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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Tropical Resources Institute

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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TROPICAL RESOURCES

The Bulletin of the Yale Tropical Resources Institute

2005 Volume 24

In This Issue

TROPICAL RESOURCES INSTITUTE

In memory of Laurie Cuoco, 1974-2005

On May 10th, 2005, Laurie Cuoco left us far too soon. The F&ES community extends our deepest sympathies to her family. In celebration of her life and in grief at her passing, we dedicate this year's Bulletin to Laurie.

Laurie's fascination with coastal environments took her to Ecuador to explore the effects of organic aquaculture on mangrove forests and local peoples. Some of her findings appear on page 59 of this Bulletin.

Illustration on previous page from *Margaret Mee in Search of Flowers of the Amazon Forests.* 1988. Tony Morrison, ed. Nonesuch Expeditions Ltd., Suffolk, England.

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About TRI

Articles

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 who are able to function across a diversity of disciplines and sectors and at local and global scales. The Tropical Resources Institute aims to build linkages across the 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.

Dear Readers,

It is with pride in our fellow students that we present the 2004-2005 TRI Bulletin. This year's Bulletin reflects several emergent topics in conservation – topics which, in turn, speak to the moment we are in as a professional community. Running through these pieces we see an impulse to assess the current state of conservation practice – with an eye, always, to doing it better.

Several writers focus on the role of international organizations, articulating complexities and tensions within global environmental governance. Lauren Baker provides a personal reflection on IUCN activities, including its recent World Conservation Conference in Bangkok, while Amina Soud comments on WWF's heavy influence on Kenyan environmental policies and Laura Cuoco lays out the controversy over a German NGO's certification of "organic" shrimp farming.

Other articles explore institutional relationships between these types of organizations and local people. Both Brett Galimidi's diagnosis of dysfunctions in information communications technology projects and Lisa Patel's analysis of building "social capital" demonstrate why conservation organizations often fall short in implementation with communities. Rebecca Reider gives a nuanced argument that successful social movements are those which attend to local livelihood needs. These insightful pieces challenge us to create more successful projects and strategies by paying real attention to the social dynamics of context. Our two pieces on ecotourism embody these challenges, as Po-Yi Hung teases out complex dynamics of power and representation among Taiwan's indigenous Amis people, while Angela Quiros's case studies provide recommendations for more beneficial whale shark tourism.

Another thread running through this year's articles is the linkage between large-scale environmental or economic phenomena and local practices. Rafael Bernardi presents a unique iterative modeling effort, showing how colonists' activities at the community level in Peru's Huallaga Valley relate to broad patterns of land use change and frontier development. Alvaro Redondo's analysis of the efficacy of various species for carbon sequestration is embedded within a Costa Rica-wide initiative to make reforestation operational on a local farm scale. Sharifa Gulamhussein explores the utility of using eco-physiology as an approach to native species restoration in Hawaii's highly degraded landscapes. We may also see Dora Cudjoe's discipline-crossing research, which links the needs of Ghanaian artesian carvers to industrial wood processing efficiency initiatives and export markets, in this light.

An important outcome of the master's research process is learning to create and critique appropriate methodology, and two strong pieces in this volume show how seriously F&ES students take this task. Both Alder Keleman's reflection on the questions she did and didn't ask and David Kneas's meditation on using a video camera in the field ask key questions about the role of the researcher and the nature of field findings.

The quality of this volume stands as a reminder of the long hours, both in tropical field sites and New Haven computer labs, that many people have invested – not only student researchers, but also, and especially, Nicole Rousmaniere, layout genius; Amity Doolittle, our tireless TRI doyenne; and Lisa Curran, indomitable Institute director. As editors, we would like to thank all our writers for their hard work and patience with this long process. We hope you enjoy the read.

Andrea Johnson, MESc 2005 & Laura Kiernan, MEM 2006

Dear TRI Community,

TRI has had yet another productive and diverse year. Just a few examples include: expanding our collaborations with international non-government and academic institutions, receiving additional funding from a diversity of sources, as well as expanding 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 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 within ICRAF. We are particularly excited that ICRAF supported our publication of five working papers under the Agroforestry in Landscape Mosaics (ALAM) partnership. These working papers are based on previous research by F&ES and University of Georgia students in collaboration with ICRAF.

Another exciting development from this year is that TRI became an active voting member of the World Conservation Union (IUCN). Program Director Amity Doolittle and Associate Dean Gordon Geballe led a delegation of two faculty members and twenty-one master's and doctoral students from TRI to IUCN's World Conservation Congress in Bangkok in November 2004. We greatly appreciate the efforts of Aban Kabraji for promoting and making this connection possible. In addition, for the past two years IUCN has sponsored two summer internships for F&ES students.

Students were equally active this year. A highlight was the holding of a dynamic student conference "Conservation in the Matrix" by the International Society for Tropical Forestry (ISTF). With over twenty speakers and one hundred attendees (from academia, institutions, NGOs, and governmental agencies), this interdisciplinary event stimulated tremendous discussion and debate. The student organizers, especially Alder Keleman and Ines Angulo, are to be commended for their professional skills in organizing this highly successful event.

The Class of 1980 Video Center is another student-led initiative. David Kneas not only raised the funds from the Class of 1980, but also established a professional and state-of the art video editing center at TRI, produced videos from his summer research, and assisted several others in video production and processing. This facility was used by several TRI students and others in the F&ES community who wish to incorporate video and documentary research into their projects.

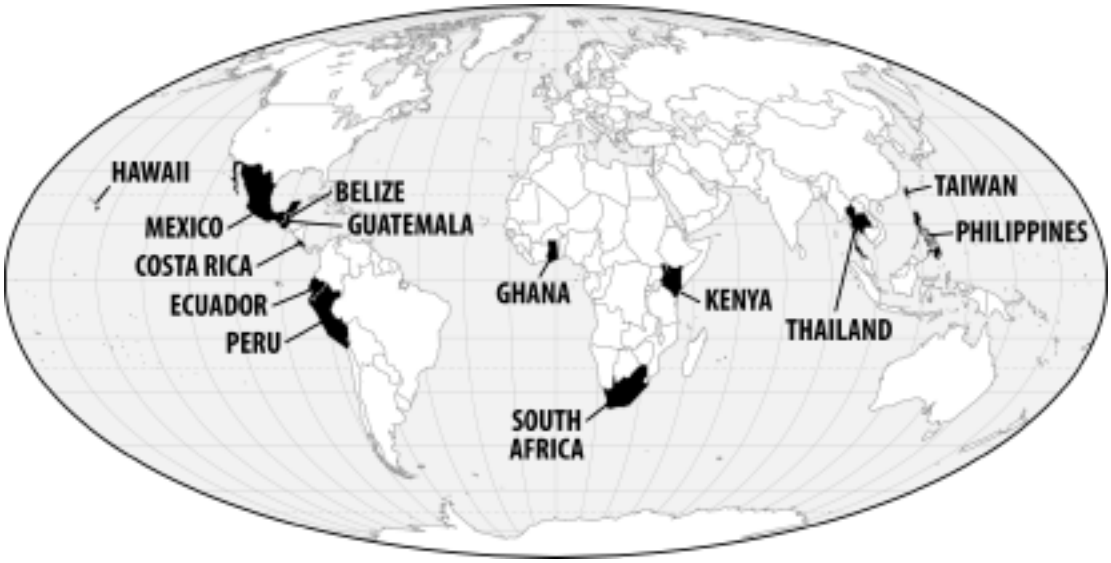
The TRI Bulletin has been greatly improved, not only by the excellent range and quality of student submissions, but by the hours of careful reviewing by our editors, Laura Kiernan and

Andrea Johnson, and by the care and attention to layout and design provided by Nicole Rousmaniere. In closing, I trust you will enjoy this TRI Bulletin. We would appreciate hearing from you and appreciate any suggestions, potential collaborations, or additional opportunities for students and expanding our programmatic reach.

Best wishes,

Lisa M. Curran
Associate Professor
Director Tropical Resources Institute
Yale School of Forestry and Environmental Studies

2004 TRI Fellows



Belize:	Angela Quiros
Costa Rica:	Alvaro Redondo-Brenes
Ecuador:	David Kneas Laura Cuoco Rebecca Reider
Ghana:	Dora Nsuwa Cudjoe
Guatemala:	Lisa Patel
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Philippines:	Angela Quiros
South Africa:	Brett Galimidi
Taiwan:	Po-Yi Hung
Thailand:	Lauren Baker

Methodology in a Time of Crackdown

by Alder Keleman, MEM 2005

The Scenario

It's 11:00 am on your first day of summer research in rural Sonora, Mexico. Full of energy, your thoughts are on your intended research target: crop diversity on local dryland farms. You've stopped to speak to a friendly old man sitting on a rocking chair in front of a restaurant when the racket of a low-flying helicopter interrupts the conversation.

"What's that?" you ask when the noise subsides.

"It's the *militares*" – the Mexican military – the old man replies. "They arrived yesterday. They say there are several hundred of them, all federal troops. The state and federal governments recently agreed to come down hard on the drug trade in Sonora, and these guys have come to get rid of all of the *gente mala* [bad people] in the region." He then launches into a tirade about the pervasiveness of the drug trade in nearby farming communities.

Eventually, the conversation wanders to other topics, and you cordially extract yourself. Walking away, you ponder the violent history of military action in Latin America, and the stories of hapless foreigners caught in these incidents. You think about your research objectives, which involve traveling by public transportation to distant ranch communities. And with an uneasy feeling in the pit of your stomach, you wonder, "Have I come to the wrong place?"

Where and Why

My summer Master's research was a study of the persistence of crop diversity on small-scale dryland farms in southern Sonora, Mexico. The research objectives were to generate a baseline assessment of the persistence or loss of crop diversity in the region, and to frame this assessment in the context of drought, free trade, and trends toward mechanized, large-scale commercial production. Methodologically, the research would be carried out using both quantitative methods and qualitative methods, including structured surveys, informal interviews, and participant observation. Institutional support for the endeavor was provided by Native Seeds/SEARCH (NS/S), a Tucson-based seed bank with a 25-year history of collecting diverse crop varieties in the American Southwest and Northwest Mexico. However, since NS/S had no institutional partners in Mexico, I arrived in Sonora with the intention of undertaking the research through contacts of my own making, or, failing that, completely on my own.

I knew before arriving that illegal activity in my field site was an important consideration. Friends and family repeatedly reminded me that my destination had a reputation for drug and human trafficking, observations to which I responded that these issues were far removed from my research topics. Within a few weeks in Mexico, however, it became apparent that this was an unrealistic approach on my part, especially in light of local household economics. Sesame, the most lucrative legal commercial

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Born and raised in Central Washington State, Alder Keleman spent the year prior to coming to Yale as a Thomas J. Watson Fellow studying the use of biodiversity for sustainable development in Australia and Latin America. She will graduate from the joint Forestry-International Relations master's program in 2006, and hopes to pursue further work and research in the community-level application of international environmental patterns and programs.

crop in the region, is sold to local buyers at seven pesos (~70 cents) per kilo, and the traditional crops that my research targeted garner even less.[1] Wage laborers – agricultural or non – are typically paid between 45 and 100 pesos per day. In contrast, the conversations I engaged in regarding the economics of "the other crop" suggest that day laborers in mountain marijuana fields may be paid as much as 200 pesos per day, with food and other expenses included. The harvested crop is said to garner up to 1000 pesos per kilo.[2] In terms of household economics, these figures leave little room for doubt that income from the drug trade merits serious consideration.[3]

According to long-term observers, local material culture reflects these economic changes. For instance, author David Yetman (1996) makes much of the increased visibility of flashy pickups in rural areas, distinguishing them as a marker of increased income from drug money. Another long-term resident of the region pointed out that luxury clothing, such as gold chains and silk shirts, has become much more common among young men in the last decade. In this context, trends toward greater disposable income also imply a trend toward new patterns of economic decision making, raising a question relevant to my research objectives: in the context of more disposable income, what new decisions are being made about traditional crops?

What to Do?

The questions spurred by the realization that the drug trade was a pervasive influence in the region were many. Do I stay or go? If I stay, how do I stay safe? How do I pursue my research methodology as planned? Do I acknowledge the drug trade in my methodology and data collection?

Addressing these questions proved to be a process of tradeoffs. Initially, I decided to stay long enough to get the lay of the land and came to feel that, within the boundaries necessary to maintain safety, I could still pursue research on local crop diversity. For support, I hired a 54-year old farmer from a nearby ranch community, who had connections with NS/S from earlier years, as my field assistant. I never visited the ranch communities without his company or that of another local. I also gave up on original thoughts of living on the ranches themselves and stayed instead in the more urban county seat, where I rented a room from an elderly grandmother with a respected family name. Having a local family association seemed to lend an added measure of security and credibility.

As luck would have it, living with this family provided an opportunity to talk to farmers in an in-town setting. My host rented office space to a local NGO, which administered government farm support programs. The volume of farmers frequenting the small office was high, and the administrator allowed me to install myself on a bench and interview the farmers who visited. These initial conversations provided information for designing the surveys that I administered later in the summer.

The drawback of these measures was that the time I spent with farmers was nearly always a short-term interaction mediated by another institution or individual. Spending no more than a few hours per day in the ranch communities meant that I was not present to hear stories that might have emerged during longer visits. Furthermore, many of my conversations were refereed by my field assistant or were held within earshot of the NGO administrator. Although I worried that their presence might influence survey respondents' answers, these seemed reasonable tradeoffs to make for safety.[4]

Wrangling with the ethical and methodological challenge of designing a framework for acknowledging the drug trade in data collection led me to establish a baseline rubric of principles.[5] First, in the interest of safety and reputation, I would ask no direct, public questions about the drug trade; such questions would be asked only in private to trusted individuals.

On Ejido La Higuera, an older farmer plows his soon-to-be maize field with mules. While many farmers in the region have taken to the practice of hiring a tractor, traditional, non-mechanized plowing methods remain a common method of cultivation. *Photograph by Alder Keleman*

Second, any information I recorded about the trade would be written in a way that disguised the individuals involved. I would record no information that could directly link a specific individual to a specific illegal act. Finally, any mention of illegal activity in a tape-recorded interview would be avoided or erased. These guidelines did not ward off uncomfortable situations, but they did give me confidence in my ability to navigate information on both legal and illegal activity.[6]

Results (?)

How do observations about the dynamics of the drug trade relate to the objectives of the research at hand? On an immediate scale, they pose the question of how the drug economy influences the persistence – or loss – of local crop diversity. This question, in turn, dovetails with queries about the changing economics and demographics of small-scale farming.

Two opposing explanations address the effects of the drug trade on local demographic and economic patterns.[7] One explanation holds that the increased household income generated by cultivating a group of illegal and legal cash crops, plus subsistence crops, should allow farmers to invest in their farms and to break out of cycles of debt and poverty. This theory predicts that children will be more likely to remain in farm communities rather than seek wage employment elsewhere. The opposing explanation holds that those involved in drug cultivation do not reinvest their money in farming, but rather, spend it on other material goods, such as store-bought food, clothing, vehicles, firearms, and gasoline. These patterns should exacerbate the exodus of young people from farming communities, who leave either to escape violence or because disposable income allows them to move to an urban setting.

Empirical evidence to directly support these theories would be difficult to acquire without asking direct and systematic questions to individuals involved in the drug trade. However, a visit I made to one community, a number of whose residents had recently moved from the remote mountain regions, shed light on the complexities that the two explanations above may mask. Few of these individuals commented on their decision to move, but one woman indicated that her family had traded secure, stable land tenure in the hills for unstable tenure in the community they currently inhabited. She suggested that, although her husband continued to cultivate a plot of land near their former residence, drug-related violence in the community was too great a risk to justify living there.[8] These families' choice to migrate sug-

A colorful array of San Juan corn awaits planting in the summer rainy season. Some families in Southern Sonora continue to select and perpetuate multi-colored varieties of corn, but the practice is not widespread, due perhaps in part to a local preference for white and yellow tortillas. *Photograph by Alder Keleman.*

gests that the drug economy did not make farming in their former home more tenable. However, the fact that they moved from one farming community to another implies no clear conclusions about the drug economy's influence on farming in general.[9]

The socioeconomic effects of drug income are also ambiguous. According to informal conversations, local perceptions disagree with the idea that drug profits may support agriculture. Area residents suggested that drug money is seldom reinvested in livestock, farm equipment, or other farm-related goods, but is instead dedicated to basic household needs, or frivolous expenditures.[10] However, the picture painted by information on the dynamics of household economic decision-making is less clear. An in-depth survey in one ranch community included qualitative queries about individuals' spending preferences given hypothetical disposable income. As a general rule, respondents in the community indicated a desire to invest in livestock or to cover basic household subsistence.[11] These answers conflict with other residents' informal observations about spending preferences.

There is also grey area in the question of how (or if) the drug economy affects farmers' decision to cultivate traditional crops. Survey and interview questions about corn cultivation indicated that, while some native varieties continued to be cultivated extensively in the region, other native varieties had all but disappeared. Some respondents cited environmental reasons for this shift, stating that the varieties which were still planted persisted because of greater drought resistance. However, a less frequent – but repeated – answer was that even some of the drought-resistant varieties had been neglected because "the women found them too hard to grind."

Dietary preferences reflect this change as well. Many households in the region now make tortillas from pre-ground, purchased corn flour. Assuming that the hardness of the neglected varieties has not increased significantly over the years, the prevalence of pre-ground corn flour in local diets would seem to point to an increased orientation toward commercial products. Given that other economic opportunities in the immediate vicinity, such as the availability of wage labor in agriculture or industry, have not changed markedly over the 10-15 year-period in which the loss of these varieties is reported to have occurred, it is possible that the combination of changes brought about by the drug economy and the drought has shifted food preferences from native home-grown corn varieties towards industrially produced commercial products.[12]

Conclusions

In the context of this project's research objectives, these observations raise more questions than they answer. As the preceding section suggests, few firm conclusions can be drawn about the direct influence of the drug trade on local agricultural patterns. Indirect information presents conflicting and tenuous conclusions, and the safety and ethical issues surrounding data collection make ground-truthing unfeasible. The data available paints an ambiguous picture, suggesting that an intermediate explanation, accounting for the interaction of the drug economy with other environmental and social influences, may be most appropriate. Nevertheless, if the drug trade had been completely ignored in my research methodology and data collection, it might be impossible to suggest even this intermediate explanation.

What does my experience suggest for methodology in future studies? A primary question is whether or not any methodology is appropriate for approaching these issues. It is possible that a longer period of fieldwork than that discussed here (some two months) would yield a more thorough understanding, but the opposite might also be true. I sensed that people were willing to speak to me about the drug trade at the beginning of my fieldwork in part because they saw me as an outsider, disconnected from the social and political networks that influenced them.[13] Conversations on this subject were far fewer as the research period progressed, a fact which could be explained partly by local political conditions,[14] but which could also be due to individuals' increasing ability to place me as a non-neutral actor in the context of local social and political networks.

One firm conclusion that I draw from this experience is the importance of using a combination of quantitative and qualitative methodologies in environmental social science research. My research objectives required me to make a quantitative assessment of native crop persistence and the influences that surrounded it. However, without employing a variety of qualitative methods, ranging from non-quantitative interviews to listening to gossip, I would have had difficulty generating appropriate survey questions, let alone gathering information on the influences of the drug economy. In other words, had I attempted to continue my conversations over the sound of a low-flying helicopter, I might simply have heard nothing at all.

Acknowledgements

Many thanks are due to José Banda Valenzuela and the community of La Higuera for their cooperation and support during my fieldwork. Michael Dove, John Tuxill, Amity Doolittle, Stephanie Meyer, Suzanne Nelson, and the staff of Native Seeds/SEARCH also provided key insights and helping hands in this undertaking. Finally, I am grateful to my family who, rather demanding that I come home immediately upon hearing about the conditions described in this article, offered unwavering emotional and intellectual support.

Endnotes

[1] For instance, corn sold in 2003 at two pesos (~ 20 cents) per kilo, while the native beans and squash that families still plant sold for five to ten pesos per several-kilo crate.

[2] Weinberg (1998) recorded the price of crops in Tarahumara communities in Chihuahua as 200 pesos per kilo. The disparity between these two figures could be explained by a number of factors, including the different distances from markets in Sonora and Chihuahua and changes in the value of the peso from 1998 to 2004. Despite these discrepancies, however, it remains clear that the value of marijuana as a cash crop is overwhelmingly higher than the value of any other commercial crop alternative.

[3] For a masterful overview of the costs, benefits, and community-scale effects of illegal drug cultivation and processing in the Bolivian Yungas region, see Leons (1993). Goodhand (2000) provides a similarly insightful outline of the shift towards drugs in both agriculture and trade in the

north-eastern Afghanistan border region.

[4] Preliminary statistical analyses suggest that there are no significant differences between crop diversity answers given in the presence of my field assistant or the presence of the NGO employee. This does not eliminate the possibility that both of them might have skewed answers in the same direction, but this is highly unlikely given that they held very different social positions and types of influence over the farmers I spoke with.

[5] Thanks are due to John Tuxill and Michael Dove for their insights and guidance on this issue.

[6] Goodhand (2000) notes similar complexities and approaches to addressing them in his study of the opium economy of north-eastern Afghanistan.

[7] These explanations are my synthesis of observations from literature, testimonies from individuals in Sonora, and conversations with NS/S employees.

[8] It should be acknowledged, however, that while the migration suggests a movement away from former homes associated with the drug trade, it may be that these individuals were not directly involved in the trade. This possibility limits the conclusions that can be drawn about demographic patterns of those families who are directly involved in drug cultivation.

[9] No information is available on the proportion of individuals choosing to migrate to urban areas and forgo cultivation altogether, as opposed to those migrants who seek another plot of land.

[10] Weinberg's (1998) observations suggested similar destinations for drug-related income in Chihuahua.

[11] Further analysis of these responses is necessary to verify that they do not vary significantly by age or by gender. It is also possible that, since the community in which this survey was carried out was located quite far from the major drug-producing areas and the residents were not, to my understanding, heavily involved in the trade, these individuals may have been self-selected for spending preferences that did not lead them to participate in illegal activities.

[12] Nabhan (1989, 2002) notes a shift away from native crops towards hybrid crops and commercial foods in small-scale farming. In the US, these changes are associated with the broader shift away from small-scale agriculture among rural populations and, more specifically ,with a decline in the number of Native American landowners and farmers (1989: 66-85). Among Native Americans in the Southwest US and Northern Mexico, the rise in dietary prevalence of store-bought, high-sugar, low-fiber foods is also associated with rapidly rising rates of diabetes (Nabhan 2002). The reasons why individuals choose to shift from home-grown to store-bought foods most likely include a combination of environmental, social, and economic factors that vary from community to community, but there remains little doubt that this shift is occurring.

[13] It may also have been assumed at the beginning that I didn't speak or understand Spanish well enough to understand the discussions that were going on around me. I had the impression more than once that people thought they were talking over my head when they were speaking about sensitive issues.

