ceilings on many goods. The new economic model departed from national ideology stemming from the Mexican Revolution (1910-1920) that had aimed to boost domestic production more equitably, distribute land among rural dwellers, and build domestic capacity in a diversity of sectors such as forestry.

Among the reforms embraced under the free-market-dominated development model, President Carlos Salinas (1988-1994) amended Mexico's agrarian reform law, Article 27 of the Constitution, a centerpiece of the Mexican Revolution. The amendment allows communally owned land, *ejidos*, to be privatized. Previously, property regime change was only possible by government expropriation. Land privatization occurred at the same time that Salinas aggressively pursued liberal economic reforms, which included free market strategies like joining NAFTA, cutting the amount of government subsidies to farmers, and beginning a rural 'modernization' program.

NAFTA and concurrent reforms to land distribution and government rural aid programs have led many rural communities to experience dramatic increases in deforestation.[2] Forested land

in Mexico is now both losing profitability and decreasing in area. Agricultural promotion was the focus of Salinas' policy changes in the negotiation of NAFTA, and as a consequence much forested land was converted to agricultural cultivation. Thus forest communities felt the greatest effect of federal decisions to embrace trade liberalization through a process closed to citizen participation.[3]

From 1970 to 1990, agricultural land use nationally increased 39 percent. In Michoacan, among the eight states with the highest deforestation rate, agricultural production increased by 29 percent. The Purepechan highlands, the focus of this study, are losing 1,800 hectares/year, approximately two percent of their forests annually, to agricultural conversion (World Bank 1995; Atlas Forestal del Estado de Michoacan 2001).

Competition from foreign investors adds to the struggles faced by forest owners, who are already competing with other productive sectors such as manufacturing or commercial agriculture. For example, Mexico's wood export trade has decreased while its imports from the United States have increased. Between 1989 and 1995, exports from the United States to Mexico were 3.5 times greater than Mexican imports to the United States (Lyke 1996). International traders, especially in the agricultural sector, are able to capitalize on a diversity of existing subsidies that correct neither distributional failures nor market externalities. Multinational corporations are able to attain subsidies as below-cost U.S. farm producers, as recipients of direct export subsidies, and as Mexican importers (Carlsen 2003). For example, the multinational agribusiness corporation Cargill receives the majority of subsidies in Sinaloa, Mexico's most heavily subsidized state (Carlsen 2003).

Nuevo Parangaricutiro as a case study

While the Nuevo Parangaricutiro community had anticipated that benefits would flow from NAFTA opening U.S. markets to Mexican agricultural and forest goods, instead they have found themselves both competing with U.S. companies in the domestic market and barred from selling to the United States. But although the current package of neoliberal reforms is creating difficulties for many forest dwelling communities (Brown 1997; Bray et al. 2003; Klooster 2001, 2003), a confluence of community-initiated adaptations, government support[4] and ties to cultural tradition have equipped Nuevo Parangaricutiro with the unique capacity to confront these changes.

Unlike many neighboring forest communities in the Meseta Purepecha, Nuevo Parangaricutiro is not experiencing deforestation. Nor has the community followed another common path in Michoacan, the world's primary exporter of avocados, and converted forest lands to avocado orchards. The community's forest activities, as explained below, are diverse and employ approximately 75 percent of the population (Gobierno del Estado de Michoacan y Centro de Investigacion y Desarollo del Estado de Michoacan 2002).

Nuevo Parangaricutiro figures prominently in academic literature on international development (e.g., Klooster 1997; Klooster et al. 2001; Bray et al. 2003). The World Bank (1995) described Nuevo Parangaricutiro as an exemplar for community forestry, placing villagers in the spotlight and suggesting that other communities should follow their example. While I would not suggest that the same adaptations or developments provide a general prescription for all community forests, or for problems of deforestation throughout Mexico, Nuevo Parangaricutiro does provide a glimpse into how one community has successfully confronted and negotiated the land use and land ownership conflicts that occur throughout Mexico and that are attributed to macroeconomic policies.[5]

Historical perspective

In understanding the specific effects that NAFTA has had on Nuevo Parangaricutiro over the last decade, it is helpful to begin by looking at the community's recent history. During the 1970s,

the community belonged to the Union of Ejidos and Indigenous Forest Communities of the Meseta Tarasca (Union de Ejidos y Comunidades Indigenas Forestales de la Meseta Tarasca), an organization that helped the community reacquire communal title from the various small private property owners of land that had been shifted from communal into private property. This early organization, however, was "not born of the community; it was born of the government who financed and facilitated everything, and it died because it didn't come from the community" (interview with community leader, July 2003). In effect, the centralized organization did not allow for enough community-initiated direction. By the 1980s, losing forest and money, the community had suspended its activities with the Union.