[14] The military left one month into my stay in the region and, around the time of their departure, the nature and frequency of conversations about the drug trade seemed to shift; without the visual reminder of the military's presence, the issue of drugs and their eradication seemed to weigh less strongly on individuals' minds.

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Contesting Copper:
Documentary Film, Research, and Mining in Ecuador's Intag Region

by David Kneas, MESc 2005

I spent much of the summer of 2004 in Ecuador's Intag region, a remote cloud forest area on the northwest slope of the Ecuadoran Andes. Bishimetals, a subsidiary of the Mitsubishi Corporation, arrived in the region in 1994, wanting to exploit a copper deposit beneath the mountain range that forms a natural border between Intag and a large national park. Mitsubishi left the region in 1997, however, after the local population burned the company's camps to the ground in opposition to mining. No other company set foot in Intag until May 2004, when a small mining company called Ascendant Exploration acquired the subsoil mineral concession from the Ministry of Energy and Mines and began seeking local consent to undertake further exploration of the copper deposit. Under the guise of protecting its personnel against "eco-terrorists" – the state initially labeled the camp's burning an act of terrorism – Ascendant has employed a bodyguard who accompanies Ascendant personnel while they are in the region and often has a pistol visible.

In conjunction with research on the World Bank's role in Ecuador's national mining program, I filmed public meetings between Intag residents and representatives of Ascendant, as well as local encounters with public officials. The goal of this essay is to reflect on the role of documentary film, and research that incorporates film, in contests over natural resources where unequal relations of power structure the social and political arenas in which those contests take place. Film is a medium of representation; as such it can be used in both symbolic and material ways to affect the dimensions of resource conflict. Incorporating film into research, then, influences not only the dynamics of the local situation, but also the nature of the research project itself.

David Kneas, originally from Kalamazoo, Michigan, has lived, worked, and done research in Ecuador for a total of more than four years. He completed his undergraduate degree in Biological Sciences and Spanish at DePauw University in 2000. Upon graduation, he hopes to start a non-profit combining his research on resource conflicts with his passion for quilting.

Representation and Conflict

Struggles over material resources are simultaneously discursive contests over meaning, identity, and representation, involving different actors across various scales, from the local to the global.[1] Be it the Ecuadoran state measuring and mapping a copper deposit or a researcher or local activist filming a mining company's public rhetoric, the ability to record and represent is powerful. Whether re-playing a meeting or event to a local audience, or providing video footage for wider national and international media, the capacity to record and represent influences how, and under what terms, arguments for and against mining are made and contested. The incorporation of documentary film into research, allied with those in Intag who oppose mining, attempts to check, balance, and foil some of the discursive arguments and tools employed by the entities that support mining. These institutions and actors include the Ecuadoran national government, which has declared mining a national priority; the World

Intag residents carry anti-mining posters to region-wide meeting on mining in the town of Garica Moreno, July 17, 2004. *Photograph by Carlos Zorilla.*

Bank, which initiated Ecuador's national mining program; Ascendant Exploration, which has a heavy stake in Intag; and some of Intag's powerful pro-mining large landowners and political brokers.

The bodyguard and the gun are, in large measure, discursive symbols directed at the entire Intag region. The gun aims to quiet the voices of resistance – in a sense, to limit the ability of the local population to challenge or re-frame the nationalist discourse put forth by Ascendant Exploration and its local and national allies. At one public meeting I filmed, Cesar Villacis, a former military general and Ascendant's community relations director and political liaison, argued that opposition to mining stemmed from foreign environmental interlocutors. By depicting opposition as foreign-based, such rhetoric delegitimizes local resistance and, at the same time, represents Villacis and Ascendant as defenders of Intag's right to "development and progress." Portraying mining as merely a means towards the end of national development gives Ascendant and the national government the upper hand in the discursive contest about what mining is and who mining will benefit. In this contest of meaning, the gun and the bodyguard, as well as a military general placed in charge of community relations, attempt to limit the ability of the opposition to present counter-arguments that might undermine Ascendant's mining narrative.

The use of documentary film operates at various levels in this context. At one level, it aims to lessen the immediate power and presence of the gun, maintaining and opening the political space through which the population can re-frame and receive arguments about mining. At another level, it creates a medium where local actors can disseminate those counter-arguments through wider discourses and institutions (such as environmental and human rights discourses and corresponding organizations) that oppose mining in Intag. For example, in response to Villacis' comments at the public meeting, a local leader also spoke, directing his comments both to the local audience and to outside observers. He affirmed that mining in Intag was indeed a question of national rights, stating that the communities who resisted mining were upholding their national and human rights to live in a healthy environment. Local organizers assured that every public meeting was filmed and made the video footage available for sympathetic national media, national human rights organizations, and lawyers who were helping to develop

Intag residents hear from Ascendant in the town of Penaherrera, July 10, 2004. *Photograph by Carlos Zorilla.*

a legal case against Ascendant and the Ministry of Energy and Mines.[2]

With a video camera in hand, then, I was deemed useful to anti-mining organizers and, therefore, was involved in local organizing against mining. By the end of the summer, in many ways, I felt the bodyguard and I were counterparts. He was an outsider who shadowed the mining company as an (officially) objective observer. He never spoke at public meetings, the gun a greater agent than he. I, too, was an outsider, (officially) objective, who accompanied anti-mining leaders the same way he shadowed company representatives. I never spoke either, my video camera a greater agent than I.

Video as a Research Tool

With my video camera, I had power to represent and convey the communities' conflict in a manner that was perhaps different from the social scientist's standard power of the pen. Film can not only reach a much wider audience outside of Ecuador, but also provides a medium more conducive to local and national distribution.[3] I screened a video clip from my summer research at an academic conference last fall, at a speaking engagement I arranged at Yale with one of Intag's environmental leaders, and allowed it to be accessed via the internet. This footage is also being used by Intag organizers to help network with other national and international organizations.

Being useful for local organizers helped me overcome one principle obstacle for social scientists in the field: access. I was included in meetings and discussions I might otherwise have been excluded from had I only been equipped with a pen, paper, and thesis topic; my interests and intentions in the region were easily understood. And though I had lived in the region for a few years and had already produced a film about the resistance to mining, incorporating video into my field research helped me gain rapport with people more quickly. Instead of asking to accompany organizers to planning sessions or public events, local organizers asked me to join them, often calling me while I was in the city to inform me of an immediate or up-coming event that they wanted me to film. Instead of just observing the organizing process against mining, I was participating in that organizing.

Greater public presence and purpose had tradeoffs, however, as it reduced access and rapport with the mining company and those who supported mining in the region. In this contest

of representation, the meaning of my research project, as well as my own identity, became identified with the resistance community and anti-mining discourse. Though I was able to speak with Ascendant personnel and mining officials during the entire summer, the more I became seen as part of the local organizing, my ability to gain information and insight from interviews and conversations with mining proponents lessened greatly. I was never able to develop rapport and trust with mining representatives or officials; I could never hope to be privy to mining's "hidden transcript" (Scott 1990).

While I had originally intended for the bulk of my Master's thesis to deal with the World Bank and Ecuador's national mining program, the video footage has proven to be a rich source of material for analysis of the discursive contest over mining in Intag and Ecuador. With an exact record of public meetings and statements made by company personnel, I have been able to more effectively deconstruct Ascendant's mining and environmental discourse; with visual footage of public meetings I am able to reflect upon tone, rhetoric, expressions, and the overall "structure of feeling" (Williams 1977). In combination with formal interviews and ethnographic field notes, documentary film has proven to be a valuable research method.

In the context of this discussion on the relations of power that structure resource contests, I would be remiss if I did not observe that depending on outside researchers to film events in Intag is problematic. Recognizing this, local organizers have been working to acquire the equipment and skills so that the local population can use the power of film independent of outsiders. While there are a few video cameras in the region already, we hope to develop a long-term program whereby the population opposed to mining has not only the capacity to record, but also the tools to edit and distribute documentary film. A documentary film program controlled by the local population would allow documentary video to have an everyday presence, in addition to planned formal gatherings and public events. While it took burning a mining camp for Mitsubishi to leave the region, organizers in Intag hope that majority opposition to mining and sound arguments against the rationale to open the region to large-scale mining will be sufficient. The incorporation of documentary film into local organizing and independent research not only helps secure the political space through which the population can express opposition to mining, but also disseminates and connects their arguments through wider discourses that question the logic of mining in the Intag region.

Acknowledgements

The video project would not have been possible without the Class of 1980, who provided the financial support to establish a documentary film center within TRI. It equally would not have occurred without the unwavering and patient support of Amity Doolittle. I would also like to thank the editors of the TRI bulletin for their careful and insightful comments.

Endnotes

[1] Based on the work of Michel Foucault, I view discourse as the array of knowledge, language, and political arguments that give meaning and legitimacy to certain modes of thought, social practices, and institutions, while rejecting or de-legitimizing others (Foucault 1972).

[2] Local organizers have been in contact with an Ecuadoran national TV program similar to *60 Minutes* and used footage of the interchange I described above to try and persuade the producers to do a complete story on Intag. It is worth noting that contests over representation are not limited to media, but also occur through mediums like national and international law. At the same public meeting, Villacis accused the popular, anti-mining county mayor of plotting to kill him. A copy of my footage was made available to the Mayor in preparation for a possible lawsuit against Villacis.

[3] A previous film that I helped to produce has been used widely in Intag as part of organizing campaigns against mining.

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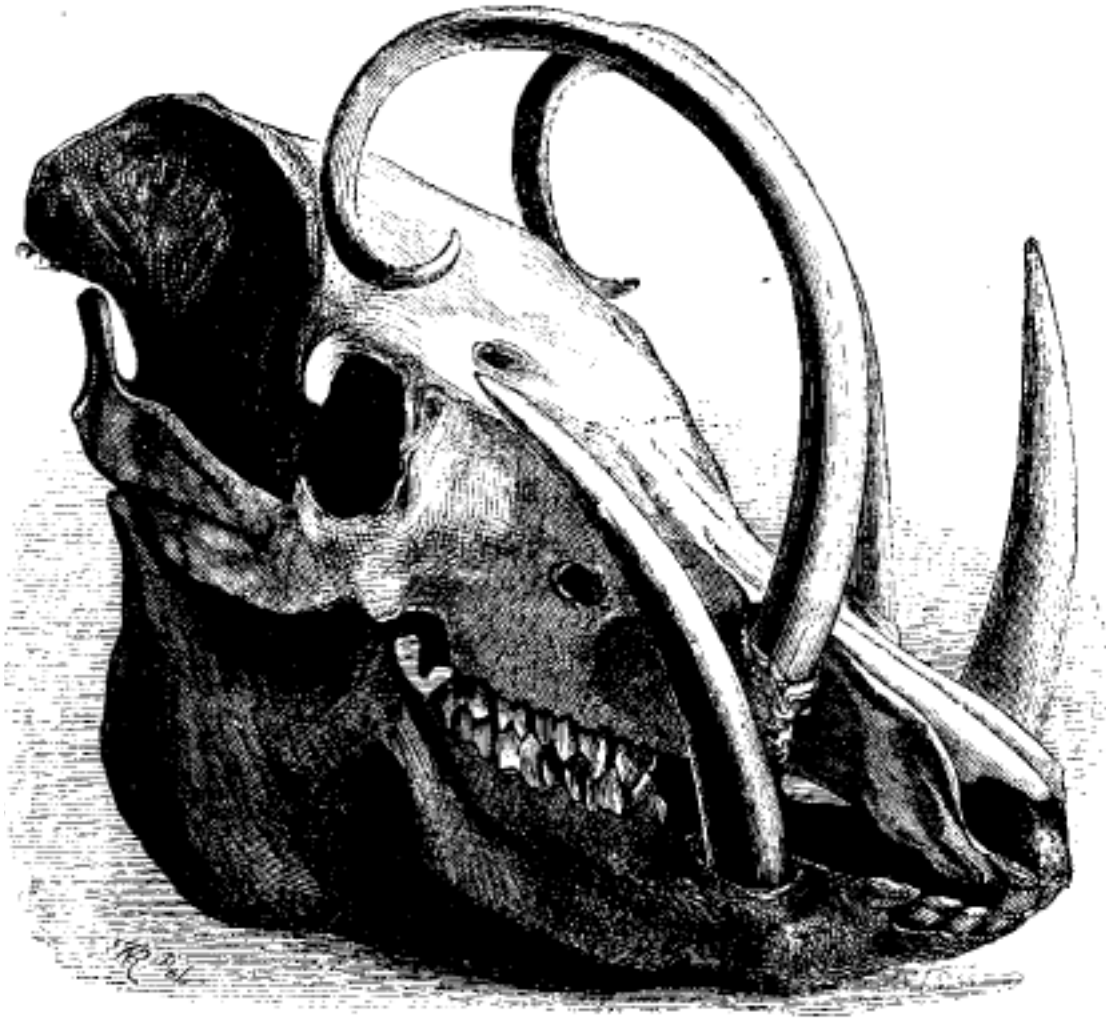

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Payment for Environmental Services in Costa Rica:
Carbon Sequestration Estimations of Native Tree Plantations

by Alvaro Redondo-Brenes, MFS 2005

Introduction

Due to the direct influence that greenhouse gases like cabon dioxide (CO_2) have on global warming, the increasing level of these gases in the atmosphere has emerged as a major international environmental concern (Shepherd and Montagnini 2001). Between the years 1750 and 2000, the concentration of CO_2 has increased by 31±4% (IPCC 2001). To curb the escalating level of atmospheric CO_2, either the overall level of emissions has to be reduced through pollution mitigation techniques, or emissions have to be captured from the atmosphere and stored in terrestrial and marine ecosystems known as carbon sinks (Andrasko 1990; Constanza et al. 1997). Tropical tree plantations, such as those in Costa Rica, have therefore been suggested as small carbon sinks (Montagnini and Porras 1998; Shepherd and Montagnini 2001; Schroeder 1992; Losi et al. 2003). These plantations may soon serve as a large source for carbon sequestration since their area is expected to increase over the next few decades (Gladstone and Legid 1990; Schroeder 1992; Houghton 1996).

The use of government incentives in Costa Rica – namely, the Payments for Environmental Services Program (PES) – has increased the number of tree plantations in the last two decades, especially on small and medium-sized farms in rural areas (Ortiz and Kellenberg 2002). For instance, the total reforested area with PES (including native and exotic species) from 1997 to May 2002 was 21,838 hectares (Sage-Mora 2002).

Carbon projects that promote agroforestry, small-scale plantations, and natural forest regeneration and preservation, such as the PES in Costa Rica, will improve the livelihoods of small-scale farmers, communities, and indigenous peoples (CIFOR 2002). Thus, studies of carbon sequestration within systems such as tree plantations are a priority since they assess an ecosystem's effectiveness in providing revenues to landowners. The first step to assess carbon sequestration in a system is to estimate its biomass. Biomass accumulation results from basic physiological processes in plants. Plants take up CO_2 from the atmosphere through photosynthesis and store carbon in biomass (Leemans et al. 1996).

The main objective of this research was to estimate aboveground biomass and carbon sequestration in small and medium-sized native tree plantations in the Atlantic and Northern lowlands of Costa Rica, using allometric equations developed by Montero and Montagnini (2004). These allometric equations use mathematical relationships that convert external measurements, such as trunk diameter and sometimes height, to total tree biomass (Losi et al. 2003). This non-destructive method to estimate biomass is highly accurate (above 95%) and provides a model for plantations growing in similar ecological conditions (i.e. location, topography, and climate) and within the same range of diameter and height measurements

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(Montero and Montagnini 2004; Perez and Kanninen 2002, 2003).

Research Sites

Research was conducted in two different groups of plantations (Figure 1). The first group is located in Sarapiqui, in the Atlantic lowlands. The second group, called San Carlos, is located in the North Huetar Region.

Sarapiqui

The study site is located at 10°12'-10°47' north latitude and 84°09'-83°45' west longitude. Mean annual precipitation is 3500-5000 mm, with a minimum precipitation level of 50 mm. Elevation is between 30 and 200 masl. Mean annual temperature is 24°C. The overall topography is flat to undulating terrain. In general, soils belong to the Ultisol and Inceptisol orders. There are various soil limitations, such as slow or impeded drainage and very low to medium fertility (OPSA 1979; Piotto et al. 2003).

Thirteen plantations were evaluated and 62 permanent and temporal plots were measured. These plantations were established between 1990 and 1995 with an association of local farmers, the County Agricultural Center of Sarapiqui (CACSA), and a non-governmental organization (NGO) called the Foundation for the Development of the Central Volcanic Range (FUNDECOR).

San Carlos

This study site is located in Costa Rica's North Huetar Region. Mean annual precipitation is 2000-4000 mm, with a mean annual temperature of 25°C. The overall topography is flat to undulating terrain. Elevation is between 100 to 400 masl. In general, soils belong to the Ultisol

Figure 1. Research Sites

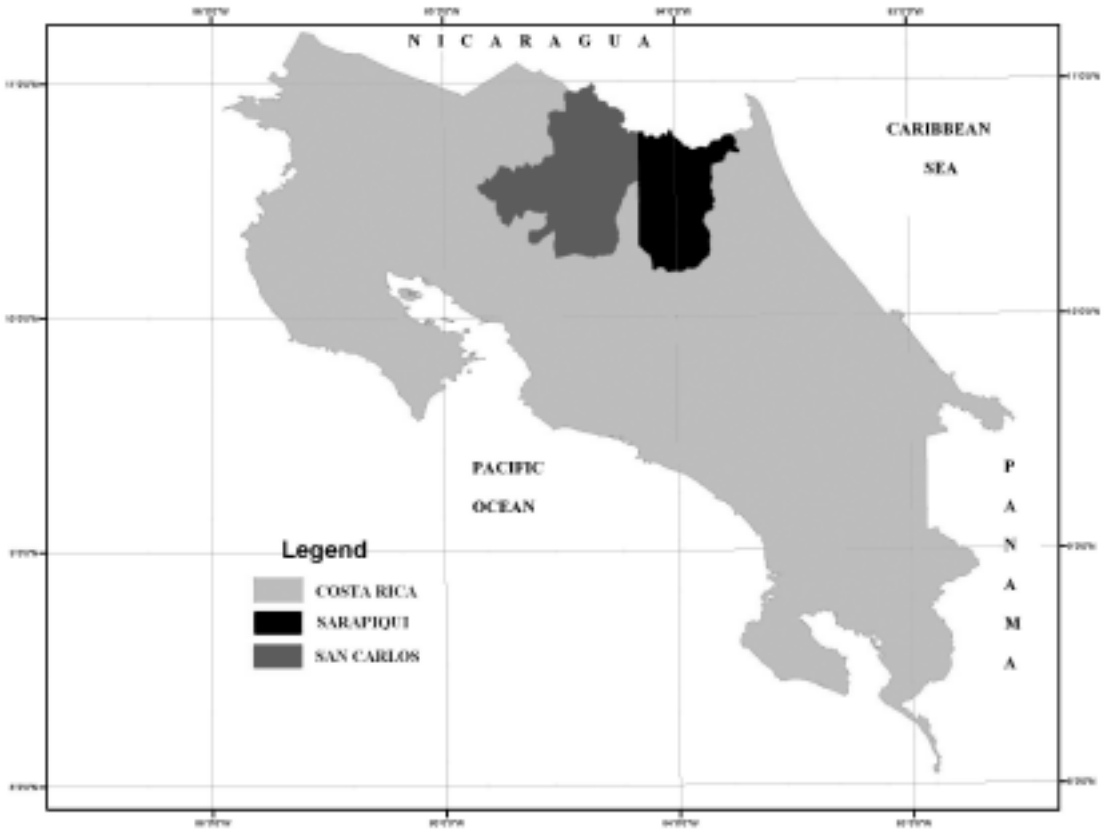

Table 1. Characteristics of tree species grown in the Atlantic and North lowlands of Costa Rica

Species name	Common name	Family	Native range	Growth, habitat
Vochysia guatemalensis Donn. Sm.	Chancho, Mayo	Vochysiacea	Mexico to Panama	Upper canopy, early-mid successional; fast growth
Callophyllum brasiliense Cambess.	Cedro Maria	Clusiaceae	Mexico to South America and the Antilles	Canopy tree. Moderately shade -tolerant; slower growth
Terminalia amazonia (J.F.Gmel.) Exell	Amarillon, Roble Coral	Combretaceae	Mexico to South America and the Antilles	Canopy tree; Heliophyte; moderately fast growth
Virola koschnyi Warb	Fruta Dorada	Myristicaceae	Belize to Panama and Ecuador	Canopy tree, mid-successional; slower growth
Dipteryx panamensis (Pittier) Record & Mell	Almendro	Fabaceae - Papilionoideae	Nicaragua to Colombia	Canopy tree, late successional; slower growth
Hyeronima alchorneoides Fr. Allemao	Pilon	Euphorbiaceae	Belize to the Amazon	Canopy tree; Early - Mid successional; moderately fast growth
Vochysia ferruginea Mart.	Botarrama	Vochysiacea	Nicaragua to Peru and Brazil	Heliophyte tree, durable, rapid growth; found in secondary forests.

Source: Jimenez-Madrigal et al. (2002)

and Inceptisol orders. The principal soil limitations are its acidity, low to medium fertility, and slow drainage (Delgado 2002).

Nineteen farms were evaluated and 117 permanent and temporal plots were measured. These plantations were established between 1990 and 1995 as part of a project on native species sponsored by the Technological Institute of Costa Rica (ITCR) and an NGO called COSEFORMA (Forestry Development Commission of San Carlos) (Delgado 2002).

Research Species

This project analyzed seven native tree species (local names are in parentheses): *Vochysia ferruginea* Mart. (botarrama); *V. guatemalensis* Donn. Sm. (chancho); *Hyeronima alchorneoides* Fr. Allemao (pilon); *Callophyllum brasiliense* Cambess (cedro maria); *Terminalia amazonia* (J.F. Gmel.) Exell (roble coral); *Virola koschnyii* Warb (fruta dorada), and *Dipterix panamensis* (Pittier) Record & Mell (almendro) (Table 1). Only six species were evaluated at San Carlos since plantations of *Callophyllum brasiliense* were not locatable. These seven species were chosen because they were the most frequently planted by farmers at both locations. In addition, these species are recommended by FUNDECOR and COSEFORMA because the PES are available for reforestation with these species.

Methods

Collection of field measurements

At every plot, I measured the diameter at breast height (DBH), 1.30 m from the ground, for each species of concern. In addition, I measured the total height to the canopy of six to eight trees per plot to extrapolate the height of the rest of the trees within the plots using linear regression. The plot size, number of plantations, and

number of measured plots varied from site to site to provide consistency with the research projects that are being carried out in the two sites and because I used the permanent sample plots set up by the organizations mentioned above.

The plot sizes varied within both sites due to variations in plantation shape and size. These plantations varied from 0.1 ha to a maximum of 5 ha. Plot areas were between 225 m^2 and 784 m^2. The number of plantations and number of measured plots varied because I measured as many plantations as were available in each site to increase the sample size and to represent variability along each region.