In 1981, the community's highest authority, the General Assembly, voted to invite a villager who owned a sawmill in Cheran, a near-by village, to set up business and marketing offices and to negotiate a deal with the major paper company in the state.[6] The sawmill owner was able to provide the necessary equipment, including the mill, tow truck and caterpillar tractor, for the community to begin community-based forestry operations.

Research Objectives and Methods

To understand Michoacan's community forests in their contemporary setting, the following objectives guided my research: (1) to gain an understanding of how Nuevo Parangaricutiro manages its resources and organizes itself, as well as what obstacles the community perceives as challenging; (2) to document land use and land ownership patterns, and (3) to understand if and how NAFTA trade reforms have influenced Nuevo Parangaricutiro's forest industry productivity and land-use decisions.

Through interviews with key informants in the community forestry enterprise, I examined what impacts, if any, had been felt in response to the recent neoliberal economic reforms embodied in NAFTA. For example, have sales and profits changed and how have changes in the Forest Law been received? In addition, participant observation after business hours, during celebrations and through everyday activities enhanced my understanding of communal organizing structures. Finally, I drew out perceptions of Nuevo Parangaricutiro and the community forestry management plan (Programas de Manejo/Estudios Dasonomicos) held by government officials in the State Forestry Commission (COFOM) and the Secretary of Environment and Natural Resources (SEMERNAT) in Michaocan's capitol, Morelia.

Results: Factors Contributing to Community Forestry Viability

During my research, five variables emerged as critical factors to Nuevo Parangaricutiro's success as a community forestry enterprise. These are: (1) vertical integration, (2) diversification, (3) strong traditional organization, (4) profit-sharing and (5) procurement of legal, communal title to the land. I will briefly discuss each of these below. The main NAFTA-related influences that surfaced were stagnant lumber prices, competition with the foreign plantation-forest industry, and increased competition to sell forest products, such as furniture, on the domestic market.[7] The following sketch of Nuevo Parangaricutiro's internal complexities provides a glimpse into local community dynamics that are simultaneously at play with effects of NAFTA's macro-scale reforms.

The first and perhaps primary enabler of Nuevo Parangaricutiro's success is that authority and decision-making power over each element of the forestry enterprise remain invested in the community. In development literature, this strategy is termed vertical integration. The community has purposefully constructed, over the last two decades, a complex and adaptive structure to oversee its forestry operations.

In 1981, the community began taking control over its own activities by acquiring a sawmill and thus ending the historical practice of government concessions and external unions that impoverished

many small forest communities. Eventually, community members also gained the right from the government to manage their forest using their own trained staff, who had apprenticed under past forest engineers and often had received some sort of technical training in forestry.

A second factor contributing to success is the diversification of community activities beyond forestry and agriculture over the last several decades. Eighteen different programs, each with its own staff paid for by the enterprise's profits, add to the wide safety net that the community has woven for itself. This is not to say that forestry is not a crucial element to community stability, as over 70 percent of employment is derived from forest related activities. However, the community sells much more than just timber. This is especially important because the price-per-board-foot has remained stagnant since 2000, a year after competing imports entered the market. In 2003, the community suspended exporting wood to the U.S. altogether because of a non-negotiable price cap imposed by U.S. buyers.

Recent diversified activities, funded partially by the federal PRODEFOR program,[8] include an ecotourism project associated with the Paricutin volcano, a white tailed deer protected area, and new mountain biking trails, all of which attract both domestic and international visitors. The roughly 15-year-old furniture factory is growing, and is looking into continuing education in order to make even higher quality products for niche markets. Villagers may also take a course given in the community to learn more about construction techniques, although the furniture made today is more or less the same as that made historically in the community, thus captilizing on a previous skill. Despite the factory's success, current profits are undergoing a decline due to imports of cheaper furniture from Central America and other countries. Meanwhile, transportation costs and duties add to exporting costs, making it unviable to sell furniture on the international market.

The third factor in the success of Nuevo Parangaricutiro is the strength of the community's organizing structure based on traditional and indigenous roots. The General Assembly, the highest legitimate decision-making body in the community, has origins that date back to pre-colonization.[9] The Assembly is open to every *comunero* and respective family members; its monthly meetings have run uninterrupted since 1983.

Like any governance structure, Nuevo Parangaricutiro does have internal disputes, and some villagers claim that a select few individuals have undue authority. The General Assembly elects three members to the town commissioners (Comisario de Bienes Comunales) and, as part of its responsibilities, attends to grievances among the *comuneros.*[10]

A fourth element of Nuevo Parangaricutiro's success stems from its profit-sharing structure. The first year that the community organized its forestry enterprise, it divided profits among each *comunero*. By the second year, the community elected to reinvest profits into the enterprise. Every year since, the community has again chosen to reinvest whatever profits are made, leading to the expansion of its enterprise, including the establishment of a capacity-building office and the aforementioned ecotourism ventures and furniture construction courses.

The final factor in Nuevo Parangaricutiro's success as a community forestry enterprise is the clarification of property ownership. Although there have been inter- and intra-community conflicts over property ownership, residents now share communal title to 18,000 hectares. The title has disentangled them, at least legally, from disputes with neighbors or individuals within the community over ownership, management and rights to the trees. Moreover, while individuals have title to parcels, passed down from a *comunero* to his male and female children, all extractive activities are coordinated by the professional forester and the community as a whole decides how land can be used, designating certain areas for farming or for forestry.

Land in Nuevo Parangaricutiro is designated

strictly to *comuneros*. For example, if a woman from outside the community marries a *comunero*, their children may be property-holding *comuneros*. However, if a man from outside the community marries a woman from the community, their children may not be property-holding *comuneros*. So, while population pressures have resulted in complaints that not every *comunero* has a large enough plot, access is restricted to ward off any further pressure on land resources.

Discussion: Market Efficiency versus Community-Directed Development

For the forestry sector, accommodating the NAFTA changes and recent Mexican administrations may mean shifting to "modern technologies" (World Bank 1995: xiii) such as automated sawmills that employ fewer people but "increase efficiency and productivity" (Victor and Ausubel 2000). Switching to less labor-intensive production under this model would decrease labor costs but would simultaneously increase unemployment in the forest sector. This would have a significant impact in Nuevo Parangaricutiro, where over half of the population is employed in forestry-related jobs.

The Mexican administration has long pushed industrialization with an emphasis on food production and inexpensive raw materials as the basis for rural development. Such policies have encouraged urban migration and unsustainable natural resource extraction, such as the high-grading that occurred in forests under the silviculture system prescribed as state policy from 1960 to 1980 (Segura *pers. comm.*).[11]

While much development literature validates communities' roles in the development process (e.g., Brown 1997; McDonald 2001; Caruthers 2001), critics counter that the communal systems have not effectively stimulated development (e.g., Schwedel and Haley 1992; Wood 1993; Bergsten 1996). For instance, the recent Article 27 tenurial changes to communal *ejido* ownership structures allow privatization explicitly in order to reverse the "unproductive and impoverishing" aspects of rural communities.[12] President Vicente Fox's current administration states that its goals are to create a "new rural culture" that is more "aggressive" and that converts "farmers, peasants, (and) producers into entrepreneurs" (Reforma 2000:8A, cited in McDonald 2001).

The underlying notions of efficiency and market-oriented growth inherent in these proscriptions of the World Bank and the national government are so central as to be seemingly beyond debate, forming the "very framework within which argumentation takes place" (Ferguson 1994, xiii). Moreover, James Scott has noted the conceptual simplifications made by macro-level institutions focused on the big picture at the expense of particularity, drawing attention to the way in which such abstractions can "privilege attention to a single outcome" (1998: 262-3). Such simplifications tend to disregard forms of organization such as community forestry enterprises, where individuals do not hold individual land titles or even receive direct profits. The indigenous knowledge that is ingrained in the practice of certain activities such as farming or forestry are often ignored, misunderstood, or unnoticed (Scott 1998).

A growing body of literature describes the ability of small, rural communities to manage their resources and meet community needs without recourse to neo-liberal industrial practices (e.g., Brown 1997; Klooster 2002; Bray et al. 2003). This literature also emphasizes the importance of the socio-political, cultural, and even linguistic diversity found within *ejido* and indigenous community systems. The significance of this uniqueness and variety is often glossed over or merely alluded to in the more economic or strictly political frameworks used to address rural livelihoods.[13] Conversely, however, Mexico's rural development problems will not be adequately addressed by treating community as a separate entity able to exist apart from regional, national, and international realities. It is only when we move away from envisioning communities as "an organic

whole" or "as standing in opposition to markets and states" that we will find "ways to negotiate differences within communities, interactions across them, and relations with actors outside specific communities" (Agrawal 1997: 2, 36).