Data analysis

To estimate aboveground biomass, I used the following equations, which were developed for each species studied by Montero and Montagnini (2004) at La Selva Biological Station, Sarapiqui, Costa Rica:

$$\text{Ln}(Y) = a + b\,\text{Ln}(\text{DBH}) \quad (1)$$
$$\text{Ln}(Y) = a + b\,\text{Ln}(\text{DBH}) + c\,\text{Ln}(H) \quad (2)$$

Where
Ln: Natural logarithm
Y: Tree biomass in kilograms
DBH: Diameter at breast height in centimeters.
H: Total height in meters.
a, b, and c: Constant values calculated for each species.

These equations use DBH and total height to estimate aboveground biomass by a tree's component (foliage, branches, stems, and total tree). Each tree species has its own equation for each component (Appendix 1). Equation (1) was used to compute most of the estimates, excluding stem biomass values for *Vochysia guatemalensis*, for which equation (2) was used. I assumed carbon sequestration to equal 50% of a component's present biomass (Montagnini and Porras 1998). The mean annual increment (MAI) for carbon sequestered was calculated by dividing the total accumulated values by the plantation age.

One-way analyses of variance (ANOVA) for different sample sizes were used to determine the statistical significance for differences in carbon sequestration and growth rates between species and locations. In addition, Tukey's pairwise comparisons were used to determine statistically significant differences within each variable that was analyzed. Regression analyses were performed to evaluate relationships between carbon sequestration and growth parameters. For all the analyses, interactions were tested and residual plots were analyzed to ensure that the model assumptions were satisfied. Analyses were performed with SAS System Release 8.2 (2001) and statistical significance was fixed at $P<0.05$.

Results: Carbon Sequestration of Native Tree Plantations

The data for carbon sequestration (Table 2) is presented by the tree components: stem, branches, foliage, and total tree in tons per hectare and by the total carbon values of the corresponding trees in kilograms (See Appendix 1). Overall, I found that the Sarapiqui plantations presented higher carbon values by species than the San Carlos plantations.

In San Carlos, the species that had the highest total carbon sequestration per tree were *V. guatemalensis* (9-10 years) and *T. amazonia* (9-10 years). The lowest values were from *V. koschnyi* (9-10 and 13-14 years). The estimates of carbon sequestration per hectare indicated that *D. panamensis* (13-14 years) and *V. guatemalensis* (13-14 years) were the species with the highest values. The species *V. koschnyi* (9-10) and *V. ferruginea* (11-12) had the lowest values (Table 2).

In Sarapiqui, the species with the highest total carbon sequestration per tree were *T. amazonia* (11-12 years) and *H. alchorneoides* (11-12 years). The lowest values were from *V. koschnyi* (11-12 years). However, no significant differences were found among the seven species (Tukey's test,

Table 2. Carbon sequestration estimations and mean annual increment (MAI) of total carbon of native forest plantations in Costa Rica

Location / Species	Age (Years)	Carbon storage per ha (Mg)				Carbon storage per tree (Kg)	MAI Carbon (Mg ha^{-1} year^{-1})
		Stem	Branches	Foliage	Total		
Sarapiqui							
D. panamensis	9-10	60.6 a	23.0 ab	7.5 ab	91.0 a	128.0 a	10.1 a
D. panamensis	11-12	26.0 (5.7)bc	8.0 (1.9)bcd	2.8 (0.6)cd	36.9 (0.8)bcd	54.7 (11.8)a	3.2 (0.8)bcd
T. amazonia	9-10	58.8 (0.7)ab	15.9 (0.6)abcd	4.4 (0.1)cd	79.1 (1.4)ab	138.1 (16.3)a	7.9 (1.3)ab
T. amazonia	11-12	40.9 (11.3)abc	11.1 (3.4)abcd	3.1 (0.9)cd	55.1 (15.6)abc	151.8 (53.2)a	4.7 (0.1)bcd
H. alchorneoides	9-10	36.1 (12.8)abc	26.9 (14.4)a	3.4 (1.3)cd	66.3 (28.5)abc	120.0 (53.4)a	7.1 (3.4)abc
H. alchorneoides	11-12	24.9 (11.6)c	20.3 (13.6)abc	2.3 (1.1)cd	46.5 (26.2)abc	144.3 (84.8)a	4.0 (2.3)bcd
V. guatemalensis	9-10	40.5 (3.7)abc	2.0 (0.8)cd	1.7 (0.1)cd	44.5 (31.0)abc	81.4 (63.7)a	4.6 (3.5)bcd
V. guatemalensis	11-12	38.3 (11.0)abc	1.5 (0.4)d	1.4 (0.5)d	41.2 (12.6)bc	137.9 (9.7)a	3.3 (1.1)bcd
V. ferruginea	9-10	11.7 (3.7)c	7.8 (3.5)bcd	4.0 (2.3)cd	23.5 (9.4)c	65.3 (11.8)a	2.6 (1.0)bc
V. ferruginea	11-12	19.2 (1.6)c	12.5 (1.3)abcd	4.6 (0.6)bc	36.3 (3.5)bc	132.9 (25.4)a	3.1 (0.3)bcd
V. koschnyi	11-12	13.7 (5.0)c	6.3 (3.2)bcd	2.7 (1.3)cd	22.5 (9.4)c	53.2 (25.9)a	1.9 (0.8)d
C. brasiliense	11-12	36.2 (5.1)abc	15.2 (2.7)abcd	8.5 (1.6)a	60.0 (8.8)abc	103.1 (61.5)a	5.4 (0.7)abcd
San Carlos							
D. panamensis	9-10	25.5 (8.0)abcd	8.4 (2.6)abc	2.6 (0.9)abc	36.5 (11.5)ab	50.8 (12.4)ab	3.5 (1.1)ab
D. panamensis	13-14	31.3 (6.3)abc	9.7 (2.3)a	3.4 (0.8)ab	44.4 (9.3)a	52.8 (12.8)ab	3.3 (0.7)ab
T. amazonia	9-10	20.9 (3.1)abcd	5.1 (0.9)abc	1.5 (0.2)c	27.5 (4.2)abc	67.3 (12.7)ab	2.8 (0.4)abc
H. alchorneoides	9-10	17.8 (2.6)bcd	9.0 (3.1)ab	1.5 (0.3)bc	28.3 (5.6)abc	59.3 (29.2)ab	2.8 (0.6)abc
H. alchorneoides	11-12	18.6 (6.5)abcd	8.5 (5.2)abc	1.6 (0.6)bc	28.8 (12.2)abc	45.2 (23.8)ab	2.5 (1.0)abc
V. guatemalensis	9-10	33.2 (11.8)ab	1.8 (0.6)c	1.5 (0.5)c	36.6 (12.9)ab	75.1 (19.6)a	3.7 (1.3)a
V. guatemalensis	11-12	35.9 (13.7)a	2.2 (0.5)c	1.6 (0.4)bc	39.7 (14.5)ab	65.6 (27.1)ab	3.4 (1.2)ab
V. guatemalensis	13-14	36.1 (3.0)a	2.5 (0.1)bc	1.9 (0.1)bc	40.5 (3.3)ab	56.9 (0.4)ab	3.0 (0.2)abc
V. ferruginea	9-10	11.4 (3.9)d	7.3 (2.4)abc	4.2 (1.4)a	23.0 (6.9)abc	55.6 (12.5)ab	2.3 (0.7)abc
V. ferruginea	11-12	11.4 (2.7)d	5.5 (3.0)abc	2.7 (1.5)ab	20.0 (6.9)bc	40.5 (26.1)ab	1.8 (0.6)abc
V. koschnyi	9-10	8.4 d	2.7 bc	1.3 c	12.4 c	30.9 b	1.2 c
V. koschnyi	13-14	14.1 (4.8)cd	4.9 (2.8)abc	2.2 (1.1)bc	21.2 (8.7)abc	27.0 (12.2)b	1.6 (0.6)bc

Means are significantly different when standard deviations are followed by different letters (P<0.05)

P<0.05). The estimated carbon sequestration per hectare suggested that *D. panamensis* (9-10 years) and *T. amazonia* (9-10 years) were the species with the highest values. The species *V. koschnyi* (11-12) and *V. ferruginea* (9-10) had the lowest values (Table 2). I found that plantation location (P=0.0001), species (P<0.0001), and density (P=0.03) were accurate predictors of carbon sequestration. Tree age, however, was not a significant predictor of carbon sequestration (P=0.36).

The MAI for carbon sequestration indicated that, in Sarapiqui, the species with the highest growth was *D. panamensis*, and *V. koschnyi* had the lowest value. In San Carlos, the highest MAI was *V. guatemalensis* and the lowest was *V. koschnyi* (Table 2).

The percentage carbon sequestration in the different tree components (stem, branches, and foliage) was similar in both locations. The carbon allocated in the stems varied from 50% (*V. ferruginea*) to 92% (*V. guatemalensis*). Carbon allocated in the branches varied from 4% (*V. guatemalensis*) to 43% (*H. alchorneoides*). Finally, the carbon sequestered in the foliage varied from 3% (*V. guatemalensis*) to 18% (*V. ferruginea*).

Discussion: Carbon Sequestration of Native Tree Plantations

According to Carpenter, Nichols, and Sandi (2004), reforestation projects on degraded sites, such as the ones included in this study, may have different objectives, among them to reduce erosion, reestablish a variety of native species, and/or establish economically viable commercial plantations. In tree plantations, economic considerations generally are more heavily weighted than in other industrial forest practices due to the higher establishment and tending costs (Hartley 2002). However, tree plantations also offer other environmental services, such as carbon sequestration (Lugo and Brown 1992; Subak 2000; Shepherd and Montagnini 2001).

In Costa Rica, the PES was implemented with the creation of the Forestry Law in 1996. The new law recognizes a range of environmental services derived from natural forests, plantations, and agroforestry systems, such as carbon fixation, hydrological services (including reduced water siltation supplied for hydropower and aquifers), biodiversity protection, and provision of scenic beauty (Subak 2000). On average, the landowner receives US$540 per hectare for establishing new tree plantations, US$210 per hectare for previous established plantations, US$210 per hectare for forest conservation and regeneration, and support for the establishment of trees within agroforestry systems, distributed in percentages over a period of five years (FONAFIFO 2004). The PES program receives revenues from a 5% tax on gasoline consumption, private-sector contributions, as well as the sale of certifiable tradable offsets (CTOs) to foreign investors. In 1997, Norway purchased US$2.0 million in CTOs in exchange for about 230 kt of carbon offsets (Subak 2000).

Results of the present study depicted that native forest plantations from 9 to 14 years old were sequestering on average between 12.4 to 79.1 Mg ha^{-1} of carbon. In addition, the MAI of sequestered carbon was between 1.2 to 10.1 Mg ha^{-1} $year^{-1}$. These carbon values are in the range of values for tropical tree plantation species worldwide, such as *Pinus caribaea* (Caribbean pine), *Leucaena spp.* (leucaena), *Casuarina spp.* (Australian pine), *Pinus patula* (Mexican weeping pine), *Cupressus lusitanica* (Cypress), *Senna siamea* (Siamese cassia), *Acacia nilotica* (gum Arabic tree), and *Azadirachta indica* (neem), which have values between 8 and 78 Mg C ha^{-1} (Schroeder 1992). However, the values reported in this study are lower than the values found for primary forests in Costa Rica, which are on average 110 Mg C ha^{-1} (IPCC 2001), and they are also lower than a 20 years old plantations of *Tectona grandis* (teak) in Panama which averaged 104.5 Mg C ha^{-1} (Kraenzel et al. 2003). In addition, MAI of carbon found in the present study was similar, if not higher, than the biomass accumulation in natural

forests greater than 60 to 80 years old and logged forests (1-2 Mg C ha^{-1} $year^{-1}$) (Lugo and Brown 1992), biomass accumulation in secondary forests from 0 to 20 years old (2-3.5 Mg C ha^{-1} $year^{-1}$) (Brown and Lugo 1990; Silver, Ostertag, and Lugo 2000), biomass accumulation in plantations worldwide (1.4 to 4.8 Mg C ha^{-1} $year^{-1}$) (Brown, Lugo, and Chapman 1986 in Lugo and Brown 1992), *Gmelina arborea* (melina) plantations in Costa Rica (7 Mg C ha^{-1} $year^{-1}$), and restoration programs in the highlands of the Virilla river in Costa Rica (2 to 3 Mg C ha^{-1} $year^{-1}$) (Subak 2000).

In Costa Rica, aboveground biomass accumulation and carbon sequestration has been studied over the last decade (including the species that are a part of this study) for both younger plantations (Montagnini and Sancho 1994; Stanley and Montagnini 1999; Montagnini 2000; Shepherd and Montagnini 2001) and for plantations with similar ages and species of the present study (Redondo and Montagnini, in preparation). Studies of plantation from four to eight years old indicated that fast growing species such as *Jacaranda copaia* and *Vochysia guatemalensis* were the species with the best production of aboveground biomass and carbon sequestration (Montagnini and Sancho 1994; Stanley and Montagnini 1999; Montagnini 2000; Shepherd and Montagnini 2001). At La Selva Biological Station, in forest plantations from 12 to 13 years old, Redondo and Montagnini (in preparation) found that the most productive species were *Terminalia amazonia*, *Callophyllum brasiliense*, and *Dipteryx panamensis*. According to these results, it seems that fast growing species (i.e. *V. guatemalensis*) accumulate biomass and carbon in the first stage of their lifespan, but before they are 10 years old, forest plantations including moderate to slower growing species (i.e. *D. panamensis*, *T. amazonia*, *and C. brasiliense*) may accumulate more biomass and carbon within the system than the former. The latter species also may sequester more carbon over a longer period of time due to their longer rotation cycles of around 20 to 30 years, in comparison to fast growing species, which have rotation cycles between 13 and 15 years (Petit and Montagnini 2004).

The outcome of the present research shows that the seven species that were a part of this study had varying carbon sequestration values due to intrinsic species growth characteristics and stand management. It is also important to highlight that the carbon sequestration estimates obtained in this research have to be used with caution. In some plantations, the range of tree species' diameters was higher, especially for the fast growing species, than those used by Montero and Montagnini (2004) to develop the allometric equations. In addition, some of these equations do not consider variations in wood specific gravity within species, locations, and within individuals of the same species due to specific growth conditions (Elias and Potvin 2003; Baker et al. 2004). Thus, an overestimation of those values is expected. In a study of native species carbon sequestration estimation with species growing in tree plantations in Panama and Costa Rica, Losi et al. (2003), using also allometric models in a different range of trees, resulted in an overestimation of 10.2% in the carbon stock values for *D. panamensis* plantations. Therefore, we can expect an overestimation similar to the estimated by Losi et al. (2003), or even higher.

Conclusions: Importance of Native Tree Plantations

The results of the present research enhance the criteria elaborated with previous research findings to improve species choice for reforestation and silvicultural management in Costa Rica, and in other regions with similar ecological features. Moreover, they support the concept that tropical plantations can serve diverse economic, social, and ecological functions that may ultimately help reduce atmospheric CO_2 accumulation (carbon sinks).

The difference in carbon sequestration values may suggest two scenarios. First of all, if our

objective is to accumulate carbon in the short term, species such as *V. guatemalensis* and *V. ferruginea* are two of the best options due their fast growth. On the other hand, if the objective is carbon sinks in the long term, species such as *D. panamensis* and *C. brasiliense* are the best options, because those species presented the highest values of carbon sequestration to date, and they also have longer rotation cycles.

The PES program in Costa Rica is an example that may be implemented in other tropical countries. A program like this not only benefits the whole society with the environmental services provided by the native tree plantations (i.e. carbon sequestration, soil and water conservation, scenic beauty, biodiversity, and restoration of degraded lands), but it also may benefit with economic incentives to small and medium landowners, who do not have access to bank loans to invest in reforestation programs or in other agricultural alternatives in degraded lands.

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Appendix 1. Allometric models to estimate aboveground biomass in kilograms for seven native tree species in Costa Rica (Adapted from Montero and Montagnini 2004)

Species	Component	Equation	r^2
C. brasiliense	Stem	Ln (Biomass) = -2.570 + 2.454 * Ln (DBH)	0.98
	Branches	Ln (Biomass) = -5.773 + 3.226 * Ln (DBH)	0.92
	Foliage	Ln (Biomass) = -6.825 + 3.379 * Ln (DBH)	0.95
	Total tree	Ln (Biomass) = -2.829 + 2.704 * Ln (DBH)	0.98
V. guatemalensis	Stem	Ln (Biomass) = -3.867 + 2.048 * Ln (DBH) + 0.697 * Ln (H)	0.99
	Branches	Ln (Biomass) = -1.872 + 1.202 * Ln (DBH)	0.92
	Foliage	Ln (Biomass) = -4.661 + 2.014 * Ln (DBH)	0.95
	Total tree	Ln (Biomass) = -2.815 + 2.428 * Ln (DBH)	0.97
V. ferruginea	Stem	Ln (Biomass) = -1.776 + 1.804 * Ln (DBH)	0.99
	Branches	Ln (Biomass) = -10.100 + 4.285 * Ln (DBH)	0.99
	Foliage	Ln (Biomass) = -12.761 + 4.976 * Ln (DBH)	0.86
	Total tree	Ln (Biomass) = -3.252 + 2.492 * Ln (DBH)	0.95
V. koschnyi	Stem	Ln (Biomass) = -3.679 + 2.481 * Ln (DBH)	0.98
	Branches	Ln (Biomass) = -9.279 + 3.962 * Ln (DBH)	0.96
	Foliage	Ln (Biomass) = -8.988 + 3.610 * Ln (DBH)	0.89
	Total tree	Ln (Biomass) = -4.132 + 2.755 * Ln (DBH)	0.98
D. panamensis	Stem	Ln (Biomass) = -2.831 + 2.747 * Ln (DBH)	0.99
	Branches	Ln (Biomass) = -6.137 + 3.534 * Ln (DBH)	0.93
	Foliage	Ln (Biomass) = -6.256 + 3.197 * Ln (DBH)	0.95
	Total tree	Ln (Biomass) = -3.011 + 2.947 * Ln (DBH)	0.99
T. amazonia	Stem	Ln (Biomass) = -2.473 + 2.501 * Ln (DBH)	0.99
	Branches	Ln (Biomass) = -4.876 + 2.844 * Ln (DBH)	0.99
	Foliage	Ln (Biomass) = -5.456 + 2.622 * Ln (DBH)	0.93
	Total tree	Ln (Biomass) = -2.538 + 2.614 * Ln (DBH)	0.99
H. alchorneoides	Stem	Ln (Biomass) = -3.136 + 2.591 * Ln (DBH)	0.96
	Branches	Ln (Biomass) = -8.615 + 4.234 * Ln (DBH)	0.98
	Foliage	Ln (Biomass) = -6.404 + 2.876 * Ln (DBH)	0.95
	Total tree	Ln (Biomass) = -1.696 + 2.224 * Ln (DBH)	0.98

Biomass is in kilograms per component; DBH – diameter at the breast height (centimeters); H – total height in meters; r^2 measures the proportion of the variance of the Ln (Biomass) explained by the equation.

Water-Use Efficiency in Hawaiian Trees:
An Eco-physiological Approach and Methodology

by Sharifa Gulamhussein, MFS 2005

Background

The ultimate causes of deforestation are manifold, often involving social, political, and economic motivations for the region in question. In the case of Hawaii, vast tracts of tropical forest were cleared in the 1830's for timber extraction of *Santalum* and *Acacia* trees and to make way for a booming cattle industry (Elevitch and Wilkinson 2000). In the past few decades, however, Hawaii's economy has shifted heavily toward agriculture and tourism, resulting in subsequent abandonment of these lands. Today, an estimated two-thirds of state's original forests have been cleared and only 10% of Hawaii's dry tropical forests now remain (Juvik and Juvik 1998).

Natural forest regeneration in Hawaii is severely impeded due to the synergistic effects of dry, nutrient-depleted soil conditions and the growing threat of intractable invasive species (Reiners et al. 1994; Scowcroft et al. 2004; Vitousek et al. 1987). Although reforestation efforts were first attempted in the 1920's by the Hawaiian Territorial Forestry officials and the private, non-profit Hawaiian Sugar Planters' Association, they involved the systematic introduction of exotic tree genera such as *Araucaria*, *Casuarina*, and *Eucalyptus* on Forest Reserve lands (Woodcock 2003). Among Hawaiians today, there is growing concern for implementing more environmentally friendly approaches, such as reforesting using native species (Dewar 2002; Elevitch and Wilkinson 2000; Kelly 2003). The tremendous environmental benefits of planting native species include ameliorating degraded soil conditions, encouraging forest regeneration, providing habitat for endangered species, preventing watershed erosion and flash floods, and maintaining ecosystem integrity and health in the long term (Harrington and Ewel 1997; Hobbs and Norton 1996; Montagnini 2001). Public and private institutions, local communities, and individuals are asking, "Which native species will grow well? Where should I plant them? How will reforesting my land benefit me, my community, or institution and the environment at large?" Investigating how plants will physiologically respond to degraded, water-stressed site conditions and whether they will survive in the long-term can help address these questions.

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An Eco-physiological Approach

Plant eco-physiology is the science of understanding how plants respond to the abiotic and biotic factors that affect their growth and development in a given environment (Larcher 2003). Eco-physiological research provides a keen understanding of whole plant functions while simultaneously contributing useful information about forest health by identifying "stressful" growth environments for plants such as limiting light, water, or nutrients. In the past, reforestation studies focused on simply restoring degraded soils by planting native species. The assumption was that if it grew there in the past, it can grow there now

(Elevitch and Wilkinson 2000). It is apparent, however, that as landuse changes through time, so do the growing conditions available at a particular site (Scowcroft et al. 2004). The power in conducting eco-physiological research resides in its practical premise: determining *how* and *why* native plant species grow well on certain sites and *what* limits their growth including factors such as resource competition for water, light, nutrients, and space with other organisms.

Eco-physiological Methods

Many eco-physiological studies begin their investigations with the tree's leaf. Leaves are the most vital organs of the vegetative plant body. Their primary function is the collection and transformation of sunlight, carbon dioxide, and water into sugars for energy and growth (Ashton and Berlyn 1992; Kerstetter and Poethig 1998). Indeed, leaf structure has evolved through time to maximize function while compensating for environmental stressors such as low-moisture availability (Kaplan 2001). For example, leaves posses tiny pores on their surface called "stomata," deriving from the Greek word for "mouth." Acting like miniature gates, these stomata regulate the amount of carbon dioxide and water entering and leaving trees at any given time (Willmer and Fricker 1996). The total number of stomata per leaf area and their size can restrict the amount of air and water entering a tree from the atmosphere, hence ultimately affecting tree growth. Eco-physiologists often conduct light-microscopic studies determining stomatal number, size, and density per leaf surface. Measuring these parameters can help elucidate the structural constraints of plant carbon intake and water-use overtime (Berlyn and Miksche 1976).

In addition to leaf anatomical methodologies, it is useful to research tree water-use using carbon chemistry. On Earth, there are two naturally existing elemental forms of carbon: abundant ^{12}C (98.9%) and its heavier isotope ^{13}C (1.1%), which contains an extra neutron in its atomic nucleus (Farquhar et al. 1989). By examining the distribution of these two types of carbon in nature and their transformation and fixing into organic compounds like sugars during photosynthesis, plant function and plant water-use can be modeled (Dawson et. al, 2002; Farquhar et al. 1989).

Water-use Efficiency in Trees

Water-use efficiency (WUE) is an eco-physiological measure quantifying the ratio of net CO_2 uptake from the atmosphere during photosynthesis versus net H_2O loss (Larcher 2003). WUE can be measured directly throughout a day as a plant conducts photosynthesis, allowing CO_2 into a leaf and water vapor out through the stomata. Although instantaneous measures of water-use efficiency are important for understanding short-term plant water use, it is often useful to model water-use and loss over the longer time scales using $\delta^{13}C$ stable isotopes. $\delta^{13}C$ integration into a tree and subsequent kinetic fractionation, that is selective discrimination against $\delta^{13}C$ uptake by the enzyme Rubisco, occurs during CO_2 carbon fixation, leaving the heavier $\delta^{13}C$ isotope behind inside the leaf. Hence, measuring the isotopic levels of $\delta^{13}C$ in plant leaves can be used as a standardized measure of water-use and loss through time (Dawson et al. 2002; Warren et al. 2001). In addition to leaf analysis, other methods of measuring tree WUE have been developed to quantify $\delta^{13}C$ in wood cellulose of tree rings to account for water-use through multiple growing seasons over a tree's life-time (Brendel et al. 2000; Ferrio and Voltas 2005; Leavitt and Long 1986). Stable isotopic modeling in tree rings has been used in climate change research to reconstruct paleoclimates to extrapolate CO_2 levels in our atmosphere pre-industrial revolution (Barber et al. 2004).

On the scale of entire watersheds, eco-physiologists today are modeling the flow of water and carbon through forests using methodologies from both the fields of plant physiology and stable isotopic chemistry. This integrative approach

allows for tracing the source and fate of water and carbon dioxide at the ecosystem level. One hot topic in eco-physiological research involves tracing from *where* a tree receives its water using the stable isotopes of $\delta^{18}O$ and deuterium δD. This isotopic approach teases apart the various sources of water entering a tree be it from shallow soils, deep ground water, or from precipitation (Dawson et al. 2002; Yakir and Sternberg 2000).

Eco-physiological Studies in Hawaii

Currently, one of the most promising approaches for reforestation in Hawaii is replanting degraded landscapes with native tree species such as *Acacia koa* (Gray) which could potentially ameliorate dry, degraded soil conditions encouraging forest regeneration. Within the past 20 years tree eco-physiological studies with koa have steadily increased. Walters and Bartholomew (1984, 1999) investigated tree anatomical response to gas exchange, water use, and light in a greenhouse setting. Meinzer et al. (1996) found that WUE could be attributed to physiological responses of stomata closing under stressed environmental conditions. Harrington et al. (1995) investigated how moisture determines leaf area index (LAI) and water-use of koa along a precipitation gradient on the island of Kauai. Ares and Fownes (1999) sampled leaves along an elevation gradient in order to determine koa stand structure, productivity, and water use on the big island of Hawaii. Still others have investigated the role of substrate type, nutrient availability, and role of temperature and geographic location on native trees (Pearson and Vitousek 2002; Scowcroft et al. 2004). Determining the environmental factors which limit tree growth and establishment in the wild, then, is a vital piece of the larger effort in understanding how native trees grow and interact with the Hawaiian environment at large.

Although eco-physiological studies are crucial for elucidating plant function from tiny leaf to whole watersheds, it is important to use an interdisciplinary team to present decision makers on the ground with the most accurate, integrative model and recommendations for sustainable forest management. Successful reforestation of degraded landscapes is collaborative task in Hawaii. My Tropical Resources Institute summer research involved quantifying *Acacia koa* $\delta^{13}C$ isotopic content and leaf stomata characteristics to determine water-use efficiency on the slopes of Mauna Loa volcano on the Big Island of Hawaii. Through collaborative planning with the University of Hawaii, Manoa, the United States Forest Service, Hawaii Volcano National Park, and private landowner Kamehameha Schools, results will inform reforestation management recommendations in Hawaii.

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Institutional Barriers to Information Access for Development in South Africa and Beyond:

A Practical Guide to Dysfunctional Relationships

by Brett Galimidi, MEM 2005

Introduction

Today, technology-based systems of information creation, access, and exchange are emerging as a new resource to manage the complexity of diverse development situations that stem from varied sociopolitical systems, cultural views, and economic motivations. Information and Communication Technology (ICT) is gaining ground in the international community as a solution to traditional development problems because of its potential to bring information and education to those who are lacking it, to connect those who are isolated, and to foster community involvement in projects (UN 2001; UNDP 2001; Bridges.org 2003). The focus of ICT is not the technology itself, such as internet access or networked databases, but its ability to enable the interactions necessary for representation of multiple stakeholders in decision-making processes through collaborative tools such as online communities, remote conferencing, and other knowledge-sharing means (UNECE 1998).

ICT solutions, however, can be problematic as they involve numerous parties in the project design, implementation, and monitoring stages. These parties each come to the table with their own interests and assumptions, and the project is likely to be shaped according to those who hold the most power and resources. If ICT is to be a tool that levels the playing field in the decision-making process, it is critical to understand the formation of key relationships between actors during ICT project development and the effects these interactions may have on resulting efforts. This article uses South Africa's Western Cape Province as a case study to address relationships between ICT donors, designers, implementing organizations, communities, and governments and to illuminate the hurdles and opportunities of ICT projects.

Brett Galimidi, a product of the San Francisco Bay Area, spent several years studying applications of internet-based technologies and is now finding ways to use them for environmental management and protection.

Background

South Africa is currently undergoing several political and economic changes that have enabled the generation of many ICT projects. South Africa's apartheid government left behind a legacy of sorrow, violence, and social destruction that must now be addressed. The end of apartheid in 1990 and the beginning of democracy in 1994, however, set the scene for a new era of 'entrepreneurial' inspiration, including a significant increase in NGOs working on development issues. In addition, despite its cruelty, the apartheid regime had developed an effective economic infrastructure, emanating from financial centers in Johannesburg and Durban and the exploitation of diamond and gold reserves around the country. This economic expansion was supported by a strong physical infrastructure of well-maintained roads, significant power generation, and wide-reaching communication systems. While this

previously benefited only the wealthy white elite, it may now serve as a valuable system for all people, especially those left behind technologically during apartheid.

South Africa's existing infrastructure, in conjunction with general post-apartheid government and NGO interest in fixing the damage from the previous forty-plus years (although with little agreement on how to fix it), has paved the way for the country to serve as a testing ground for ICT solutions. For example, one of the provincial governments (equivalent to the state-level in the US) has implemented an online system that, aided by call centers in rural areas staffed by local residents, distributes useful government information on everything from health to democratic rights to job skills.

Methods

In the summer of 2004, I traveled to South Africa to gain direct insight into the current state of ICT projects and the institutional structures that are promoting (or preventing) them. I worked with a Cape Town-based NGO directly addressing ICT access issues and conducted my own research focused on ICT project design and implementation. Through semi-structured interviews, I asked questions about perceptions of ICT use in development, barriers that may prevent the use of ICT solutions (including socioeconomic factors, culture differences, and education levels), how information flows and is controlled, if there is collaborative decision-making, and if communities' support the projects.

My primary investigatory emphasis was at the government/NGO level rather than the community level. While site visits to assess current project implementation played a small role in analysis, most interviews were conducted in Cape Town, the *de facto* center of NGO and ICT action, with NGO staff, government officials, and on-the-ground practitioners back from the field.

Key Relationships[1]

Institutional structures are complex, filled with nuanced relationships and motivations. While understanding the full suite of interactions in a relatively short period of research is extremely difficult, my results point to several key relationships that are core to project development and provide some insight into the ways that their dysfunctions can impact the design and outcome of ICT projects. To be clear, the problems described below neither exist in every case, nor provide a full survey of the tensions in the ICT process. Rather, I describe common pitfalls that may be predicted, recognized, and addressed to make ICT a more effective solution for development issues.

Project donors/project designers

A fundamental relationship in an institutional structure addressing development problems is that between project donors and project designers. Donors, more often than not, are aid agencies, governments, or foundations, while designers are typically NGOs.

Several themes persisted in the interviews (Figure 1). It became clear that a critical breakdown occurred between the expectations of donors and the on-the-ground realities of a project. Donor expectations come from a number of influences and motivations (Chapin 2004), which, in turn, may influence the direction of a project, particularly for local NGOs. This influence can cause the project to veer from the designers' area of expertise, while forcing it to conform to a set of goals that may not be appropriate to the project's local context. In one case, an NGO I spoke with repeatedly felt burdened by the heavy bureaucracy associated with some donor sources, whereby, as recipients, they did not have direct control over how the money was allocated. They also spoke of "funding from a distance" issues in which the donors do not quite grasp the field situation and thus offer to help in ways that are not particularly useful. For

Figure 1. Dynamics of the project donor / project designer relationship

Breakdown	Cause	Result
Donor expectations and on-the-ground project realities	• Bureaucracy • "Funding from a distance" • North-South philosophical differences	• Conform to goals of the donor organization rather than take advantage of the abilities of the organization
Donor need for quick quantification of success and long-term horizons often necessary for a project to reach its full potential	• Donors need to please their investors with fast, positive results • Many NGOs competing for resources allows selectivity on behalf of donors	• Inappropriate measures of project "success" • Project focus on short-term rather than long-term results • No "core funding" to be used for non-project specific administration
Continual need for funding forcing designers to comply with donor wishes, even if not in the best interest of the project	• Limited donors • Little ability for designers to push back on donors • Job security fears	• Projects that meet donor needs more than community needs • Perpetuation of need-based relationship

example, with ICT, many US and European companies like to donate old computing equipment to schools in Africa and elsewhere. This often can be problematic as few people in these areas have the technical knowledge to administer the machines, deal with software crashes, and provide other basic maintenance operations. In addition, conflicts that emanate from North-South philosophical differences, such as the need to help communities with economic development in the first place, had prominence.

Another regular breakdown existed between donors' consistent need for short-term quantification of success and the long-term horizons often necessary for a project to reach its full potential. With many NGOs competing for resources and funding sources that are linked to investor appraisal, easily quantifiable success measures have become increasingly important (Stem et. al. 2005). In the case of ICT, this may mean that "number of internet-connected computers" is the key measurement for project success rather than "successful community-derived development projects enabled by ICT." The former is clearly easier to quantify, but the latter might better measure the actual success of the project.

The project designers also had their own institutional challenges of social understanding, technical capacity, and financial resources. The most obvious problem was the continual need for funding. The competition for money, unfortunately, sometimes leads NGOs to alter their desired plan or reshape their areas of expertise to meet funders' desires. As one NGO leader said, "organizations are simply not in the situation to stand up to funders." Not only do NGOs not have the financial security to push back, but, in less developed countries, they also are often staffed by people who may have serious difficulty finding work somewhere else. In South Africa, and likely elsewhere, this creates a significant disincentive to rock the relationship boat with regular funders. Other complaints aired during interviews included the difficulty in obtaining "core funding" – that which facilitates general NGO administration rather than specific projects – and a lack of accountability on the NGOs' part that, if addressed, might enhance the credibility of these organizations in the eyes of their funders and thus earn them more project discretion.

Project designers/project recipients

A second relationship critical to ICT implementation is that between the project designers and the project "recipients," or

Figure 2. Dynamics of the project designer / project recipient relationship

Breakdown	Cause	Result
Lack of cultural/ contextual understanding	• Initial assumptions of designers • Information gathering from a few powerful "community leaders" • Rapid-assessment approaches that limit visibility of community subtleties •Assumption that "community" represents unified actors with common interests	• Solutions that may not adequately address the root causes of the problems at hand
Beliefs about ICT and the implementation of information-based solutions	• Assumption that the primary barrier to access is physical, such as a computer and internet connection • Assumption that all information is good information	• No addressing of socio-economic factors at play • Possible perpetuation of biased, false, or subversive information • Little time spent assessing other non-ICT options
Little or no upward input into projects	• Paternalism • Assumptions of recipient need on behalf of designers	• Continued distrust of outsiders • Perpetuation us-versus-them feelings in some areas

intended beneficiaries of the work (Figure 2). The relationship between funders and NGOs described above ideally implies that the views and insights of the project designers, if not beholden to donors, would match those of the communities they are attempting to help. This, however, is not necessarily the case.

Project designers at times lacked a cultural and/or contextual understanding of the situation at hand. One practitioner who works primarily in a South African township (an apartheid-era relocation site for black South Africans) pointed to several reasons why this may happen. First, general initial assumptions on behalf of the designers may significantly influence projects. Second, a lack of full insight into community dynamics, which results from dealing only with community leaders who may wield power in their own self-interest as opposed to the community's, can bias the local input projects receive. Finally, as mentioned, donor pressure may shortchange projects if, for example, a rapid assessment approach to problem solving is required that does not permit time to understand community subtleties. Also, it was a common assumption among designers that a community represents a unified front of actors with similar and common interests. This is rarely the situation (Agrawal and Gibson 1999; Mohan and Stokke 2000).

Indeed, a number of assumptions reappeared in my interviews with project designers, some vocalized outright and some implied. Perhaps the most basic assumption was that the real limitation preventing people in communities from utilizing information for economic advance is physical access to a computer and internet connection. Needless to say, there are numerous other barriers to "access": education level, language ability, social constraints, and economic limitations (Okpaku 2001). To be fair, while this mentality still exists in some circles, many project designers do understand the complexities of information access and some, like the NGO for which I worked, are addressing this directly. A more common problem with ICT project designers was the belief that all information is good information. There was little acknowledgment of the possibility that information provided to community

members may be biased, false, or lacking in relevant content. Finally, I observed that many people working on ICT solutions spent little time evaluating other non-ICT options for addressing community needs and thus assumed their solution optimal.

Troubles with the designer relationship were also apparent from the perspective of the recipients. A recurring frustration among recipients was the lack of upward input into projects. This problem was described repeatedly to me, with regard to development projects in general, by my contact working in the township. Paternalism, a frequent critique in development projects (Chambers 1994), can result in this type of unidirectional project. ICT has the potential to ameliorate this dynamic by opening channels for collaborative decision-making. It is particularly counterproductive, therefore, to become paternalistic in the implementation of ICT projects. The potential for multidirectional information flow is widely recognized by designers, but its practical implementation proved to be difficult. Similarly, nearly all fieldwork contacts interviewed said that project recipients often have an inherent distrust of information provided by outsiders, especially from whites with whom they associate the oppression of apartheid and, to some extent, the perceived unfairness of modern capitalism. ICT can pose a solution for this problem as well through increased transparency of sources and, again, through the multidirectional information flows.

In the South African context, my research also pointed to a more profound disconnect in the designer/recipient relationship. In discussing township development projects, it was noted that apartheid has resulted in a "psychological hangover" that prevents some black Africans from pursuing a life outside of the apartheid mentality although it is legally over. After decades of oppression, many citizens do not recognize they have any democratic rights at all. From an information-use perspective, those marginalized by apartheid have little understanding of how outside information could help them address the problems they face (Jagwanth 2002). Of course, this is not a cognitive failure on behalf of the community members as much as it is an assumption by project designers that community members actively want access to information. Designers may simply conclude that if information is available, it will be used. While community members may benefit tremendously from increased access to information, they must first understand those benefits. Designers must be careful, however, not to oversell ICT either. One interviewee mentioned the problem of community members expecting ICT solutions to solve all of their problems. "The computer will get me a job" had been overheard more than once.

Unfortunately, the effects of apartheid are still quite strong, as evidenced by the township's existence and the severe economic disparity that continues between blacks and whites. Addressing apartheid as history ignores the current psychological realities of the affected people. While project designers may assume that people are eager to change their current situation, many community members do not consider change a possibility due to the hangover effect. Marginalized people's desire to use new tools like the internet to gain footing in current society may simply not exist.

Project recipients / project recipients

The final relationship category discussed here occurs within a group of recipients (Figure 3). These intra-community relationships can pose a challenge to project designers, as they are often cultural in nature and require anthropological-type methods to uncover. ICT project budgets rarely allow for this depth of analysis. Much of the insight discussed here comes from two key individuals: the one working in the township and another working with an indigenous group in northern Namibia.

Interviews with project leaders indicate that some breakdowns existing within a community

Figure 3. Dynamics of the project recipients / project recipients relationship

Breakdown	Cause	Result
Little post-apartheid understanding of democratic rights among those in the townships	• Decades of oppression resulting in a "psychological hangover" from apartheid • Townships still under authority of powerful "community leaders" rather than the central government	• Projects implemented that the recipients may not utilize
ICT solutions or attempts not well received by recipients	• Felt threatened by a loss of power, tradition • Leaders/headmasters often embarrassed to admit they had no computer knowledge • Aggregation of power by a few "leaders" in the townships	• Resistance among some to ICT projects • Inefficient implementation
Corruption among community leaders	• Little means to hold community leaders responsible, by residents or the government	• Near impossible to get legitimate information on the needs of the recipients • Lack of accountability by those who are in charge

create tensions between community members and thus affect the overall acceptance of ICT.

Both the township and the Namibia cases involve people that were marginalized for several generations. As the ruling classes changed their country's sociopolitical trajectory to suit their needs, these communities were neither allowed to practice traditional ways nor be part of the dominant regime. Now, although legally considered equal, many people are in a state of social limbo where they feel neither "traditional" nor "modern." As a result, a vacuum exists that can profoundly affect an ICT project. New generations knowing only of oppression have developed their own social systems within the larger post-apartheid context. The townships in particular, often with tens or hundreds of thousands of residents, have entrenched power hierarchies and social strata that developed in reaction to government oppression.

Within that vacuum, daily actions of various individuals within the township, Namibia, and elsewhere present an even more nuanced challenge than community-wide issues. As mentioned earlier, it is common to think of a "community" as a unified entity. Communities are dynamic and consist of individuals who have their own interests.

With regard to ICT, those interviewed reiterated three common themes. The first was the loss of power. Several village elders in the Namibia case and township community leaders felt threatened by an influx of outside information. They saw their control and status as vulnerable. Second, many school headmasters and other leaders were embarrassed that they had no working knowledge of computers. Instances were reported by my internship NGO where teachers and leaders had hidden donated computers for "safe keeping" rather than learn how they worked so they could teach the students. Third, as with any development project, corruption is a danger. Particularly in the township, where community leaders aggregated power during and after apartheid, abuses of power were common in many NGO-led projects. This was perpetuated as project designers often turned to these leaders for direction instead of others in the community that may have a better working knowledge of a problem.

This third relationship category is complex and changes with various cultures and socioeconomic realities. While the details change with each project, project designers can anticipate the potential imbalances in intra-community relationships and address them to maximize project effectiveness.

Discussion

Development projects are frequently constrained by the institutional structures that initialize and enable solutions from the outset. ICT projects are no different. Currently in South Africa – and there is little reason to believe these relationship issues are unique to this country – ICT projects are at risk of failure due to the same sort of institutional barriers that hamper traditional development models. Shifting needs and priorities on behalf of all involved may overshadow the original goal of a project, and those in need of help will endure the most of these relational breakdowns.

The true success of ICT projects can be elusive when the wrong indicators are measured. ICT is a new paradigm in development, which has few set precedents; repeated failures could result in the wholesale abandonment of the concept. To avoid this, the numerous participants in the project design and implementation process should openly address the existing institutional structures that may affect the project and the relationships within. In turn, proper expectations may be set by designers and thereby increase the likelihood that projects will work towards attainable and beneficial goals and will be given the opportunity to reach those goals over a long-range horizon, if necessary.

Care must be taken by ICT project designers and funders to address possible dysfunctions in the relevant relationships, as they may be detrimental to overall project success. ICT can be tremendously powerful and beneficial. To reach its potential, designers must anticipate breakdowns and problems, and resolve them proactively rather than reactively. In doing so, project successes will become more common and will benefit all involved: donors, NGOs, communities, and individuals.

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Endnotes

[1]These relationship categories are comprised of the following individuals: Project Donors – any of the potential monetary supporters of projects, including foundations, aid agencies, and governments; Project designers – a broad category comprising all individuals and organizations involved in the project creation, implementation, and monitoring stages; Project Recipients – those who are the intended beneficiaries. These categories are designed to remove the connotations of social differences (such as "indigenous people") and need (such as "rural poor").

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Whale Shark "Ecotourism" in the Philippines and Belize:

Evaluating Conservation and Community Benefits

by Angela Quiros, MEM 2005

Introduction: Donsol and Placencia

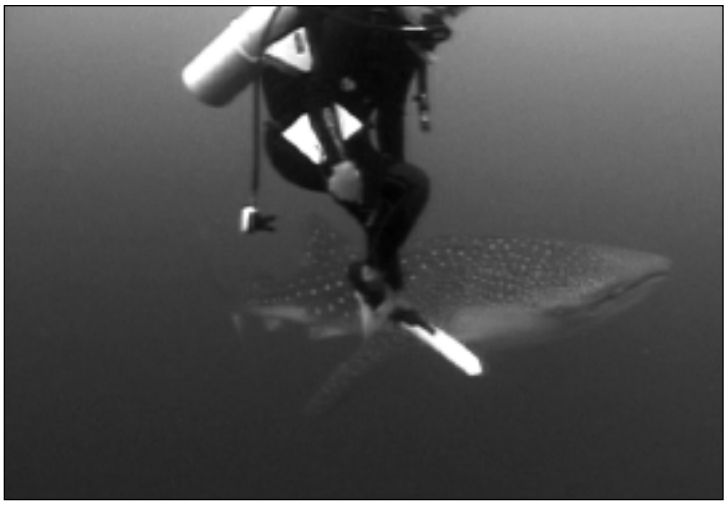
Whale shark tourism all over the world is a highly lucrative industry based on an ecologically vulnerable species (Norman 2000). In the Philippines, Donsol is a popular destination for local whale shark tourism. In Belize, international divers visit Placencia to observe whale sharks in Gladden Spit Marine Reserve. Other sites of whale shark tourism are Ningaloo Reef in Australia, the Seychelles, and Isla Contoy in Mexico. Although these sites have different environmental, social, and economic contexts, all can benefit from adopting ecotourism best practices.[1]

The initiatives in Donsol and Placencia support literature on the variable role that ecotourism plays as a conservation development tool. In a study that tested enterprise strategies for community-based biodiversity conservation, Salafsky et al. (2001) found that an enterprise strategy will not lead to conservation at all sites. Rather, various conditions – including the nature and benefits of the enterprise and the identity of the stakeholders – influence the probability that a particular strategy will lead to conservation. To conserve whale sharks while improving residents' socioeconomic status, community-based ecotourism was initiated in Donsol, Philippines and Placencia, Belize. In this article, I present qualitative results of research conducted between January and August of 2004, where I studied and evaluated impacts of these projects on whale sharks and the communities involved.