As the attention to community forestry grows, appreciation is also growing for alternative development models. What is 'efficient' and "successful," we see from Nuevo Parangaricutiro's example, differs among the various actors and interests from the local to global level. This community exhibits considerable flexibility in its organizational and administrative development in order to meet its objective to be a profitable locally-based enterprise. Nuevo Parangaricutiro's adoption of a promising new silvicultural treatment – the *Metodo de Desarrollo Silvocola* (MDS), which has been viewed with suspicion by other communities – is an example of its ability to decide on proactive changes in local practice.[14] This adaptive ability is juxtaposed with a number of enduring traditions, such as commons property management, traditional celebrations and festivals, and even shared duties like taking turns sweeping common spaces. The combination of adaptation and maintenance of certain traditions is key to understanding this rural, indigenous community's dynamic forms of resistance and accommodation to the neoliberal development model.

Notes

[1]I will refer to the community as Nuevo Parangaricutiro from here on, since San Juan is the consequence of a Spanish re-naming in the 16th century and not how villagers refer to themselves; likewise, Purepechans are commonly referred to as Tarascans, but this is also a Spanish re-naming considered insulting today.

[2]Including Nuevo Parangaricutiro's neighbor, Angahuan.

[3]For example, the 'rural revitalization' program PROCAMPO intended to ease farmers' transitions after NAFTA-related reforms, but resulted in farmers clearing additional forests to increase their agricultural holdings and thus access to government aid.

[4]Because nearly 80 percent of forest belongs to communities, with the remainder on private land or protected areas, studying community interactions and management is crucial to any attempt to understand Mexican forest management. Several new government programs aimed at community and *ejido* forests, namely the Project for Conservation and Sustainable Management of Natural Resources (PROCYMAF) and the Project for Forest Development (PRODEFOR), began under the 1997 Forest Law. (www.conafor.gob.mx/programas_nacionales_forestales; PROCYMAF, Elaboracion de Programas de Manejo Forestale, Terminos de Referencia Estandar, 2003). However, the Plantations Development Program (PRODEPLAN), also started in 1997, originally had ten times the budget of community forestry programs. Although the gap has since narrowed significantly, the disproportion reveals a continuing federal bias for commercial plantations over community-run operations (Klooster 2003).

[5]Michoacan's forest perturbation is attributed to a variety of factors, such as land conversion to agriculture and cattle use (e.g., McDonald 1999, 2001), illegal logging by rural dwellers (e.g., Atlas Forestal 2001), conflicts among forest owners (Purnell 1999) and forest fire and health problems related to mismanagement (Atlas Forestal 2001). A document produced by the National Institute of Solidarity and Social Development (SEDESOL) states that Michoacan needs to resolve agrarian land disputes (Instituto Nacional de Solidaridad y SEDESOL 1997).

[6]Interestingly, this paper company has since been bought by the U.S. company Kimberley Clark.

[7]The community's avocado orchards are experiencing similar difficulties, with barred entrance into the U.S. market and competition domestically with the newly arrived U.S. avocado companies Calavo, Mission, West Pack, and Fresh.

[8]PRODEFOR, established under the 1997 Forest Law, targets sustainable development of

ejidos and communities. PRODEFOR coordinates with state governments to provide technical management and other forms of aid, and one explicit "objective" is to help *ejidos* and communities diversify production activities (www.conafor.gob.mx/programas_nacionales_forestales).

[9]For further discussion of Nuevo Parangaricutiro's history see Moheno (1985: 1-187).

[10]In this case, a *comunero* is a man of Purepechan lineage, traced through the father, and who has communal title in Nuevo Parangaricutiro.

[11]See Note [14] for a description of the state's silvicultural policy.

[12]Quoted in *The Backgrounder*, Oct 1, 1992 (quoted in Meyer and Sherman 1995: 698).

[13]See Haenn (1999), Brown (1997), McDonald (1999, 2001) for discussion of this problem see Schwedel and Haley (1992), Wood (1993), Bergsten (1996), World Bank (1995), Keipi (1999), Victor and Ausubel (2000) for examples.

[14]Using small clear cuts, seed trees, progressive cuts for natural pine regeneration, and collecting debris in such a way as to encourage seed contact with the soil while reducing fire hazard, the MDS system does not transform pine-oak forests into oak-dominated forests as do the older and more accepted systems used by many forest communities (Klooster 1997; Segura, pers. comm., November 2003). Both rural communities and silviculturalists in Mexico have resisted the change. Communities cite distrust of the more intensive MDS treatment, which results visually in a forest that corresponds to perceptions of degradation. Silviculturalists and producers, meanwhile, prefer the older system (*Metido Mexican de Bosques y Irreguliers*, MOBI), which allows extraction of the biggest and highest quality trees; the older MOBI system is used in 57 percent of Mexico's forests (Segura *pers.comm.*).

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Social Movements and the Scholar: Discussions at the 2004 World Social Forum

Compiled by Andrea Johnson, MESc 2005

In January 2004 some 80,000 people converged on Mumbai, India, for the fourth annual World Social Forum, the first to be held outside its original venue in Porto Alegre, Brazil. Since its inception in 2000, spurred in part by the 1999 WTO protests in Seattle, the WSF has emerged as a touchstone for 'global civil society', broadly writ.

If this massive gathering had a central goal it was, as articulated in the Forum charter, to provide "an open meeting place for…groups and movements of civil society that are opposed to neoliberalism and to domination of the world by capital and any form of imperialism, and are committed to building a planetary society directed towards fruitful relationships among humankind and between it and the Earth."[1]

During five overwhelming days, groups and individuals articulated their respective struggles and visions through a riotous array of venues and media: street theater and speeches, workshops and art installations, documentaries, banners, dances, graffiti. Within the official schedule, emblazoned with the WSF's lofty slogan, "Another World Is Possible," one could find literally thousands of workshops and panels on topics that ranged from plantation labor struggles in Sri Lanka to democracy and the WTO, from corporate eco-crime to caste discrimination. Among the options was a series of workshops organized in part by Nikhil Anand MESc '04, who formed, along with Carishma Gokhale MESc '05 and Andrea Johnson MESc '05, an F&ES delegation to the World Social Forum.

Social movements created spaces at the WSF for a rich variety of forms of expression.

The workshops, co-organized by F&ES, the Delhi-based Center for Equity Studies, and Federal University of Rio de Janerio, were entitled "Social Movements and the Scholar: Three dialogues exploring the academic-activist dynamic." Throughout these sessions, participants from both sides of this 'divide' discussed the tensions and opportunities inherent in negotiating what can be both a fruitful and a contentious relationship. For this piece I have compiled just a few of the many points raised.

"Taking sides": Truth and Ethics

Prof. Sharit Bhowmik, Department of Sociology, University of Mumbai (SB): Right from my beginnings as a PhD student studying tea plantation labor in northern India, I have believed that getting involved and not taking a neutral stand was really important if one is going to enrich one's research, that so-called 'value-free research' has no meaning at all. What is neutrality in research?

Kanokrat Lertchoosakul, Faculty of Political Science, Chulalongkorn University, Thailand (KL): In the postcolonial or developing countries that have a long history of political struggle like in Thailand, many academics were a part of the struggle and liberation movement. So it's very hard to say that you have to identify or draw the line between you and the social movements. Academics have played active roles as strategic advisors, as legal support.

For example, many activists and grassroots people in the current anti-dam and land movements have been put in jail, and academics have had to play a legal role to guarantee that those people will not be harmed.

Victor Munnik, Earthlife Johannesburg, Nuclear Energy Costs the Earth campaign (VM): In South Africa I've been engaged in research on a civil society water caucus group whose steering committee I'm on. One of the choices I had to make right from the start on this research was that if something that would harm the caucus came out in the research, or something that was not strategic to reveal, I would cut it out.

As a second example, we have to rely a lot on academics to provide knowledge to our anti-nuclear campaign. We had an academic who's part of our campaign give us a training on the political history of nukes in South Africa, where basically so-called peaceful nukes were a cover to make weapons of mass destruction. This was such a stunning history that we asked this academic to write it up, and the point I want to bring to you is that we specifically want this history as part of the media and advocacy campaign. So we asked the writer for certain emphases, to show the light on certain points. I think it would be academic to say that is a distortion, but it is a sort of a sharpening and a focusing and a making it effective for use in campaigning. So it's very partisan, but my message to you is that partisan is right and can work.

Mashile Phalane, Earthlife Johannesburg (MP): It's very important if you are academics to align yourself with who you are working with. If you are doing work on hawkers here in India, see yourself as a hawker and as part of that movement, so that you are able to get more and richer information – and work and feel and explain that research. There's no use if you just write research but you don't have feelings for it.

Adam Habib, Human Sciences Research Council (AH): I've been an academic for a long time, but I've also been an activist. Every time I'm in a discussion about this relationship, on the one hand you get a set of people who say that academics require a large degree of independence to meet academic responsibilities. Conversely there is the constant slagging off that academics get from activists precisely on the grounds that they tend to use social movements in a way that benefits their narrow academic interests, and then don't transmit a lot of the benefits back.