Angela Quiros is from the Philippines and has prior experience in marine conservation issues in the Philippines and the Caribbean. She plans to continue working with marine wildlife and ecotourism in the context of protected areas.

Context

In January 1998, whale sharks attracted to plankton blooms were discovered in aggregations off Donsol, a fishing village in the Philippines. This event attracted tourists, poachers, media and government agencies interested in obtaining a piece of the whale shark pie. In the wake of the discovery, poachers killed seven sharks; Donsol waters were subsequently declared a whale shark sanctuary, and related hunting and trading was banned throughout the Philippines. However, local fishermen were commissioned to take people on their boats to swim with the whale sharks, even though Donsol had no official tourism infrastructure (Yaptinchay 1999). WWF-Philippines started the Whale Shark Research and Conservation Project to provide ways for Donsol to protect whale sharks through responsible tourism and fishing practices. In 1998, they worked with the local government and the Donsol Municipal Tourism Council to develop a community-based whale shark sanctuary and ecotourism program, to set regulations and fees, and to organize and train guides and boatmen (Yaptinchay 1999). Registered tourism arrivals were up to 3,175 between December 2003 and May 2004, and in 2003, the Department of Tourism of the Philippines built a Tourism Office that coordinates all whale shark tours.[2]



The author diving with a whale shark in Gladden Spit, Belize.
Photograph by Shayne Peche.

Whale sharks have congregated at Gladden Spit on the Belize Barrier Reef as long as the oldest fishermen can remember. Whale shark tourism, however, was not considered until 1997, when the community discovered that during the ten-day period around the full moon in April and May, whale sharks eat the eggs and sperm from spawning cubera snappers (FoN 2002). Whale shark tourism in Placencia, the nearest town to Gladden Spit, grew from one to 22 tour operators between 1997 and 2004, and the tourism market grew from 500 visitors in 2002 to 1,299 visitors in 2004. (Jones 2004). Official management did not start until 2004, when Friends of Nature, a Belizean conservation organization worked with The Nature Conservancy and the Placencia community to train and register whale shark guides, to establish and implement regulations, and to designate a Whale Shark Zone in Gladden Spit.

Challenges

Challenges to successful ecotourism ventures in Donsol and Placencia originate from the unique biology of whale sharks, socio-economic concerns of communities, and tourism management. Adopting eco-tourism best practices would minimize effects of tourism on whale sharks and benefit local communities.

Impacts to the whale sharks

Whale sharks' sensitive nature, aggregation at specific times of the year, slow maturation rate (30 years to reach sexual maturity) and migratory behavior all make them susceptible to anthropogenic impacts (IUCN 2004). The IUCN classifies whale sharks as vulnerable based on past records of declining catches and abundance (Norman 2000). This evidence supports the need for low-impact activities at whale shark sites to promote sustainability of the industry.

Observations of whale shark tourism in the Philippines and Belize indicate that whale shark behaviors include feeding, diving, and basking on the surface. Some behaviors are categorized as "avoidance behavior," such as diving away from swimmers, changing direction, and banking (Colman 1997). Since Gladden Spit and Donsol waters are both feeding grounds for whale sharks, disturbing them while they feed could reduce the sharks' survival by diverting their energy from feeding to avoidance behavior (Sorice, Shafer, and Scott 2003; Hammitt and Cole 1998). In Donsol, management practices and tourist behavior significantly increased the probability of whale sharks exhibiting avoidance behavior, such as directional changes and diving in response to humans. Significant predictors of a whale

BIO holding on to whale shark in Donsol, Philippines
Photograph by Cristina de León.

shark's directional changes were path obstruction of the whale shark and proximity of a swimmer to the whale shark. Significant predictors of a dive response were first-time sighting and path obstruction of the whale shark.[3]

Social and cultural changes

There are benefits and drawbacks to whale shark tourism. On one hand, commercial sectors are thriving, as evidenced by the proliferation of small stores and restaurants in Donsol, and resorts in Placencia. Both towns take pride in being known for whale sharks. The yearly Butanding Festival[4] held in Donsol every April is testament to that fact. On the other hand, tourism has brought little infrastructure development. Good roads are needed at both sites.

Whale shark tourism comes to Placencia at a time when tourist visitation is low, providing an important off-season income. However, only a few licensed tour operators and dive guides in Placencia benefit from this highly lucrative industry, with dive tours reaching US$200 a person. In Donsol, 26 active guides, or Butanding Interaction Officers (BIOs), and 60 members of the Boat Operator's Association (BOA) work on a rotational basis. A whale shark tour boat in the Philippines costs US$50, which can hold up to seven people. The lower fees in Donsol and greater membership translate to lower returns, as compared to Placencia.

Certified guides and tour operators in both locations aim to keep membership low to provide more income for those already involved. In Donsol, BIO training has not been conducted since 1998, and recent attempts by WWF-Philippines to organize training for new BIOs have been halted due to conflicts among stakeholders.[5] In Donsol, whale shark tourism is an alternative to fishing and farming, and efforts by the local government are underway to provide alternative means of tourist income, such as firefly watching and island hopping. However, these activities are not enough to provide full-time employment.

Tourism development has changed some underlying values in the community. Stakeholders chose to have a protected area in their own waters, but with the coming of tourism, attention has shifted from eco-tourism for whale shark protection to tourism for commercial gain. The race to maximize profits has resulted in crowded conditions at the whale shark aggregation sites. One tour operator in Placencia has stopped conducting whale shark tours because he thought that there were "too many people" in the water. Tour guides and operators are placed in the difficult position of juggling between conservation and lucrative tourism activities.

Alternatives

If whale shark tourism management continues in its current state at these sites, increased impacts on the whale sharks may decrease sightings and increase conflicts that affect the experiential quality of the tour. In a tourist survey at Gladden Spit, visitors said that they would not return if crowded conditions did not improve (Lindberg 2004).

Whale shark ecotourism can work. In Ningaloo Reef, Australia, the industry has been prospering since the early 1990s due to proper monitoring (Colman 1997) and adequate financing for the management of resources. One alternative for creating a more sustainable product is to institutionalize ecotourism by changing rules and regulations, properly financing tourism management, and monitoring tourism impacts.

Changing rules and regulations

Rules and regulations in Donsol and Gladden Spit were adopted from those in Ningaloo Reef (Colman 1997). However, site-specific characteristics make it impractical to have identical regulations. In Donsol, for example, visibility varies between three to six meters, while visibility in Ningaloo Reef reaches up to 20 meters (Kurtz 2004). Ningaloo's rules mandates that swimmers be at least three meters from the head and five meters from the tail – a rule that, if obeyed in Donsol, means visitors will not be able to see the whale shark! Thus, BIOs bring swimmers less than one meter away from the shark, breaking the regulations.

The same is seen for the "no touch" rule. Between March and June 2004, I observed 99 touch incidents from 776 interactions. BIOs touch whale sharks, and rarely reprimand visitors for breaking those rules, giving conflicting messages about the "no touch" rule. Visitors watch an orientation video that clearly lays out rules. When visitors enter the water, however, it is not uncommon for them to be encouraged to touch the whale shark by the BIO.

Two main themes of conflict in Donsol are boat approach and crowding. Interaction guidelines specify a maximum of one boat per whale shark, but when whale sharks are scarce, several boats "share" one individual, crowding around it and dropping their swimmers in the water immediately after the previous boat. This results in shouting exchanges between the BOAs and BIOs.

Whale shark tourism in Gladden Spit is concentrated during the 10-day period each month between March and June. In Gladden Spit, whale shark guides have reported up to 80 divers in the water. Whale shark tourism in Donsol, on the contrary, starts as early as January and runs until August each year, for every day of the month. Although crowding associated with very short seasons can be avoided in Donsol, weekends and holidays have the same crowding intensity as Gladden Spit. There is a 15-20 boat a day limit in Donsol, but during peak season, the only limiting factor is the number of boats and guides, available for trips. During Easter in 2005, ten uncertified guides led tours because BIOs were occupied on two or even three trips per day, and the Tourism Office recorded 76 boat trips in one day.

To address some of these crowding issues in Placencia, Friends of Nature (FoN) formed a working group in October 2004, composed of whale shark guides and tour operators, to change regulations at the Whale Shark Zone. Changed regulations involve instituting a formal rotation for whale shark dives with strict time slots to minimize crowding in the area. Applying changes in the 2005 season has the potential to improve the management of tourism at Gladden Spit.

Financing

One of the greatest challenges to a self-sufficient and functional protected area is having stable capital inflows to cover management, especially personnel costs, maintenance, and

FoN Rangers and Community Researcher on patrol in Gladden Spit Marine Reserve *Photograph by Angela Quiros.*

infrastructure. Gladden Spit Marine Reserve was one of the sites selected by The Nature Conservancy to participate in a program that utilizes tourism user fee mechanisms for protected areas. This initiative sought to put an economic value on services in protected areas through income generation mechanisms (TNC 2002). In March 2003, Friends of Nature (FoN) determined levels for the user fee system at a community consultation meeting as US$15 per person. Donsol has a similar user fee system, in which locals pay US$2 and foreigners pay US$6.

Government, conservation organizations, and local institutions influence the appropriation and misappropriation of revenues from whale shark tourism. Stakeholders are involved in this decision-making process, although to varying degrees and to varying levels of continuity. The Local Government Unit (LGU) in Donsol manages and finances whale shark tourism in Donsol. Entrance fees were established in 1998 and are collected and held by the LGU and are not specifically used for tourism management. All funds collected in 2003 were collected by the LGU and re-allocated to the Butanding Festival in Donsol, a yearly celebration of the coming of whale sharks in April.[6] In Placencia, alternatively, whale shark tourism is co-managed by Friends of Nature and the government of Belize. Funds used to manage Gladden Spit come from external grants awarded to FoN. In 2004, funds collected from whale shark tickets were handed over to the government of Belize. While the majority of revenues remained with the national government to support other protected areas in Belize, a portion of those funds were returned to FoN and used to purchase a new boat motor for patrolling and research activities along the reef.[7]

In Donsol and Placencia, revenues from entrance fees are not used specifically for managing whale shark tourism. Funds generated from entrance fees should stay within the site, and fees should be priced at a level that will help finance management. At both sites, however, revenues are insufficient to cover the cost of management, monitoring and improvements to the site, and, therefore, ongoing outside funds will be required.

Tourism impact monitoring

Monitoring tourism impacts on wildlife, environment, and community are an important and neglected part of tourism management. Monitoring is not typically accounted for in tourism management plans and must be financed by external funding.

Anthropogenic effects on wildlife have been studied in the context of activities like swim-with-manatee tourism in Florida, USA (Sorice, Schafer, and Scott 2003), and swim-with-dolphin operations in New Zealand (Constantine 2001) and Australia (Scarpaci, Dayanthi, and Corkeron 2003). Whale sharks have been monitored around snorkelers in Australia (Colman 1997) and in 2004, I initiated a pilot monitoring project in Donsol, which is ongoing for the 2005 season. The crowded conditions in both Donsol and Gladden Spit necessitate monitoring and a strengthening of regulations.

In Gladden Spit during the 2004 season, whale shark sightings were down to one to two whale sharks per dive from a historical high of eight to nine whale sharks per dive (Jones 2004). The decreasing likelihood of whale shark sightings in Gladden Spit should make evident to stakeholders the need for impact monitoring. Whale sharks, a long-lived, K-selected species,[8] may be the type of animal that does not immediately exhibit negative effects of disturbance. Tourism at both sites is not older than ten years, while a whale shark can live up to eighty years (Norman 2000). Therefore, negative effects of tourism may not be seen until more years have passed. Given the lack of scientific knowledge about this species, employing the precautionary principle is a prudent long-term plan.

Integrating monitoring into the management plans of Gladden Spit and Donsol would improve the current band-aid approach to whale shark conservation at these sites, where management does not mitigate adverse impacts with adequate foresight. Monitoring would help the two sites move toward true ecotourism principles, by indicating which activities most adversely affect the whale sharks and informing managers to minimize those impacts.

Conclusion

The community-based "eco-tourism" projects in Donsol and Placencia have the potential to be model enterprise strategies that will lead to conservation. A successful long-term approach is contingent on several factors: impacts to the whale sharks and the environment must be properly managed, conflicts among stakeholders must be relieved through better management practices, benefits must be spread more equitably for all participants, and the two sites must continue to receive active NGO and government support. Institutionalizing ecotourism at both sites – through implementing strategies that respond and adjust to changes, properly financing tourism management, and monitoring tourism impacts – will move Donsol and Placencia closer to sustainability.

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Aguirre, Vicky Zayco, Rolly Magpayo, Jef Buscar, Chino Villanueva, Christine Edullantes, Vera Horigue, and Elson Aca.

Endnotes

[1] Ecotourism is defined as a "low-impact, environmentally-sound and community-participatory tourism activity…that yields socio-economic benefits to the concerned community" (Libosada 1998).

[2] Personal communication with Maria Ravanilla, Department of Tourism, Philippines, Director of Bicol Region on March 22, 2005.

[3] Logistic regression analyses were used to model whale shark avoidance behavior.

[4] *Butanding* is whale shark in Bicolano.

[5] Personal communication with Tito Arevalo, former Tourism Officer of Donsol's Tourism Office, May 2004.

[6] Personal communication with Karina Escudero, March 11, 2004.

[7] Personal communication with Will Jones, Development Director of Friends of Nature, October 1, 2004.

[8] K-selected species have more or less stable populations at or near carrying capacity in relatively stable habitats.

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Modeling from Below:
The Social Dynamics of Land Use Change in the Buffer Zone of Cordillera Azul National Park, Peru

Rafael Eduardo Bernardi de León, MEM 2005

Introduction

The Cordillera Azul National Park (CANP), created in 2001, lies in the Huallaga Valley of northern Peru, where the Andes meet the Amazon rainforest. Portions of the departments of San Martín, Ucayali, Huánuco, and Loreto fall within CANP (CIMA 2004). CIMA-Cordillera Azul, a Peruvian non-governmental organization (NGO), manages the park, making it the first privately managed, publicly protected National Park in Peru. While CIMA manages the park, ultimate control over Cordillera Azul remains in the hands of the government's National Institute of Natural Resources (INRENA). The park protects a unique array of species, ecosystems, and geologic formations and remains largely untouched from industrial exploitation due to its inaccessibility and the recent history of drug trade and guerrilla war in the region by both Shining Path and the Tupac Amaru Revolutionary Movement (MRTA).

Present pacification and reduction of illegal coca crops are creating a new scenario for development in the region. Economic opportunities however, seem to repeat a pattern of 'boom and bust' cycles that characterize the history of the Amazon region. Trends of logging and road opening are part of agricultural frontier expansion processes that result in high rates of forest conversion to agricultural or degraded lands, threatening the park's stated management goals of protecting biodiversity and contributing to sustainable local livelihoods (CIMA 2004). In order to address these threats, there is a need to understand the main social and economic factors behind frontier expansion in the area.

For this research, I developed a model for conceptualizing the processes underlying land use change based on a literature review and preliminary analysis. This initial model assisted in framing questions for a household survey in the buffer zone. The model was then refined to incorporate findings from the survey. The model was an iterative tool to understand the process, guide my field research, and generate recommendations on land-use change. Here I present the results from the household survey in relation to the model, highlighting locally significant factors driving land use change in the community and providing recommendations for future management.

Case Study

I focused my study on San Juan, a small, recently established rural community located in the province of Picota, department of San Martín (Figure 1), composed primarily of migrants from the Andean departments. San Juan is a dynamic community whose active local authorities and good communal organization have led to the establishment of a school, the construction of a 14 km road linking San

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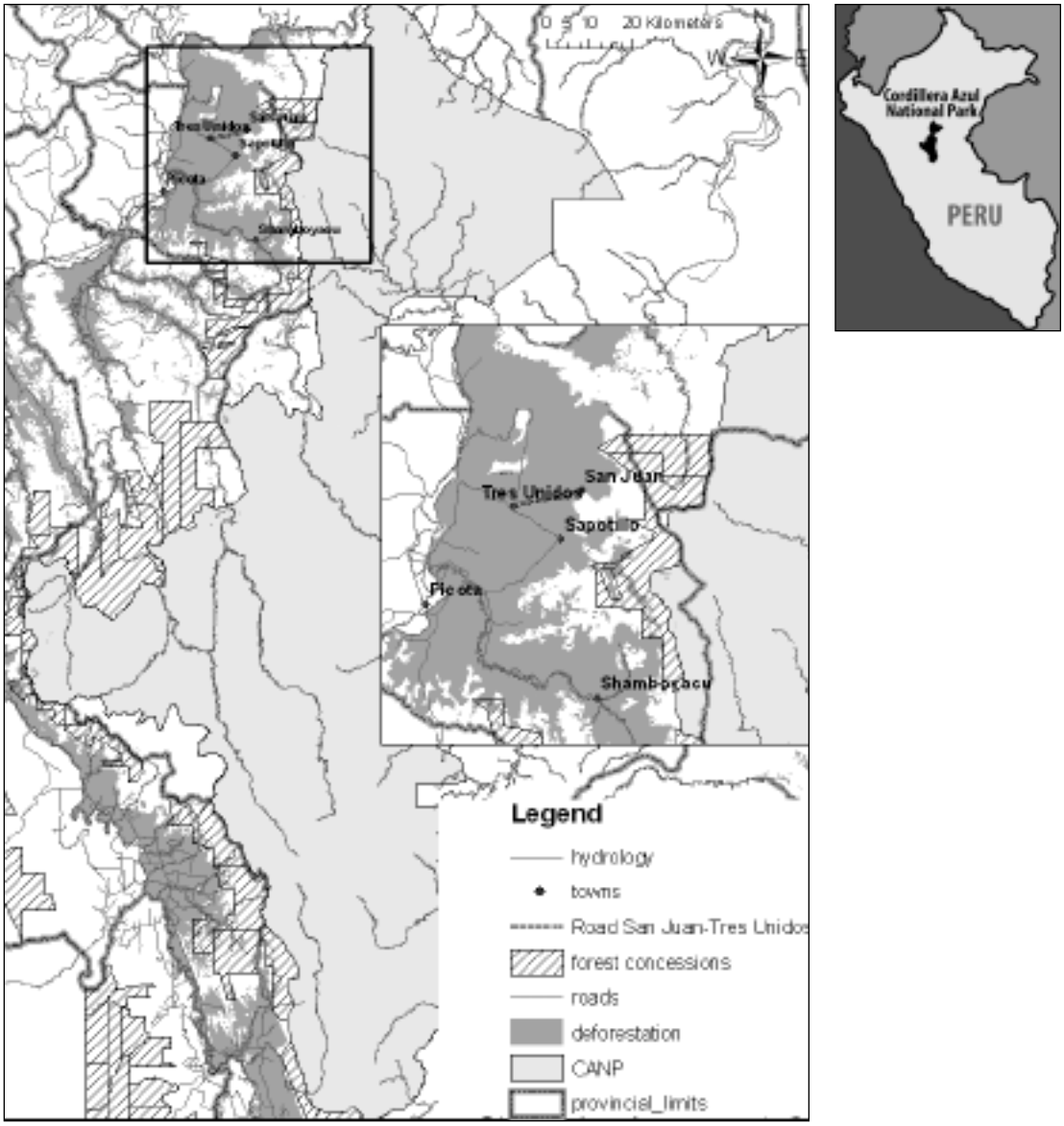
Figure 1. Map of the Cordillera Azul National Park
Showing the community of San Juan, uses of the land including timber concessions and areas with significant deforestation in its western buffer zone.



Source: CIMA 2004, Plan Maestro del PNCAZ.

Juan to the capital of the district, Tres Unidos, and other benefits from programs supported by USAID as part of "voluntary" substitution of coca with other crops. San Juan's authorities have been working with CIMA to develop a zoning plan, and local farmers are working with the NGOs' technicians to improve their agricultural practices in the park's buffer zone.

Methodology

I conducted semi-structured interviews with officials and professionals from governmental bodies and NGOs from May to July 2004. I also conducted household surveys in the local community of San Juan. The sample for the final survey was 34 households, chosen

randomly from a total number of 95 heads of households listed in San Juan's official register. To corroborate these results, I spent several days in the San Juan community conducting additional semi-structured interviews and participating in social life. Finally, I mapped new roads and land cover changes with GPS and digital photography.

Results

A local-scale model of land use change

Models for land cover and land use changes have identified particular socio-economic drivers that determine the way in which new patterns manifest themselves in the landscape during frontier expansion (Mustard et al. 2004). Models for tropical deforestation, in particular, show "economic factors, institutions, national policies, and remote influences (at the underlying level) driving agricultural expansion, wood extraction, and infrastructure extension (at the proximate level)" (Geist and Lambin 2002: 143). Scenarios of frontier deforestation that follow the paving of roads have been studied in the Brazilian Amazon (Carvalho et al. 2001; Nepstad et al. 2002; Soares-Filho et al. 2004). In Peru, researchers found that different factors lead to land conversion by colonists versus indigenous groups. The socio-economic causes of land conversion by colonists tend to follow road access and are linked to production techniques, integration into markets, land access, and the availability of labor and capital. The most significant factors leading to land conversion by indigenous groups are access to land, size of the family's productive lands, and family labor capacity (Bedoya Garland 1995).

The conceptual model I developed through this research (Figure 2) aims to incorporate our existing large-scale understanding of frontier expansion from regions across the tropics with local and first-hand perspectives on the socio-economic causes and effects of land use change in San Juan. I do not claim to encompass the full complexity of this process. In this article, I used a simplified version of the model, which also can be used to rank the different factors according to their importance. In the following section, I describe significant findings from the household surveys and observations and explain how these findings validate or alter proposed factors in the model.