Now I think the criticism of academics is to a large extent deserved. But often in this discussion what people do is start quoting Edward Said, suggesting that we should be looking towards the role of the "public intellectual," the one speaks the truth to power. This needs to be qualified. Because power is not only state power. You also have power located in social movements. You have power located in collectives outside the state. Fundamentalist organizations exert an enormous amount of power. And it's important, if you want to be a public intellectual or an academic, to remain relatively independent so that you can speak the truth as much to state power as to the elites of movements, collectives, organizations.

Arguing for relative independence doesn't mean that you mustn't be engaged. You can surely be engaged, but you can be critical and reflective and, however difficult this is, raise the difficult questions that need to be raised.

Dr. Shekhar Singh, Center for Equity Studies (moderator) (SS): Working with activists while being primarily an academic, at least in India, I have found that the fundamental difference was that whereas social movements and activists had a loyalty to a cause, the good academics had a loyalty to the truth. Now sometimes the cause and the truth went together. But sometimes they didn't. Sometimes there was this strategic discomfort that if this particular truth came out, in this particular manner, it would harm the cause; and it's always a very difficult debate. I've always felt personally that in the long term sticking with the truth always helps, even if in the short term it seems to go against the cause.

VM: I'd like to bring us back to why we are in Mumbai at the moment. What is peace practice? How do we build an alternative world? There's a personal practice of personal responsibility, this applies to academics and activists and everybody.

And then there's a responsibility towards the political economy in which you find yourself – because you're not going to work like Rene Descartes sitting and thinking about it. What does this mean? First of all, academics have to be good academics. We cannot simply use the word "truth," as if there hasn't been 20 or 30 years of debate that truth is constructed, that truth is part of struggles about identity, about representation – I've really been shocked about academics ignoring their own inheritance as academics. Feminist methodology has dealt with these questions in a very profound way and we should not refuse that heritage.

Professor Lakshmi Lingam, Woman's Studies Unit, Tata Institute of Social Sciences, Mumbai (LL): Very clearly I think researchers need ethical guidelines within which to work with social movements, such as the guidelines that medical researchers and psychologists have for working with their 'subjects'. Something that will help us to ask from the first moment of a partnership: what is it we want when we do research together? What will the research be used for, and how we are going to take it forward as part of knowledge building? What are the basic principles and parameters? Privacy, informed consent, confidentiality, authorship, revealing funding: let's have all that on the board. If we need each other, and if we have a 'larger enemy', we need to come together.

Making Research Relevant

SB: A researcher's views about social movements, and the way society functions, can be very much an ivory tower outlook; we tend to look at things in a very broad-based way. On the other hand, I've found that people working at the grassroots also tend to be a bit myopic. The nexus between the two becomes very important and mutually enriching.

It is also necessary to make our research relevant. For example, one must realize that there is a lot of funding for studies on the poor – poverty, though it may be demeaning for the poor, can therefore be profitable for social scientists. Now the researcher has to ask: does my work have any impact on lives or is basically an academic exercise? And if the latter, then be honest about it, and let's not tax the patience and also the resources of these people just to give them false impressions that our work will matter. It might matter to me, because it might lead to a promotion or better projects in the future, but to what extent it is valuable, if my research cannot go back to help the people in their understanding and their critique?

KL: I have found that research conducted or initiated by the academic him/herself, particularly when s/he determines what questions are asked, is meaningless for the social movements. It may be significant in policy making for the elite and ruling class, but it's very hard to find any research paper that benefits, enhances, and empowers the movement. But in the research and mapping we are promoting in Thailand now, the grassroots people design and conduct the research, and academics play only a supporting role in conceptualizing and implementing it. This research from the people has become very significant material for the anti-dam movement. Also, the process of struggle and research has enhanced their ability to speak in the same language as politicians and academics.

But I still find it's very important for academics to work on research that puts critical issues and comments to the social movements themselves. Because it's true that movements sometimes lack the critical culture, and there's a lot of romanticizing among academics and people at the grassroots level. Sometimes they really need just writing and analytical and critical research in order to realize that being participatory and being radical will not always lead to success.

AH: There's what I call the romanticization of participatory methodology. Now I don't think participatory methodology is wrong – in particular contexts it's very very relevant, but methodology needs to be chosen in part by what you're researching. Some of the best research I've seen frankly is largely reflective work based on secondary studies. 'Blue-sky' ivory tower research can have fundamental impacts 20 or 30 or 40 years down the line. Let's be honest, academics tend to treat participatory methods as "things that NGO researchers do." And NGOs tend to think other

forms of research methodology are inappropriate. I think we need to get out of these homogenous dichotomies that say, "this one is good, that one is bad."