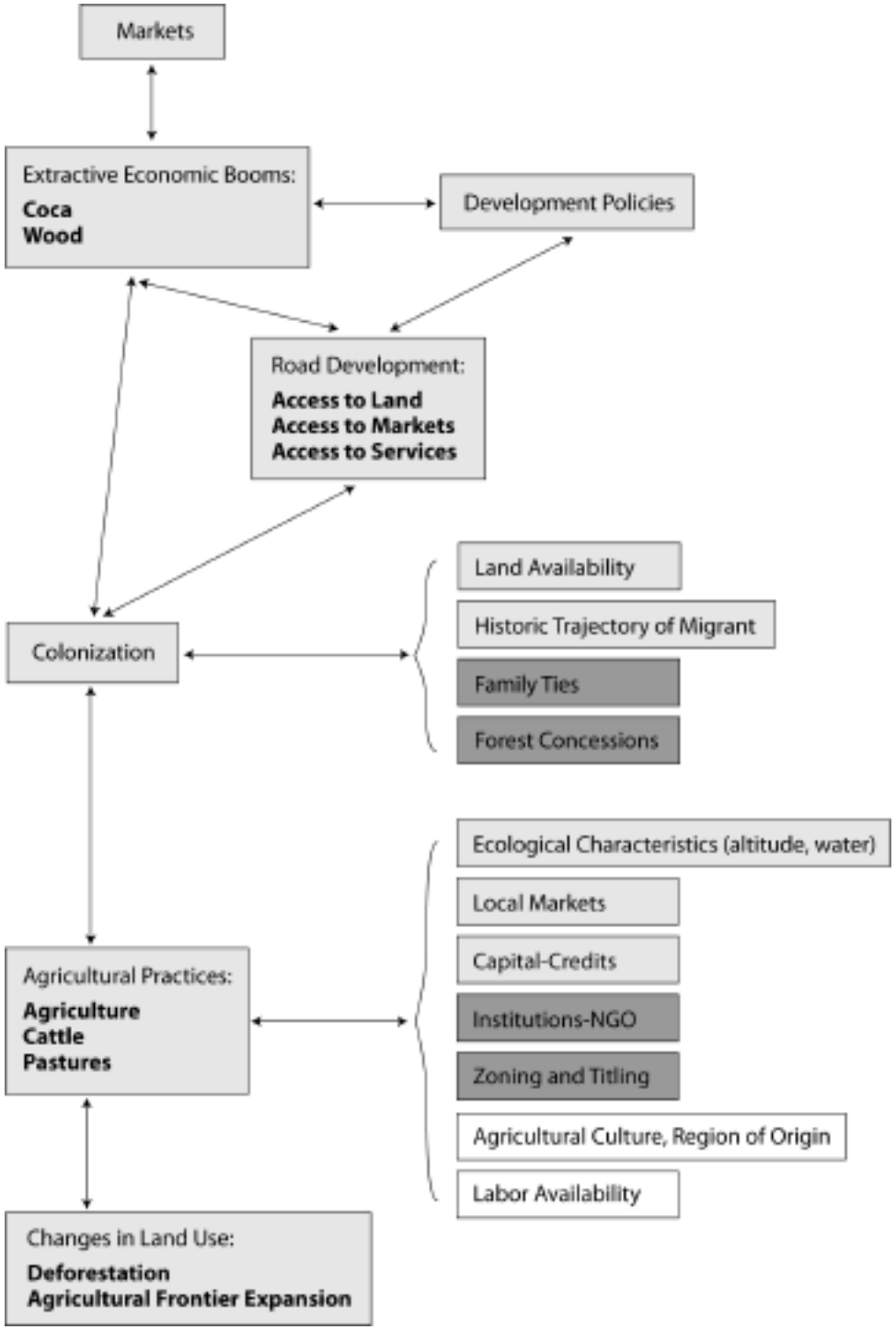
Road development and access

While roads are fundamental for development and service access during frontier expansion, their effects on ecosystem degradation and deforestation are well known (Imbernon 1999; Mahar 1989; Carvalho et al. 2001). However, good transportation systems are essential to community livelihoods and key to economic development. Two main processes are contributing to the opening of roads in the San Juan area: (1) legal and illegal logging activities, and (2) the establishment of Alternative Development Programs (ADPs), a major component of the Peruvian government's coca substitution policies, which are financially supported by the US Agency for International Development (USAID).

Roads opened by illegal loggers have been the vanguard for land conversion in the district of Tres Unidos. Road openings sometimes transpire through agreements with local landholders who pay for increased road access by giving loggers rights to the trees on their land. Illegal loggers need roads to access wood, while landholders want better access to transport their products to markets. These poorly designed roads constitute a short-term solution for farmers, but they can also cause erosion or landslides.

The effects of deforestation on USAID-financed road improvements were shown in several studies (CARE 2002; CDC 2003). In areas under ADP jurisdiction, 80% of deforestation has been linked directly to road access, the main impact resulting from improvements in penetration roads funded by ADP (CARE 2002), as was the case from the road built in 2002 linking San

Figure 2. The most significant factors determining land use trends in the study area. Light gray boxes were considered in the initial conceptual model based on literature research and initial observation and have remained as significant in this case study. White boxes represent those factors that were initially considered in the model but not found to be particularly relevant. Dark grey boxes were factors that were added as a result of new findings from the research.



Juan to Tres Unidos. As a result of these findings, USAID has increased precautions when undertaking new road projects, one being the requirement of an indirect impact assessment for major road improvement projects.

Improved roads dramatically change access to markets. In the poorly drained soils of the Peruvian Amazon, transportation of agricultural products on the farmer's back or by horse after a rainfall requires a great amount of effort. The combined effects of poor roads, high transportation costs, and the need for significant investments of labor and time often become a considerable barrier to new colonization. However, in San Juan, roads have reduced the transactional costs of farming and have improved the standard of living. Before the road to Tres Unidos was built, transportation costs for some farmers amounted to as much as 5% of coffee's gross income.

Colonization

As throughout the Peruvian Amazon (Bedoya Garland 1995; Maki 2001), colonizers (*colonos*) arrived in San Juan seeking land and escaping economic constraints in both the highlands and the coast. San Juan is composed mainly of migrants from the highlands (60% of respondents) and the primary commercial crop there is coffee, generally planted in diverse agroforestry systems with plantains and manioc, which may reduce rates of slash-and-burn agriculture. Maize is also widely planted, but mainly as a subsistence crop. Once settlers acquire lands in San Juan, they typically conduct burns to create the initial fields and then keep planting within them, leaving the land fallow for one or more years between annual crops. Most recent migrants to San Juan have acquired the land through purchase rather than occupation; free land around San Juan is rarely available. This absence of free land reflects the stage at which San Juan is, in a colonization process that began approximately 10 years ago and has accelerated in recent years due to the construction of the road to Tres Unidos. The growing population is a relatively new phenomenon (Table 1). The new regional access created by the road and the increase in colonists is pushing the frontier past San Juan, towards the Cordillera Azul National Park and into the nearby timber concessions.

To understand the colonization process, research must address family, communal, and extra-communal ties – in Enrique Mayer's words, the "complex network of kinship, social and political obligations that link a household to others, to the rest of the community, and to the larger social world" (2002: 27). The importance of these links and their relevance to the development of a model for land conversion processes can be inferred. For example, there is a close link between newly arriving immigrants and the presence of family ties to residents in San Juan. Fifty-six percent of the farmers stated that relatives had immigrated to San Juan before them, and 68% stated they had other relatives in San Juan (whether these had come before or after their own arrival).

Deforestation and wood extraction

Between San Juan and the adjacent park, there are newly established timber concessions created under the Forest and Wildlife Law of

Table 1. Number of people interviewed according to year of arrival.

Year of Arrival	Number of Respondents
1994	3
1995	0
1996	0
1997	2
1998	3
1999	2
2000	5
2001	3
2002	6
2003	8

2000 (Gobierno del Peru 2000). The concessions have contributed to a larger regional demand for high quality wood, boosting the extraction and commerce of old and new timber species. Concessions bring in a large working force and accompanying machinery (such as bulldozers and chainsaws), which, once present, can be used for illegal extraction – illegal logs are sometimes "laundered" by declaring them as originating from the concessions. Finally, ongoing colonization was observed inside concessions next to roads opened for timber management, even though it is illegal to colonize lands inside a concession. In some cases, this is encouraged or tolerated by the concessionaries as a way to avoid further obligations of replanting and managing their land.

Most of the villagers interviewed in San Juan (70%) did not find any commercially valuable wood growing on the lands they acquired, even though almost all of them (88%) cleared land to plant their crops (mean: 3.2 ha/person, with 77% having cleared <4 ha). This figure confirms that loggers are leading the frontier expansion, which reduces the lands' potential to support sustainable livelihoods associated with the forests when settlers arrive. Villagers see good quality timber on their lands as a valuable asset since it can be sold in difficult times or utilized (e.g. in construction) in the future.[1]

Lack of enforcement by police in controlling illegal logging has caused communal authorities to take efforts into their own hand by confiscating chainsaws in areas outside concessions. These efforts, however, have led loggers to file a judicial penal demand against them for stolen property (still in process as of August 2004). This lack of control curtails residents' ability to protect their lands. It is crucial that park managers work to provide institutional support for community concerns and facilitate official enforcement, possibly through the establishment of channels or mechanisms that provide quicker responses to claims made by local authorities.

Credit and property titles

Seventy percent of the farmers interviewed mentioned a lack of credit availability (e.g. loan programs) as the main reason they have not requested one. Only one-fifth of the people interviewed stated that they have never sought credit. These people stated that they either had no desire to generate debts or were able to draw on alternative family support mechanisms. The majority of farmers suffer from a lack of credits resulting from non-formalized land titles and a lack of appropriate loan programs. Lack of credits has been hypothesized as a barrier to investment in production and hence development (de Soto 2000). Others, however, argue that increased participation in market systems may decrease the subsistence capacity of small farmers by placing them in a situation where they can no longer support themselves on subsistence agriculture, but they are not yet fully integrated into the market (Mayer 2002). Most settlers in San Juan have only a "certificate of acquisition" for their land; some claim to have a legal certificate of possession or title. In either case, the San Juan farmers are dependent on commercial crops, and a system of soft credits[2] is crucial for farmers' security.

Agricultural practices and labor

In the San Juan region, the proportion of cultivated land decreases with the size of the property (almost all farmers with >2 ha planted <40% of their plots). The inverse relation between intensity of land use and size of property has been observed for the Amazon's colonists and has been linked to the lack of a labor force, mainly in coca growing regions (Bedoya Garland 1985). This lack of labor, however, does not seem to be a significant factor of land use in San Juan. The majority of the farmers (~60%) have stated they hire workers during harvesting, and some (~20% of those interviewed) also use a system of collective help, called *minka*. In addition, there is no correlation between the number of family members that help with production and the size of crop harvests.

Cattle

The dynamics of expanding clearings to establish extensive cattle ranching have been widely studied in Brazil (Hetch 1993; Mattos and Uhl 1994; Fearnside 1989). In Peru, smallholder peasant agriculture seems to be a more important factor than ranching in driving the process of frontier expansion (Bedoya Garland 1991; Wood 2000). In the department of San Martín, preferential land use estimates identify pasture as between 1.9% and 6.8% of the total land base (MINAG 2002). Nevertheless, San Martín's meat production has increased by 57% in the period of 1998 to 2001 (ibid.). Ten percent of the farmers interviewed in San Juan owned cattle (mean of six heads). These people also occupied disproportionate total land area (22% of total lands among survey sample), although the fraction of land they had under production (crops plus pastures) was similar to the average for other colonists. Precipitously falling coffee prices – now at one-fourth of their 1992 value (JNC 2004) – has increased cattle's importance as a source of financial stability; people also value grasslands as a proof of land tenure. Therefore, it would not be surprising to see an increase in cattle in the region over the next few years.

Future projections

Colonists are willing to diversify their agricultural activities (e.g. planting cacao). When asked what they thought their situation would be like in three years with respect to land, crops, and cattle, the farmers, in general, aspired to increase their properties on average by 20%. With respect to crops, they projected an average increase of 65% in cultivated lands.

Overall, people projected expanding their cattle pastures four-fold in terms of area and five-fold in herd size. Although this only reflects aspirations, San Juan seems to be no exception to the general increase of cattle in the Peruvian Amazon, an important consideration in any zoning plan.

Role of NGOs and institutional framework

As is typical in the Amazon region, a strong legal framework prohibiting logging and land conversion through slash-and-burn agriculture exists, but there is a lack of enforcement capability. One indicator is the lack of regulatory awareness in community members. Less than 10% of the farmers interviewed in San Juan correctly identified the existing environmental regulations and over 90% had not changed their practices as a result of the prohibitions, with the exception of the ban on coca planting/harvesting.

This area's history of coca production, together with its conservation value, has led programs by NGOs and cooperation institutions (like USAID) to significantly affect land use change in the region. Making coca eradication a national priority, USAID funding of Alternative Development Programs (ADPs) has had large impacts on the economy of farmers and local development, and these programs have faced a great deal of opposition. Given coca's cultural importance, and the fact that it is the most profitable crop, these controversial programs continue to be a source of social unrest.

CIMA's strategy, as CANP's manager, is to avoid a traditional "aid to passive subjects" approach and instead focus on developing the strengths or potentials of the communities. This strategy increases the people's trust despite generalized suspicion towards NGOs associated with the ADPs. Trust has been found to be a crucial value in building robust social processes in protected areas (Stern 2004). CIMA is currently generating a participatory zoning process to help communities define land use and to acquire land titles from governmental organizations. The administrative, legal, and technical support of CIMA in this process can contribute to sustainable management plans. Moreover, extending this support to articulate demands by communities to the government for basic services can be one of the most significant ways the park's management can contribute to communities in the area.

Discussion

This research shows the utility of cross-referencing general models with local contexts in order to understand both the large-scale forces at work – which are often similar between countries and over time – and the specific context that enables management to succeed.

Trends observed through my fieldwork in San Juan confirm the linkage between road opening and an increasing rate of land conversion. The most salient findings of this study, in terms of factors behind land conversion in San Juan, include (a) the importance of family ties as a contributing factor to immigration, (b) the role of logging in the colonization process, (c) labor availability not appearing to be a limiting factor in crop production, and (d) the importance of property titling for credits and as a component in zoning plans. My research also suggests that the "agricultural culture," or previous practices in the life of the *colono*, does not seem to influence the main types of crops grown in the new setting, although it may have an impact in conversion of forests to pastures. Finally, the influence of ADPs and environmental organizations emerged as a notable factor due to the amount of interventions in the area.

Table 2 briefly summarizes actions that can reduce the impacts of key factors that lead to land conversion and deforestation, as suggested by linkages in the land use change model. Overall, this research confirmed the importance of legalizing land titles in the current CIMA land-zoning plans, and the importance of considering family ties when working with the communities to slow down immigration rates. INRENA efforts to control illegal logging should be complemented with efforts to make sure that the concessionaries control colonization within their forest concessions.

To achieve appropriate regulations regarding land use and the maintenance of forest cover, the CANP managers can make a fundamental contribution to residents by strengthening community authority and control and by providing legal, administrative, and technical support to communities. This will help empower the community to face the demands of loggers and other actors in the frontier expansion process. Increasing colonization trends moving past San Juan towards the park are indicating that it is crucial to work with communities in the early stages of the colonization process, and to reach long-term alternatives that contribute to both the park's goals and to the development of the communities in the region.

Table 2. Potential actions to address key factors in local land-use change

Factor	Possible Actions
Family Ties	CIMA could work with community to influence spatial and temporal immigration trends
Forest Concessions	Greater control by INRENA to avoid settlements inside concessions
Institutions, NGO	CIMA could provide legal and administrative support to communal demands of services made to governmental bodies, and support increased governance with communal participation
Zoning- Land	Improve land use patterns by including current and desired land use of the property communities into micro-zoning plans, linking it to title formalization and research on market alternatives.
Capital and Credits	Further research needed on credits and loans programs for agriculture

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Many of the concepts expressed in this document are a result of discussions with professionals of CIMA, Cedisa, and other organizations, even though they may not be explicitly mentioned in the work.

Endnotes

[1] According to César Flores, a Yale PhD candidate working with WWF, in the cultural landscape of the *sierra*, or Andean highlands, forests do not usually play a fundamental role in agricultural or subsistence activities; this reduces the value that new settlers may attribute to forests. This is a point that deserves further study. Work is being done by local NGOs to incorporate values of the forests into the farmers' subsistence strategy.

[2] "Soft credits" are credits with low interest rates or that incorporate subsidies in order to support investments in agriculture. They are generally provided by the State's agricultural and development programs.

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Organic Aquaculture in Ecuador:
A More Sustainable Solution?

by Laura Cuoco, MESc 2005

Introduction

For hundreds of years, local fishermen in Ecuador sustainably farmed coastal waters surrounding mangrove forests for shrimp and other harvestable marine organisms (Macintosh and Zisman 1999). In the 1970s, several Ecuadoran companies and individuals took advantage of the presence of shrimp in these waters to construct artificial shrimp ponds for higher production for export (Olsen, Robadue, and Arriaga 1995). The 1980s witnessed a marked increase in the production and consumption of shrimp worldwide. Concomitant with the growth of the aquaculture industry in Ecuador was massive deforestation of mangroves to provide space for artificial ponds. While aquaculture provided great economic benefit to shrimp farm owners, the negative consequences to local communities and estuarine environments have been devastating.

One system introduced in Ecuador in the late 1990s as a more sustainable alternative to modern shrimp farming was organic aquaculture.[1] In 1999, the first worldwide standards for the certification of organic shrimp aquaculture were established by Naturland, a non-profit German association (Naturland 2003). While organic aquaculture may appear to be an innovative solution, it has not been accepted wholeheartedly by all actors. Several environmental NGOs in Ecuador, as well as in other countries, have spearheaded a movement against Naturland's certification process. The reason for this opposition is two-fold. First, the actual standards are contentious: they are not in compliance with national legislation, they do not account for all stakeholders, and they are not fully implemented and enforced per Naturland's own guidelines (Cisneros and Salgado 2004). Second, there is a greater concern that organic certification is legitimizing aquaculture without solving the problems inherent to shrimp farming, and that it is detracting from the integrity of the organic label (Cisneros and Salgado 2004). This article uses research findings from first-hand interviews and document review to explore the organic aquaculture controversy in Ecuador.[2]

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Background

As late as the 1970s, mangroves were thought of as swampy wastelands (Mitsch and Gosselink 1993). Now, however, mangrove forests are touted as one of the most productive ecosystems in the world, providing myriad benefits to humans and the environment. Ecologically, mangroves help stabilize coastlines, preventing erosion and acting as a buffer during major storms; they harbor a wide diversity of wildlife (Hogarth 1999); and they serve to filter out nutrients that are potentially harmful to coastal waters (Twilley et al. 1998). Local communities worldwide have long sustained their livelihoods through utilization of the many services that mangrove ecosystems provide (Hogarth 1999).[3]

The life cycle of shrimp is closely tied to mangroves. Post-larval shrimp migrate, or are carried, to estuaries, where they are protected from predators and provided with nutrients from waters surrounding mangroves throughout their juvenile stage, before reentering the open sea to mate and spawn (Hogarth 1999). The geographic distribution of the species that is commercially fished or cultivated closely follows the distribution of mangroves (ibid.). For this reason, the construction of shrimp ponds has been predominantly in mangrove ecosystems. However, farm owners unaware of the importance of these forests for shrimp habitat cut mangroves for pond construction. Mangroves in Ecuador suffered tremendously from deforestation during the 1980s as a response to the global increase in shrimp consumption.[4] By 1999, as much as 50% of Ecuador's mangrove forests were deforested (A.E. 2003); in some areas with a high concentration of shrimp ponds, losses were closer to 90%.

Effects of modern shrimp farming

The effects of mangrove deforestation on the environment and local communities have been substantial. The majority of shrimp farms are not locally owned but were created by outsiders who illegally cleared mangroves. This deforestation has threatened the livelihoods of those who depend on mangroves for resources, deteriorating their health and causing an increase in emigration rates (A.E. 2003).[5] Those who remain are frequently denied access to the surviving mangroves if new farms were constructed between their lands and the forests. Many people who were offered employment were poorly paid, suffered less than adequate working conditions, and were only hired on a temporary basis, often losing their jobs to outsiders brought in to replace them (Hagler 1997).[6]

The biological, chemical, and physical impacts of large-scale shrimp farms are also substantial. Salinity and acidity of surrounding waters have increased while productivity has declined, and contamination of waters has resulted in the die-off of some marine species. The loss of mangroves has exaggerated coastal erosion, causing a loss of protection from El Niño events; increased sedimentation of waters; and elevated the potential for pathogen outbreaks in shrimp populations (Boyd and Green 2002).[7]

The socioeconomic and environmental inequities surrounding aquaculture in Ecuador are so contentious that violence has occurred in the last decade (A.E. 2003). Various environmental NGOs, national and international, have now joined forces with communities to support their struggle to prevent any further deforestation and encourage reforestation efforts, to regain access to existing mangroves, and to rid the coastline of illegal farms.

Organic farming

In the late 1990s, in response to the negative environmental and social consequences of modern farming methods, the world's first organic shrimp farm was created in Ecuador.[8] Naturland's subsequent standards for organic shrimp aquaculture are based on the following principles: the absence of chemicals, limited stocking density, strict environmental monitoring, and protection of the surrounding environment (Naturland 2002).[9] As of May 2004, there exist six certified farms and four packing plants and laboratories where larvae are raised by organic standards (Cisneros and Salgado 2004).[10]

Critique of Naturland

While some environmental organizations accept organic aquaculture and, more specifically, the standards set forth by Naturland, other NGOs have questioned various facets of these guidelines. Acción Ecológica and C-CONDEM, both environmental organizations based in Ecuador, have recently been in communication with Naturland via public letters, addressing their concerns with the certification procedure and the consequences of organic aquaculture.[11] Their critiques are discussed below, based on the aforementioned

correspondence, Naturland's guidelines, and Ecuadoran law.

Specific concerns with standards

The specific concerns that environmental NGOs have with Naturland's standards are in regards to water quality and the lack of enforcement of organic label guidelines. Naturland has counted the improvement of water quality in pond effluent as a success, based on the elimination of chemical inputs into organic farm systems (Bergleiter 2003). However, this is misleading. Most farm owners have not utilized any chemicals since 1999, when an outbreak of White Spot Syndrome Virus wiped out shrimp stocks (McClennen 2004). This was a turning point when aquaculture farmers began to understand the negative effects of chemicals inputs (ibid.).[12] The reduction of chemicals, therefore, is not due to the inception of organic aquaculture. Moreover, chemicals are not the only problem; organic farms still expel nutrients and organic wastes, which contribute to the eutrophication of surrounding waters. Standards specify that effluent water quality must be monitored on a monthly basis (Standard IIID2.1; see Naturland 2002 for complete standards). Farm owners, however, state that because they are not using chemicals anymore, they do not see the need to test or treat waters before discharging them, claiming that excess nutrients and feed wastes are consumed by other fish (Cisneros and Salgado 2004).

Another critique is that standards do not require owners to convert all of their ponds to organic ones. Naturland standards also serve as guidelines for organic agriculture, but while the agricultural standards specify that the entire farm area must be converted within five years to maintain its organic status (Standard I8), critics argue that no such standard is in place for organic aquaculture. Observers note that two owners are operating both organic and non-organic ponds on their properties with no plans for total conversion within the next five years (Cisneros and Salgado 2004).[13]

The issue of access to existing mangroves is also contentious. Naturland's standards state that locals are to be permitted free access to open waters around the ponds (Standard IIID10.3), but community members attest that this access has not been implemented (Cisneros and Salgado 2004). One farm owner states that he gave colored shirts to residents to wear for easy identification when entering his farm, yet locals say this is not true.[14] Another owner situated beehives near the community entrance to deter locals from entering. In yet another case, canals created by the state for neighboring families were closed off from access (Cisneros and Salgado 2004).

General concerns with standards

General concerns are raised by procedural issues related to stakeholder information access and involvement. Though Naturland's certification process was established over five years ago, standards were published solely in English until May 2004, thereby limiting Ecuadorans' abilities to be fully informed about the certification process (Cisneros and Salgado 2004). Furthermore, Naturland emphasizes the involvement and support of public institutions, scientists, environmental NGOs, technical experts, and relevant stakeholders in the development of standards. However, the only locals involved in the development process were the farmers who later received certification, while those stakeholders who have been negatively impacted by aquaculture were left out entirely.[15] Other environmental NGOs, including the ones who have been criticizing Naturland, were not invited to certification meetings either.[16] Perhaps in response to the negative backlash on this front, Naturland has continued to encourage participation in the form of comments and critiques from all affected stakeholders and organizations. Naturland's responses, however, often do not address the issues presented nor do they appear to be fully aware of what is actually occurring on the ground.