SS: As mentioned, academics need to raise questions for activists: is this really what you want to do? Is this really getting you anywhere? Is this really consistent? What is the larger picture within which you are working? As academics we shouldn't be apologetic all the time, thinking we are not really worth our salt unless we are supporting some social movement or another in a direct way.

Critiques of the linkage between U.S. economic and political imperialism, as exemplified in its most militarized form by the war on Iraq, were pervasive at the Forum.

Engaging Outwards

AH: The problem with the academy is it speaks mainly to peers. Academics write for journals in which mainly PhDs and professors read, and then they comment and they reflect on it. That peer review mechanism is an integral component of the academy, but it seems to me that it's incumbent upon members of the academy that you also reflect and are able to translate some of your work into a more popular discourse – be that the World Social Forum, the mass media, or some other public forum through which to engage the broader world.

SS: But there is a similar problem among social activist groups. They only speak to the converted. If I'm to organize a meeting on environmental protection today, 90 percent of the people who would come would be people who already believe in environmental protection. And so both have a problem to address: how does one develop a style which can reach out to those people whom you really want to reach out to?

Conclusion: Building Bridges?

Nikhil Anand, student, Yale School of Forestry and Environmental Studies: We've been talking a lot about the ways in which social scientists and activists can build bridges between each other, but I'm having a problem with the categories of scientist and activist, as many have pointed out before. Much of the social sciences emerges out of a historical engagement with colonialism, and the language and tools of the discipline have a political project. Conversely, much of activism is really building up from the social sciences and social theory. Is it possible for us to imagine knowledge being produced and accepted and shared between different categories of people? Is it possible to actually imagine the categories dissolved altogether, so that we can have ways in which people can talk about their experiences and be equally appreciated and acknowledged as valid, whether they are scientists or activists or movements?

LL: Perhaps we can think of both as possibilities, and think about dissolving as a larger goal but dealing with it – building bridges – as a short-term goal. Ultimately, a classroom is as much an arena for activism as anywhere else.

Notes

1. For more on the WSF, please see http://www.forumsocialmundial.org.br/home.asp, http://www.wsfindia.org/, or J. Sen, A. Anand, A. Escobar, and P. Waterman, eds. 2003. *The World Social Forum: Challenging Empires*. Viveka Foundation, New Delhi, India (available in part online through www.choike.org).

Announcing theTRI 2004 Fellows

We are pleased to announce the recipients of TRI funds for the summer of 2004. There are four sources of funding for tropical research this year at F&ES: the Tropical Resources Institute Endowed Fellowship, the World Agroforestry Fellowship, PRORENA, and the Compton Foundation Fellowships.