Mangrove Restoration Project on Isla Corazon, Manabi Province, Ecuador. *Photograph by Laura Cuoco.*

Legislation

Another focus of criticism relates to conflicts between Naturland's standards and Ecuadoran law. Legislation and governing bodies have existed in Ecuador since the 1970s to protect mangroves from deforestation caused by the installation of shrimp ponds (Hemphill, n.d.); however, enforcement has not occurred.[17] Naturland allows farms that were constructed before 1994 to be considered for certification, essentially ignoring the previous twenty years of legislation that outlaw the removal of mangroves (Standard IIID1.2; Cisneros and Salgado 2004).[18] Interestingly, all the farm owners who participated in the meetings to draft standards began their farms prior to this year.[19] Additionally, representatives of Naturland appear not to have known how the legal process, with respect to aquaculture, functions in Ecuador, nor did they know which laws should be considered when forming their standards (Cisneros and Salgado 2004).[20] They are also accused of not verifying whether certified farms are on old mangrove lands or not, basing their knowledge solely on farm owners' testimonies (Cisneros and Salgado 2004).[21] Environmental impact assessments have also not been carried out to the full extent of the law before determining the legality of shrimp farms. Further, there is no set process to verify compliance with labor laws, which some farm workers state have not been implemented (Cisneros and Salgado 2004).

Reforestation efforts are another contentious legal point. Section IIID1.2 of the Naturland standards states that "the former mangrove area in property of the farm shall be reforested to at least 50%" (Naturland 2002). Ecuadoran law, however, requires more than 50% reforestation (Cisneros and Salgado 2004). The manner of reforestation is also problematic. According to Naturland, mangroves are to be planted on dikes and canals. This is not a viable solution to the problem of deforestation since reforested areas are a non-continuous, fragmented line of trees.

Naturland's response to the legality of their standards and the lack of adherence to Ecuadoran law is that "certification initiative is an activity under private law; therefore it is not meant to replace or resemble national legislation" (Bergleiter 2004a). They acknowledge the need to integrate aspects of national legislation in their standards, but claim not to be accountable to the fullest extent of established Ecuadoran laws (Bergleiter 2004a).

Evaluating the Potential Benefits of Organic Shrimp Farming

There are several economic benefits that have been attributed to organic aquaculture by

various environmental NGOs, including an increase in employment and a reduction in costs as the market opens up for organic shrimp (Cisneros and Salgado 2004).

An increase in production may provide more jobs for outsiders, but it is not likely to increase the local employment base, as evidenced in the situation of non-organic farms. For some time, locals were able to earn money by gathering larvae from wild stocks and selling them to laboratories; however, sources are depleted and the organic label requires that larvae be raised in labs (Standard IIID3.2). Another issue not considered by Naturland is the extreme difference in employment figures when comparing earnings on a shrimp farm with that of an equal area of mangroves. One such comparison states that one hectare of mangroves feeds ten families, while one hundred hectares of pools employs one family (Cisneros and Salgado 2004).

A reduction in costs resulting from the elimination of chemical products in fertilizers, feed, and antibiotics has occurred on most farms, not just organic ones.[22] Other savings are in cheap labor and fewer environmental restrictions, common to many products produced in the developing world; however, these economic costs do not include ecological and societal costs. The harm done to the environment in terms of mangrove destruction, eroded coastlines, or diminished marine life is not accounted for, nor are the costs carried by local communities in the loss of jobs, food, or raw materials (Cisneros and Salgado 2004).

Finally, proponents suggest that organic aquaculture increases access to markets. The underlying assumption is that the "green" label will expand the market for this product and increase prices, which could encourage more environmental protection. If organic standards are insufficient to address the externalities of shrimp farming. However, consumer ignorance of the validity of certification standards will only continue to exacerbate the societal, cultural, and environmental shortcomings now associated with organic farming.

Conclusion

Other points of contention exist and most likely will continue to emerge. At this stage, several Ecuadoran NGOs have united together to call for a moratorium on certification because "it legitimizes the impunity of an illegal industry…that uses public resources for private benefit, that doesn't reinvest in the development of the country and that doesn't guarantee food security for communities, but in fact, excludes them" (Cisneros and Salgado 2004, translation mine). While Naturland agrees with its critics in some respects – accepting that more collaboration is necessary and that certification is a dynamic process subject to change – they disagree that a moratorium is the answer. They state, "While developing and investing in sustainable practices that are friendly to both society and nature, the pioneer farms should be supported, not discredited for purely political reasons. However else…should development of a more sustainable industry start?" (Bergleiter 2004a).

Under Naturland's standards, according to the organization's own estimation, mangroves and surrounding waters are protected and locals regain access to the remaining patches of forests. Research suggests, however, that this is not the case in Ecuador. Little has been accomplished in the way of integrating the greater part of Ecuadoran coastal society into the certification process and improving their livelihoods. Furthermore, environmental NGOs are not discrediting Naturland for political reasons; rather, they believe that the standards are threatening to the environment and Ecuadoran society and culture. Additionally, most, if not all, of the organically certified farms are illegal per Ecuadoran law. To support these farms would set back any efforts to return these lands to their naturally forested state.

Should these 'pioneer' farms be supported while the issues are being sorted out? Is organic aquaculture the solution? Will this new method eventually have a positive impact on

the environment and local communities? I am inclined to disagree and do not support these farms at this stage. At the very least, standards must be rewritten in a stronger fashion to offer even greater protection for the environment while including local community needs. Yet, even if all standards fell within Ecuadoran law, my research indicates that organic aquaculture is not the answer. Locals saw their entire livelihoods dramatically changed with the inception of large-scale shrimp farming and have been struggling to gain lands to replant mangroves and improve their quality of life. Shrimp farming, whether organic or non-organic, will continue to infringe upon their way of life, degrade environmental quality, and act to lower standards of living for local communities.

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Endnotes

[1] R. Mears, pers. comm. 2004.

[2] I conducted research in Ecuador from June through August 2004. I interviewed shrimp farm owners and environmental NGO staff as well as local communities around Bahía de Caráquez. The findings in this report are based on these interviews and personal observations.

[3] People derive their main source of protein from marine organisms captured in the mangroves; they use mangrove wood for construction, fuel and charcoal; and they make medicines, food, drinks, and cosmetics with materials from these forests (Hogarth 1999).

[4] In Ecuador, shrimp production more than doubled in this decade (Olsen et al. 1995), with the United States as the largest importer (WRM 2003).

[5] Local community members attest to the high rate of emigration from the Bahía de Caráquez region owing to a lack of employment in this region. This is based on information gathered in community interviews.

[6] Local community members affirm that this has occurred.

[7] The most recent spike in disease occurred in 1999, when the White Spot Virus virtually decimated the shrimp industry in Ecuador (Rodriguez et al. 2003). In more recent years, the industry has been slowly recovering.

[8] R. Mears, pers. comm. 2004.

[9] Naturland's standards were first published in 1999 and revised in 2002.

[10] Other certified farms once existed, but they have since dropped the right to the organic label. One farm owner stated that she could not afford to pay for the certification and did not see a high enough demand to make it worth the investment (Flor Maria Dueñas, pers. comm, 2004.).

[11] There has also been ongoing correspondence between Naturland and other international organizations in reference to shrimp farm certification in other parts of the world (Rönnbäck 2003; Bergleiter 2004b).

[12] For a more detailed analysis of the effects of the White Spot Syndrome Virus, see McClennen 2004.

[13] My field observations confirmed this.

[14] Cisneros, R.B. Personal Communication. July 2004.

[15] Ibid.

[16] Ibid.

[17] The majority of Ecuadorans name corruption as the prime factor in lack of enforcement, while others cite poor communication between governing bodies and a lack of understanding as to where their respective jurisdictions lie.

[18] For a listing of Ecuadoran legislation that pertains to the installation of shrimp farms on mangrove lands and deforestation of mangroves, see Hemphill (n.d.)

[19] Cisneros, R.B. Personal Communication. July 2004.

[20] Ibid.

[21] Another point of contention has been the requirement that only those farms "which in part occupy former mangrove area, can be converted to [o]rganic [a]quaculture according to Naturland standards if the former mangrove area does not exceed 50% of total farm area" (Standard IIID1.2).

[22] See above, "Specific Concerns with Standards."

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Evaluating Capacity Building and Participatory Development in Community Timber Operations of the Petén, Guatemala

by Lisa H. Patel, MESc 2005

Introduction

The UNDP defines capacity-building as "the process by which individuals, groups, organizations, institutions, and societies increase their abilities to (1) perform core functions, solve problems, and define and achieve objectives and (2) understand and deal with their development needs in a broad context and in a sustainable manner" (1997). Capacity itself can be divided into three realms: physical, human, and social. Physical capacity describes equipment and capital, human capacity refers to the education and skill set of individuals, while social capacity, the most difficult of the three to assess, describes the nature of interactions between individuals in a community through networks or institutions.

Building community capacity to implement a project requires cultivating a sense of ownership and responsibility, made possible through active local participation in the decision-making process. Both the ways that external agents, such as governments or development institutions, open spaces for participation, and the ways that these spaces are utilized by local people influence eventual project outcomes.

I researched the process of capacity-building in community timber harvesting projects of the Maya Biosphere Reserve (MBR). The MBR, the largest contiguous tract of tropical rainforest in Central America, was created in 1990 amidst a flurry of reports regarding rapid deforestation from increasing immigration and "slash and burn" agriculture (Grunberg et al. 2000). The Guatemalan government, caught in a struggle between the preservationist tendencies of international conservation NGOs and insufficient resources to properly protect the forest, granted communities within the reserve concessions to manage the land. However, the government required that each community receive Forest Stewardship Council (FSC)[1] certification to ensure sustainable forest management, and also required that each community have an "accompanying NGO," called a *regente*, to assist with meeting FSC standards, implementing sustainable forest management plans, and forming governance bodies capable of administering the project. Communities were also subject to yearly evaluations from CONAP, the Guatemalan environmental agency responsible for MBR management, to ensure that operations were running smoothly.

The international non-governmental organizations Conservation International and the Tropical Agricultural Research and Higher Leaning Center (CATIE) were among the first organizations to provide technical assistance to communities seeking concessions. In 1991, USAID provided funding to these organizations to build local institutions within Guatemala to ensure that technical support would ensue without the continuing need of international NGOs. These institutions received funding to help communities create timber operations from the ground up, including governance structures,

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management plans, and business plans. In the year 2000, funding from USAID changed again. While the communities had received the necessary training from these NGOs in technical aspects of management, USAID contracted Chemonics, a development consulting firm, to build a stronger business vision.

Ten years after the first community began timber harvesting, multiple assessment reports point to the same problem: while communities have been successfully capacitated in technical aspects, social capacity remains weak throughout the communities, threatening the future sustainability and success of the projects (Chemonics 2003).

The blame for this gap in capacity has been laid upon NGOs, communities, and the government. This article examines how capacity building has translated into project implementation. In particular, I examine the role of social capacity in creating a participatory project in a situation where the form of production was new to communities. Ultimately, I will argue that development projects must build the necessary social capacity by cultivating high levels of community participation and ownership to create strong and vibrant community operations.

Methods

I conducted informal, unstructured interviews in Spanish with the community members of Uaxactún and Carmelita and collected project assessment documents for analysis. I focused on seven community harvesting operations in four of the thirteen communities within and outside the Maya Biosphere Reserve. Each operation is run by a *junta directiva* (board of directors), which is chosen by the *socios* (members) of the organization during a general assembly meeting. The board of directors is composed of a treasurer, vice-president, president, and secretary. While meetings of the general assembly occur once every few weeks, the board of directors meets more frequently. During these meetings, budgets, activities, and plans of operation for all economic actions are discussed and decided.

I also interviewed community associations that have arisen as a result of the concessions: ACOFOP, a political association representing the thirteen communities of the Maya Biosphere Reserve, and FORESCOM, the commercial coalition of community operations, currently consisting of nine of the thirteen operations. Finally, I interviewed an array of NGOs, funding agencies, and government representatives involved in the project, including CONAP; USAID; Chemonics; *Naturaleza para la Vida* and *Mundo Justo*, two regional Guatemalan NGOs that originally served as *regentes* for communities but are now being phased out in favor of FORESCOM; and Smartwood, the non-profit auditor organization that evaluates community concession operations for certification under FSC standards.

The interviews focused on perceptions of the original funders of the project and the NGOs that played a pivotal role in the capacity-building process of the communities I visited. Individuals were asked to comment on the role of the NGOs as well as on the status and

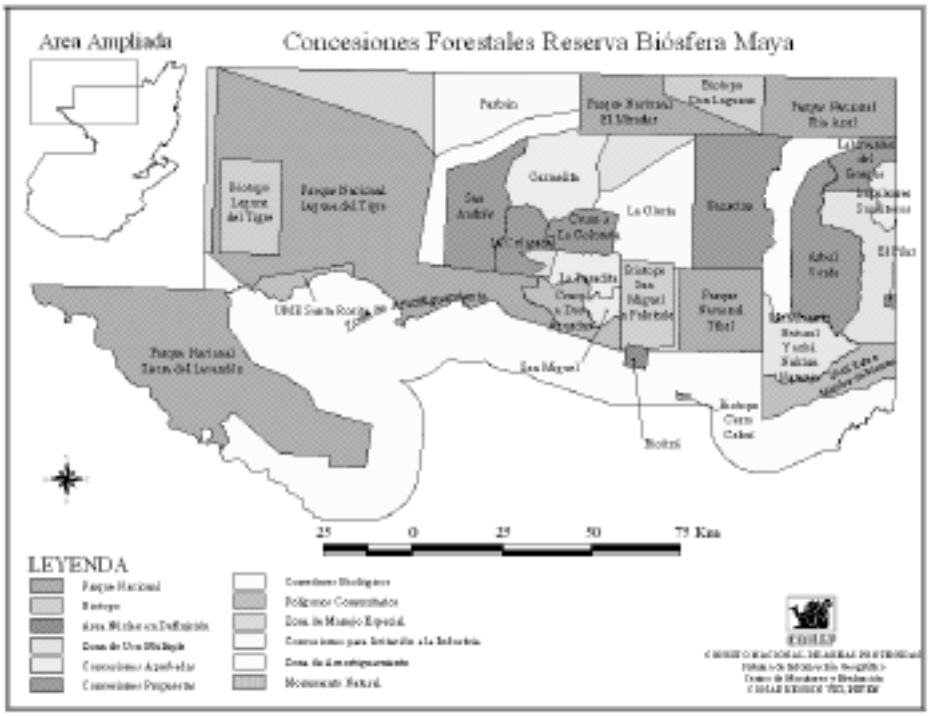
Key Players in the Management of Maya Biosphere Reserve

FORESCOM: the commercial coalition of community operations whose goal is to increase volumes, bargaining power, and profits for communities.

CONAP: the environmental regulation branch of the Guatemalan government. CONAP administers the management of the Maya Biosphere Reserve and other protected areas, and carries out yearly evaluates of community concessions

ACOFOP: a political association representing thirteen communities of the Maya Biosphere Reserve. ACOFOP initially fought for communities' rights gaining concessions.

Figure 1. Map of the Maya Biosphere Reserve



future of the forestry operation.

While interviews were open ended by nature, all themes were eventually touched upon. I developed a thematic rubric of responses and utilized tallies from how often individuals mentioned certain opinions to draw conclusions regarding the process of capacity-building. Results here are divided between responses from NGOs, Chemonics, and CONAP, on the one hand, and responses from communities and community-run institutions on the other.[2]

Results

Responses from NGO and government

1. **Stagnating community operations**: Four of twelve individuals interviewed expressed concern over the communities' failure to utilize opportunities to move operations forward or improve the communities. Respondents critiqued communities for failing to distinguish between being a non-profit and for-profit organization, with several individuals commenting that this lack of separation holds communities back from becoming successful businesses. For instance, many communities divided their profits and returned the earnings back to their members instead of investing in improving the operation itself, a tactic criticized by some individuals. Project stagnation also resulted from the governance structure, which rotated leaders every two years. As the president of the junta directiva was also the manager for the project, many individuals argued that changing the leader every two years translated to poor institutional memory and, therefore, into projects that never moved forward.

2. **Lack of education of board of directors**: Nine of twelve individuals cited a lack of education or skills as a reason for the communities' current problems, stating that this influenced the success of the project and the effectiveness of NGO activities. NGO tactics for administrative capacity building included workshops with members of the board of directors or training sessions for individuals such as the accountant.

Working with individuals that did not have the necessary reading or education level hindered the success of trainings.

3. **Technical and social capacity-building**: Methods utilized by NGOs for "social capacity-building" were criticized as being insufficient, poorly planned, and too rushed. Additionally, NGOs criticized themselves and were criticized by others for failing to build the necessary knowledge and consciousness among the population regarding the importance of the project to the communities' livelihood. While social issues were overwhelmingly seen to have been neglected, six of twelve individuals agreed that the communities had the necessary technical training to handle management, including species identification, proper felling and silvicultural techniques, and minimization of environmental impact and debris.

4. **Criticisms of NGO involvement**: Seven of twelve individuals expressed a negative attitude toward the work carried out by NGOs in the region, including individuals that worked for local NGOs. Individuals criticized the duration and motives of NGO participation, claiming that NGOs would merely dump money on communities then leave as quickly as they had arrived, and that NGOs were interested more in continuing their own funding than in building self-sustaining communities. Several respondents stated that by requiring mandatory NGO involvement, the government created the perfect opportunity for the paternalistic relationship that developed between certain NGO workers and communities. This paternalism both cultivated a sense of dependence on the part of the communities and made communities wary of working with NGOs in the future. The propensity toward self-critique by NGO workers indicates proof for another source of complaint from outside observers: that NGO field workers were often forced to work within constraints or under command from higher authorities who did not understand field realities.

Responses from communities: Junta directivas

1. **Participation of socios**: The junta directivas found that many socios did not participate actively enough and did not understand the importance or the purpose of the project. While general assembly meetings were always well-attended, junta directiva members commented that participation was usually limited to a small number of individuals. Their explanation for this was either that the NGOs did not complete their job in raising people's awareness, or that community members were too busy with other concerns to understand the implications of the forestry project.

2. **Separating timber management from community governance**: Under the traditional structure of governance, the president of the junta directiva also serves as the manager of the project. The Association of Arbol Verde is the first association to disconnect these roles by appointing a separate manager for the timber harvesting operation – a condition dictated by the Smartwood assessor. The junta directiva of Arbol Verde felt that this change positively influenced the organization, facilitating better communication and order. Additionally, the manager could stay on longer than a two-year term, as the position was hired as opposed to elected, which facilitated better institutional memory. Other community organizations did not see the necessity of appointing a separate manager. Some said that this would require yet another salary, money which they did not have, while others said that the president was doing a fine job with management.

3. **Differing attitudes regarding NGOs**: Personal experiences greatly colored attitudes toward NGOs. For example, the junta directiva of Arbol Verde argued that NGOs were more interested in increasing their own funds than in building community capacity. The junta directiva, both collectively and individually, articulated a desire to change the way

funding for NGOs worked, claiming that money should go directly to communities. The junta directivas of other communities expressed milder opinions, with the main criticism being NGOs' short time commitment. The communities of Uaxactún and Carmelita expressed generally positive reactions to NGO involvement, particularly to the technical assistance provided during early phases of the forestry project and the vital advocacy and assistance roles that NGOs played in gaining community concessions.

Responses from communities: Socios

In both Uaxactún and Carmelita, there were vocal opponents to the formation of the concession itself; people cited greater community division, corruption, and having been tricked or under-informed as negative impacts on the community. Additionally, many individuals expressed concern over being in debt to buy or rent more equipment for the timber operation.

Overall, a majority of individuals interviewed expressed positive or neutral views, saying either that the project had little impact or that the project had generated new jobs for the community. However, no individual expressed that the community as a whole was improving as a result of the project. The only direct benefits people claimed to see were either jobs or the money they received at the end of each fiscal year for being members of the organization.

Discussion

In assessing community concessions around MBR, community operations are divided between the succeeding, the stagnating, and the failing. What factors separate the more "successful" enterprises from the stagnating or failing operations?

1. **A coerced process**: Community ownership in a project is high only when communities are given power to control and decide their futures (Fukuda-Parr 2002). As Soza (2003) notes, the granting of concessions in the MBR was a forced process, as communities were told that they must either become certified or lose their right to live on the land. By failing to give communities a legitimate choice and creating stringent requirements of NGO assistance, the government forced a relationship between NGOs and communities, often leading to a pattern of paternalism and dependence (Chemonics 2001). In part because of this dynamic, community ownership over the process of concession formation was low, resulting in low levels of participation and knowledge from the general assembly and the general sentiment that the project had not benefited the community as a whole.

2. **Lack of education**: In the case of Uaxactún and Carmelita, community members who had access to basic education were asked to manage multi-hundred thousand dollar timber operations with rigorous FSC certification within the span of a few years. NGO and government respondents reported that basic education did not translate well into the language of business, making project implementation difficult because leaders did not have the appropriate educational background to understand how to make important management decisions.

The constant references to "lack of education" point to a failing on the part of NGOs and the government to understand the capacity of the community from the onset. As timber harvesting was a new form of production and required new forms of organization for project implementation, NGOs and the government failed to consider how to structure training or project implementation to account for this difference in capacity.

3. **Failing to plan for social capacity-building**: One salient point that emerged from interview responses was the seemingly contradictory sense that social capacity-building was neglected from the onset, even while the social aspect

was recognized by all players as having vast implications for whether the projects would ultimately succeed.

On the one hand, failure to factor social capacity into plans can be attributed merely to the government's reliance on international conservation NGOs to assist communities. As one individual noted, employees of conservation organizations are trained in ecological and biological sciences rather than social sciences or business administration and were thus unable to provide the needed expertise to build solid community governments or timber operations. On the other hand, neglecting the social question can be viewed as a larger symptom of development projects. While project design may incorporate the building of certain forms of social capacity, such as conducting leadership training or information sessions for the community at large, this approach is similar to technical skills training and in many ways fails to account for the unique and complicated nature of social capacity. Technical skills are easy to teach and fit well within the still-dominant paradigm of development thinking, where the outsider development institution provides the necessary skills in a short, defined period of time.

Social capacity cannot be taught in a workshop or explained in a seminar. It is worked into the fabric of a society itself and requires a long-term investment by NGOs and government to build the trust, knowledge, and relationships that ultimately translate into the participation and the capacity of a community to carry out a development project. Targeting social capacity in these projects can be elusive. Moreover, while building capacity is a daunting enough task, *creating* capacity, as this project attempted, can be counter-productive. Creating capacity in this case did not entail a careful assessment of what capacity existed; rather, NGOs entered communities to provide a "crash course" in timber harvesting with the hopes that communities would not only pick up the necessary skills, but also organically build the necessary organizational infrastructure through leadership and civic participation to make their projects succeed.