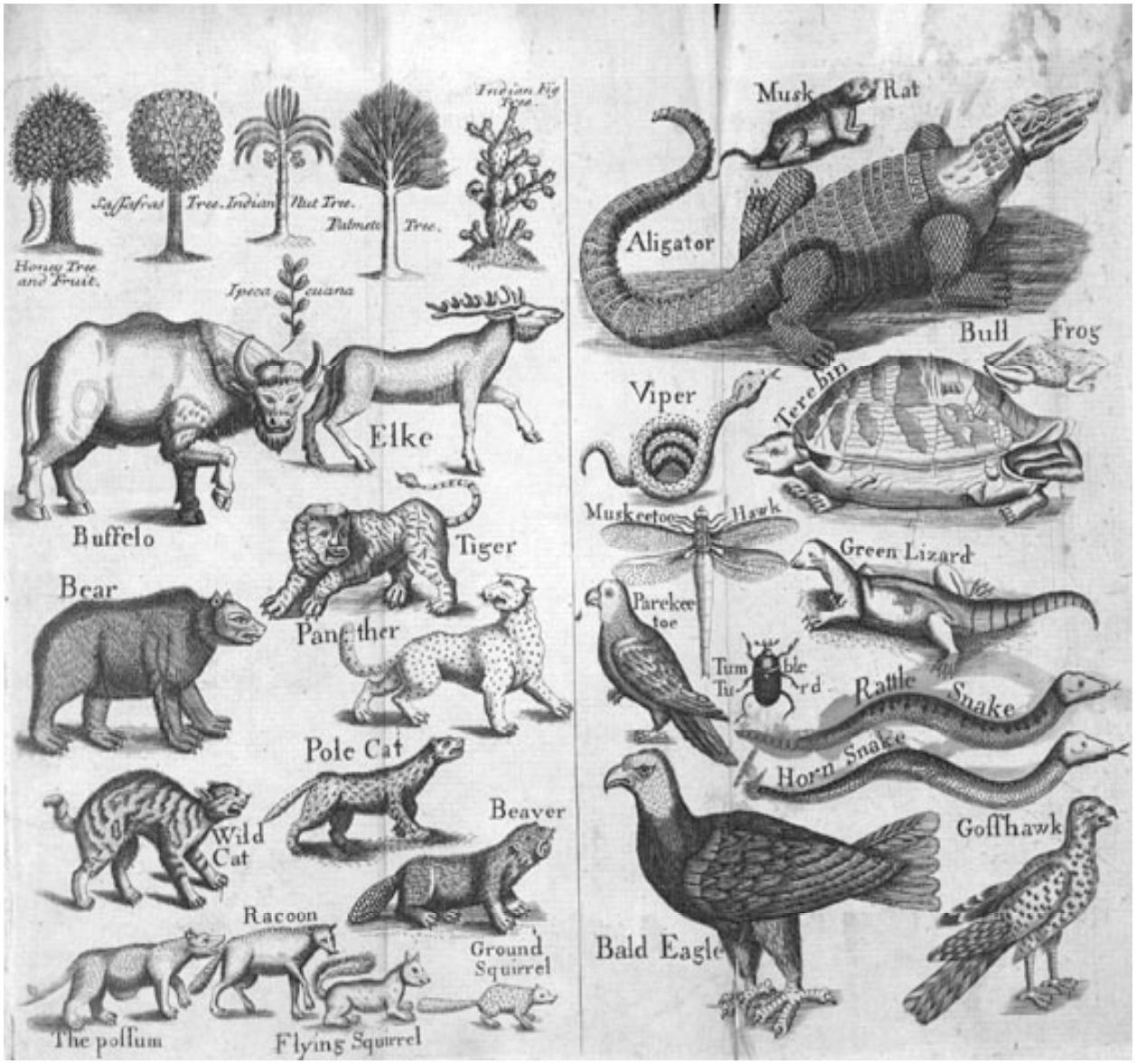
TRI Summer Endowed Fellowships are designed to support Master's and Doctoral students interested in conducting research in the tropics. This year we funded 19 Master's students and 2 Doctoral students working in 18 different countries.

The 2004 research fellows and the country of their research are:
Nicole Ardoin, Galapagos; Cristina Balboa, Indonesia; Victoria Critchley, Australia; Laura Cuoco, Ecuador; Isao Endo, Bangladesh; Brett Galimidi, South Africa; Alicia Gray, Peru; Carishma Gokhale, Belize; Sharifa Gulamhussein, Hawaii; Po-Yi Hung, Taiwan; Thu Ba Huyhn, Vietnam; Yasuko Iiyama, Indonesia; Andrea Johnson, Peru; Alder Keleman, Mexico; David Kneas, Ecuador; Lisa Patel, Guatemala; Kaisone Phensopha, Laos PDR; Angela Quiros, Philippines; Rebecca Reider, India; Seth Shames, Israel; Aaron Welch, Belize.

PRORENA, based in Panama, is a joint initiative of the Center for Tropical Forest Science (CTFS) at the Smithsonian Tropical Research Institute and the Tropical Resources Institute at the Yale School of Forestry and Environmental Studies. PRORENA (Native Species Reforestation Project) is a highly collaborative research, education, and outreach program aimed at developing viable strategies for restoring diverse, native tropical forests. This year Jeremy Goetz will be joining the PRORENA team.

The World Agroforestry Centre (ICRAF) has dedicated research funds for Ellen Brown to pursue research on the interface of agroforestry and conservation, exploring the integration of natural resource management in buffer zones of protected areas.

Compton Foundation's Fellowship Program aims to contribute to the capacity of developing countries, especially in Central America and Sub-Saharan Africa, to improve policies and programs relating to peace, population, sustainable development and the environment. The Foundation strives to accomplish this goal by supporting outstanding graduate students who are committed to careers in the program areas of interest to the Foundation within the developing world. This year's recipients and their home countries are Amina Soud, Kenya; Dora Cudjoe, Ghana; Tendro Ramaharitra, Madagascar; Rafael Bernardi, Uruguay; Alvaro Redondo Brenes, Costa Rico; and Cesar Moran Cahusac, Peru.



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Tropical Resources

The **Bulletin of the Tropical Resources Institute** is a student-edited bulletin where Master's and PhD candidates from the Yale School of Forestry and Environmental Studies publish the results of their TRI-funded independent research.

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The mission of the **Tropical Resources Institute** is to provide a forum to support and connect the initiatives of the Yale community in developing applied research, partnerships, and programs in the tropics. We support projects and research that aim to develop practical solutions to issues relating to conservation and management of tropical resources.

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