Conclusion

Neglecting the social and human dimensions of capacity-building is not a unique symptom of the timber harvesting operations of Petén. A similar story has unfolded in projects throughout the world (Campbell and Vainio-Mattila 2003; Madrid and Chapela 2003; Newmark and Hough 2000). Thus, my argument is special not for its rarity, but rather for its ubiquity. Development is both quick and slow to change: quick in that new projects are constantly funded throughout the world, and projects are modified as each project is created; slow in that the institutional memories of organizations can be lumbering and the lessons learned forgotten in the glut of experiences from year to year.

In this case, communities were introduced to new forms of production without proper attention to building their social and human capacity through participation. In the future, assessments regarding a community's capacity to carry out a development project should be strengthened and should incorporate the human, social, and physical aspects of capacity. More importantly, the pervasive reference in development project evaluation to gaps in social capacity, both in the Petén and around the world, point to the importance of creating projects that are people-driven and led. Only when community ownership of a project is high – a goal achieved by accounting for community capacity and creating spaces for community members to influence the design and conception of projects – can participatory development be realized.

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Endnotes

[1] The Forest Stewardship Council has evolved as an independent, third-party auditor of forest management. Certified timber is stamped with the FSC logo to alert consumers that the wood was harvested under a sustainable management plan. Certification is thus a consumer-oriented solution to forest degradation, working on the assumption that consumers would be willing to pay a price premium on timber that they know has been harvested sustainably.

[2] It is worth noting here that while different communities worked with several different local and international NGOs, my analysis treats these NGOs equally. I found that community perceptions of NGO involvement were based not on the line between Guatemalan and foreign, but rather between whether or not an individual employee was from the community itself.

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Perspectives from the Field:
Local People, International Organizations, and the Politics of Mangrove Conservation in Kenya

by Amina Soud, MESc 2005

Introduction

My summer research entailed documenting the traditional conservation techniques utilized in mangrove forest areas in the Lamu coastal area of Kenya. As part of this work, I asked the harvesters to take me where they were currently working so I could take pictures. I was shocked by their reaction – the harvesters adamantly refused to allow my recording of the area. When I inquired as to why they refused, they told me a Swahili saying: "*ukiumwa na nyoka, ukitambawa na ungongo huruka*" – when one is bitten by a snake, one becomes sensitive even to the slightest touch of a thread.

After a long argument with them, they proceeded to tell the story about how the global non-governmental conservation organization, WWF, had conducted itself in Lamu. They told me how WWF officers came to a local boat owner, Mr. Fumo Faruq, and requested a boat to be taken to where people harvest mangroves. The WWF staff members paid the charges, Ksh 3000 (US$45), and proceeded on a guided tour of all the areas in which the forest grows. During the tour, they became interested in an area in which mangroves have never grown naturally. The harvesters explained to the WWF staff members how some places in the forest have soil qualities that are incompatible with forest growth and showed the WWF staff members similar places as their interest grew. Little did the harvesters know that the WWF staff was going to use this information against them.

Based largely on this tour, WWF published on the first page of its Kenya report for 1999-2001 that mangroves were overexploited in Lamu, and that the government of Kenya had to act immediately to save the remaining forests. The government, which had already passed previous laws limiting exportation, subsequently enforced a complete ban on harvesting mangroves. Even breaking a leaf was a criminal offense. This policy, I argue, did not take into consideration the effects this would have on the community. It is a fact, for example, that all of Lamu's old buildings are cyclically repaired with new mangrove wood, that the economy of the district is partly dependent on mangrove trade, and that the health of the forest itself is dependent on harvesting old trees.

The Lamu case represents one in many where an international organization imposed policy on developing nations and their indigenous people in the name of "biodiversity conservation" (e.g. Chapin 2004). The Lamu communities had perfected a sustainable utilization system of their primary natural resource, but policies implemented by the government and international bodies to fulfill conservation goals have led to the communities' dispossession of natural resources, and thus a dislocation of livelihoods. This article examines the rationale and consequences behind WWF's designation of Lamu's

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mangroves as unsustainably harvested, drawing upon the ecological, social, and political history of the region. I also elucidate the complicated political line that the government has to walk between local and international stakeholders.[1]

Lamu's Social and Ecological Context

The Lamu district has 80,000 people and its district headquarters on Lamu Island has a population of 12,000 (Kenya Census 1999). The local county council elects its chairmen every two years. There is only one local NGO, Tawasal Foundation, which works with many Lamu community-based organizations for their general welfare. Though lacking institutional structures, the people themselves actively participate in the political and subsistence economic issues in their communities.

The Lamu district's inhabitated islands and adjacent mainland are estimated to encompass 70% of Kenya's total mangrove forest cover, which is approximately 50,000-60,000 ha (Kairo and Kivyato, n.d.). Lamu is also a World Heritage site, attracting domestic and international tourism. It has one marine park called Kiunga National Marine Reserve (KNMR) and a national reserve called Dodori (Figure 1).

The mangrove forests, which grow in river deltas where fresh water meets the sea, serve a variety of purposes for the Lamu people. The forest shelters the archipelago from harsh sea waves, supplies nutrients to fish and crustaceans, and controls water quality (Kairo and Kivyato 1996). The tree trunks, called mangrove poles, are used for building houses, *dhows* (sailing boats), and fencing; the bark is used for leather tanning; the dead parts are used as charcoal; the young leaves are used to make a common side dish; the seeds are made into medicine; and the flowers promote local honey production. Lamu people's culture and architectural skills are centered on these trees.

There has been clearly a trend in the kind of ban, from an export ban to a complete or blanket ban. For over three decades, the Kenyan government has put mangrove forests under protection, due to their degradation through detrimental human utilization such as salt and aquaculture farming and charcoal making, by banning the exportation of mangrove products. Recently, a restoration program for mangrove forests was initiated south of Lamu due to the dwindling supply of building materials caused by clearing for aquaculture and salt farming (Kairo 1996). Then, in September 2001, as I have described, the government slapped a blanket ban on any form of forest harvesting.

UNESCO and WWF Involvement

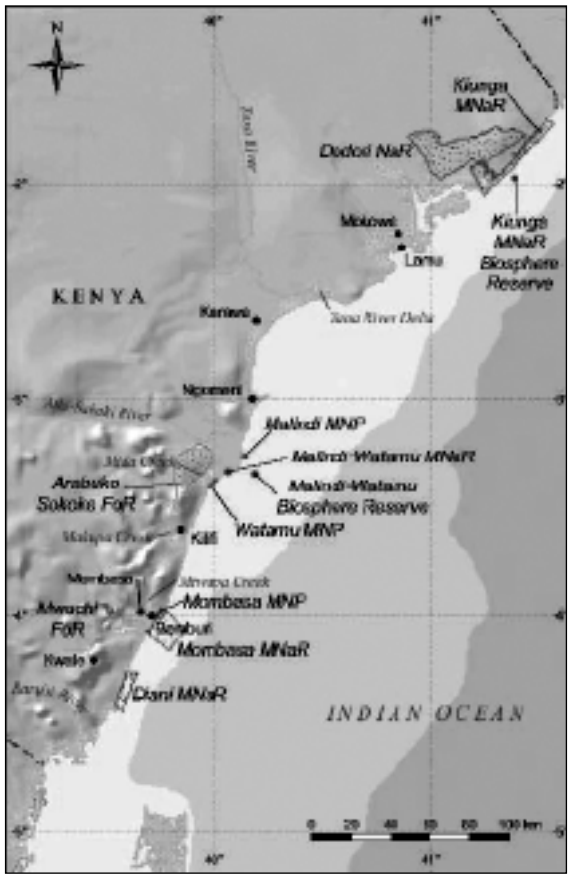
The Kiunga National Marine Reserve and Dodori Nature Reserve were designated as Biosphere Reserves in 1980 by UNESCO, as a product of UNESCO's initiative for "conserving nature," which was accepted by the government of Kenya. Since the Kenyan government is poor, UNESCO contributed beyond simply maintenance costs by proposing in the late 1990s that a world conservationist "expert" from WWF be in charge of management. The plan was attractive to a poor government with little financial means.

In 1999, WWF established its East African Eco-Region in Kenya. The organization was charged to work with the Kenyan Wildlife Service (KWS), the national agency responsible for reserves. Today, the current power structure leading to forest management relies mostly on government officers' reports to the forest headquarters in Nairobi, Kenya's capital, and the Eco-Region conservation report from WWF (KWS inclusive).

Reserves' Impact on Local People

The people that I interviewed in the area all opposed the existence of the Kiunga and Dodori National Reserves and the involvement of WWF. They complained that the existence of the

Figure 1. Distribution of mangrove forest along the Kenya coast line.



Source: UNEP-World Conservation Monitoring Centre, World Heritage Sites (2003). http://www.unep-wcmc.org/index.html?http://www.unep-wcmc.org/resources/publications/UNEP_WCMC_bio_series.htm~main

national reserve in Lamu has disrupted their whole socio-economy. Originally, the local people divided the sea area into zones. The fishermen knew their fishery zones; the farmers planned their jetties for the transport of goods, and the mangrove cutters had their harvesting zones. But, according to the traditional knowledge of the area, the national reserves fall in the fertile agricultural lands, the fisheries' nutrient beds, and the healthy mangrove forest swamp, all of which were part of local peoples' utilization schemes. They perceived that WWF's management had set these areas off-limits to their traditional uses. The indigenous peoples who are most directly affected by the reserves are the Wandau mangrove harvesters, Bajuni fishermen and farmers, and Waboni hunters and gatherers. These people have considerable knowledge of the medicinal and nutritional properties of many plants and trees. They were relocated to outside the reserve areas when the reserves were designated and were encouraged to undertake agricultural practices. It is believed there are only 500 Waboni left, most of these in the three villages along the Kiunga-Lamu road: Milimani, Mangai, and Basuba.

Although the government, WWF, and KWS have tried to alleviate the problems the reserve has caused to these indigenous groups through various programs, people are not happy with the management. They say that they are denied the benefit of using their land for agriculture, mangrove harvesting, and fishing, and that very little of the levies collected from tourism go back to them.

Politics and the Harvesting Bans

The conflict between UNESCO's and WWF's interest in conservation and the locals' interest in forest-based livelihoods created a management system that wavered between bans and reinstatements of the forest harvest between the 1970s and today. The issue became more complicated when political parties, the government, and the local people politicized it. After WWF's quick survey of the forest in 1999, the government supported WWF's idea of a complete ban in order to be in good rapport with those concerned with the condition of the world's environment. However, at the same time, the votes of the Lamu people, who wanted the ban lifted, mattered to the government.

This dual affiliation led to the series of bans and lifts. Harvesting was banned over fear of overexploitation, yet the reason for lifting the ban is less that people have changed their patterns of mangrove cutting than that local people have pressured for reinstatement of harvesting. This becomes clear when we see that, throughout the 1970s to 1990s, the Kenyan government did not have a reliable inventory of the forest. This changed with WWF's quick 1999 survey – yet even with the more reliable information, the ban was still re-imposed and then lifted.

The president was surely playing politics through the 2001 ban. I say this because the results of GIS and remote sensing research support the presence of sustainable harvesting in the mangroves in Lamu. The issue was obviously significant and politically delicate, as it involved, on the one hand, Lamu people's environmental, social, and economic conditions, and, on the other hand, the international conservation community's vision – and their financial assistance for the government of Kenya. The government needed to balance between the two. The Kenyan government, in its endeavors to meet the policy goals of creating and maintaining systems of public order that embody human dignity, is weakened by its dependence on financial aid provided by the international world. However, the strong civil society in the form of organized, affected Lamu citizens used all means in their hands (national media, memorandums, politicians, and votes) to press the government to make a decision in their favor. Members of the opposing party (NARC) also used this ban as a political weapon against their opponents, the KANU government. They promised to lift the ban immediately if they were in power. Partly as a consequence of this promise, NARC won the national elections in December 2002.

WWF Reaction

WWF, seeing that it caused troubles in Lamu after the complete ban, decided to join hands with the government's agencies, Kenya Marine and Fisheries Research Institute and the KWS, to conduct another survey of the mangrove forest adjacent to the Marine Reserve. The government did not have enough funds to do the survey, and thus asked for support from German, Norwegian, and UNESCO programs. The results affirmed that sustainable harvesting is possible in the area: "Given its high potential productivity and regeneration, mangroves forest within and adjacent to KMNR have excellent prospects for sustainable exploitation" (Kairo and Kivyatu, n.d.:14).

After this report, WWF openly supported a lift on the ban. They were then in the daily papers with other pressure groups in Lamu trying to persuade the new government to lift the ban. About a year after the NARC government was formed, in September 2003, it did so.[2]

Conclusions

Pressure from all sides helped to lift the ban. However, the actions of the WWF, which caused the complete ban, increased suspicion in

the Lamu people towards government agendas. It caused people to ask the government questions about their relevance as citizens. The citizens' anger towards the government was due to the exclusion of local people from decisions concerning their own areas' management issues while they included foreigners who did not know the land.

WWF initially did not pay enough attention to the people's and the forest's history and context – social, political, and ecological – in the mangrove area. In this case, the organization acknowledged that they had been wrong and changed their course. However, we must ask: if the people in Lamu had not been organized and mobilized enough to protect their interests, what would have happened?

This case is not an uncommon occurrence, and it is part of a larger problem in conservation projects. I cannot put the blame solely on WWF for the problems encountered in the management of the Lamu forest. While WWF is partly accountable, the deeper issue is a system where the politics and agendas of resource-rich, cash-poor countries like Kenya intersect with the large budgets and priorities of international institutions and conservation groups. In the collision and negotiation of these interests, it is the local people who too often continue to lose out.

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Endnotes

[1] This report is based on observations and interviews conducted from June to August 2004. Government officials interviewed included the following: Mr. Mwihindi Kiilu Bernad (Deputy District Forest Officer, Lamu), Mr. James Njuguna Baatia (District Forest Officer, Lamu), Mr. Mohamed Omar (District Environmental and conservation Officer, Lamu), and Mr. Hussein Soud Elmaawy (Chairman, Council of Elders).

[2] Interview with Mr. Hussein Soud Elmaawy, Chairman, Council of Elders.

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Oil and *Chicha*:
Indigenous Movements and Survival in the Ecuadoran Amazon

by Rebecca Reider, MESc 2005

Introduction

Around the world, poor people, including indigenous people, despite being vastly outmatched in resources and power, have often stood in fierce opposition to multinational resource extraction companies and complicit governments (Gedicks 2001; Brysk 2000; Martinez-Alier 2002). How do subsistence-level agrarian people build strong socio-environmental resistance movements? Investigating the formation of a local indigenous movement against oil development in the Ecuadoran Amazon, in this article I focus on a nascent indigenous organization – RECOKA, *La Red de Comunidades Kichwas de la Amazonía* (Network of Kichwa Communities of the Amazon). RECOKA's story is worth studying not only for its presence in the province of Napo, the newest frontier in Ecuador's high-profile petroleum struggles, but as a broader window onto what drives the "environmentalism of the poor," or "the activism of poor women and men threatened by the loss of the environmental resources and services they need for livelihood" (Martinez-Alier 2002: 119).

Understanding the mounting anti-oil movement in Napo requires understanding not just the political and economic context of oil, but the lives of the individual people who make up the movement. As Escobar (1992: 63) argues, movements begin within people's individual lives; to explain the development of social movements, "theory must start with people's self-understanding, with giving an account of people as agents whose practices are shaped by their self-understanding." In constructing this type of account, I examine how Kichwa people in Napo see the forest, indigenous organizations, and oil companies in relation to their own lives. I argue that such a multi-faceted perspective is a requisite first step for any efforts (on the part of international environmentalists, for example) to build lasting alliances with local people's movements. I further argue that these movements will succeed most strongly when they attend to people's material aspirations and survival concerns.

Rebecca Reider, a native of California, has worked as an environmental educator and writer in the U.S. She has lived and worked with indigenous communities in Guatemala and Ecuador on environment, development, and agriculture projects.

Oil in Ecuador

Modern Ecuador was built on "black gold." In 1967, the Texaco-Gulf consortium discovered oil in Ecuador's Amazonian rainforest region, known as the "Oriente." The industry took off rapidly thanks to a worldwide upswing in oil markets in the 1970s. Soon, half the federal budget came from oil revenues.

Over time, however, many began to question whether oil actually was helping Ecuador's people economically. During the oil boom, as the government took out high-interest foreign loans, Ecuador's national debt skyrocketed from $209 million in 1970 to $12 billion in 1990; meanwhile, national poverty rates grew from 47% in 1975 to 67% in 1995 (Gerlach 2003). Still, under pressure to make debt payments, national administrations continually sought to pump more oil. A new Heavy Crude Pipeline, completed in 2003 with foreign

investments, doubled the capacity to export oil out of the Amazon. Searching for oil to fill the new pipe, the Ecuadoran government ventured to open new central Oriente areas to oil drilling – including Napo Province.

Petroleum extraction has already devastated the Oriente's people and environment elsewhere. In the northern Oriente, during the 1970s and 1980s, Texaco operators carelessly spilled oil from ruptured pipelines and disposed of toxic waste products in unlined pits, which seeped into forest soils and regularly overflowed into local rivers (Kimerling 1991). The contamination killed fish, animals, wild plants, and food crops, and caused epidemics of cancer and other diseases (Acción Ecológica 2001). As oil's impacts in Ecuador have become more widely known, opposition has swelled, particularly among the Oriente's eight indigenous groups.

Stemming the Oil Tide: A Case Study

Ecuador's legal resource rights regime virtually guarantees conflicts over oil. Indigenous peoples in many cases possess increasingly secure legal titles to land; but all resources underground, such as petroleum and metals, still belong to the state. Conflicts ensue when the government auctions off these resource rights to oil companies, which then attempt to enter local people's lands to access the underground materials. In this way, the Oriente's resource struggles are literally rooted at the level of the soil.

Napo Province is the newest front in Ecuador's oil wars. The government prepared to auction off rights to two new oil blocks there in 2003. Together, oil blocks 20 and 29 contain more than 80,000 inhabitants, including 536 indigenous communities, most of them Kichwa.

Local and national activists are using both legal tactics and protests to keep the Napo oil blocks unexploited. The concession process is on hold because of a lawsuit claiming that local people have not received proper prior consultation, a right guaranteed by the 1998 Ecuadoran Constitution and International Labor Organization Convention 169. However, many Napo activists believe that as long as petroleum interests dominate Ecuador's government, oil opponents will have to fight "not in the courts, but in the streets," in the words of RECOKA coordinator Fredy Alvarado. This belief is not mere idealism; Ecuador's indigenous movement has been a strong political force in recent decades (Selverston-Scher 2001). Mass marches and acts of civil disobedience resulted in land titles for some Amazonian indigenous groups in 1992, and contributed to the forceful removal of the country's president from office in 2000.

The social movement against oil in Napo began from the ground up. In March 2004, more than 2000 people from 120 communities gathered in the city of Tena, the provincial capital, to hear anti-oil testimonies and officially form the *Frente de Resistencia a la Actividad Petrolera* (Front of Resistance to Petroleum Activity). Seventeen local organizations signed a declaration opposing oil activity in their territories. For the organizers, mobilizing a large number of communities was not just an expression of populist spirit, but a tactical necessity; elsewhere, oil companies have broken down resistance by trying to make individual agreements with communities outside of the movement (Sawyer 2004: 9).

The following case study examines the dynamics of movement-building within one of the organizations most actively leading the *Frente de Resistencia* in Napo: the association of 16 indigenous Kichwa communities calling themselves RECOKA. From June-August 2004, I lived in Shiwayacu, one of RECOKA's member communities, and worked as a volunteer in RECOKA's office in Tena. My main work was to survey member communities to provide information to the organization's leaders. RECOKA's mission is not only to resist petroleum development, but more generally to "generate alternative projects for a higher quality of life" (RECOKA

Corn growing in a cleared rainforest plot - here, in the community of Shiwayacu - represents one of the few opportunities for rural Kichwa people to earn a cash income. *Photograph by Rebecca Reider.*

2004). The survey therefore addressed communities' land tenure, transportation access, infrastructure, agricultural systems, schools, health services, interaction with oil and mining companies, and opinions of RECOKA itself. Results for seven communities are described below.[1] Though the survey's immediate goal was to help RECOKA plan future projects, the survey also illuminated more broadly what it means to build a social movement among forest-dwelling indigenous people.

Findings

Survey results, coupled with observations from my time living in Shiwayacu, suggest a constellation of issues that oil opponents must consider and deal with: not just petroleum economics, but agricultural economics; not just anti-oil messaging, but local access to cash and education. The RECOKA communities, like other subsistence-level agrarian people, view the forest, their fields, oil companies, and NGOs through a common lens: a strategic eye for their own survival. Some conservationists have noted that indigenous people often view the environment in terms of the goods and services it provides, and may be more likely to conserve species and ecosystem functions which are useful to them (Redford and Stearman 1993: 253). Utilitarian concerns alone cannot completely explain the Kichwas' complex cultural relationship to the forest. Still, on walks through the forest, people in RECOKA communities, regardless of their age, would point out to me dozens of plants, usually with reference to the plants' usefulness: medicines, fibers, fruits, wood, ceremonial plants, decorative seeds, dyes, and trees which attract game animals or harbor edible grubs. Similarly, RECOKA's people view the growing thicket of non-governmental organizations and companies with an eye toward furthering their own communal survival.

Forest livelihoods

RECOKA's people survive based on small-scale agriculture. Balanced with one foot in the market economy and one outside, they engage in some production for self-consumption and cash cropping of a few major commodities – chiefly cacao and maize. Subsistence cultivation takes place in the *chacra*, a dense and diverse garden planted under shifting cultivation in cleared forest plots. One study found 23 different annual crops and 23 perennial crop trees being grown in chacras in Napo (Perreault 2002: 90). Yuca (manioc), the main staple crop, is eaten steamed, or is mashed and fermented to make a beverage known as *chicha*,

Leaders from several RECOKA communities march through the streets of the national capital, Quito, as part of an international indigenous people's demonstration. *Photograph by Rebecca Reider.*

drunk throughout the day.

A single family may possess multiple *chacras*, planted and harvested at different times to assure a continuous year-long supply of yuca. However, all communities report that they are on the edge of subsistence; during occasional food shortages they may eat only yuca and plantains or drink *chicha* in place of meals. Dwindling fish and game populations put further stress on Kichwa diets. This reality is reflected in statements community members commonly made to me: "If we don't do this [grow crops], we're not going to eat anything"; "If we don't work, we will die."

Hungry for cash

Even in plentiful harvest years, most Kichwa families surveyed no longer consider their *chacras* sufficient for survival because subsistence crops do not yield access to one of the most coveted resources: cash. Cash crops hold a highly privileged place in household economies, reflected even in the words of children in RECOKA communities, who readily differentiated cacao trees in the forest understory by telling me, "*Con cacao ganamos plata*" ("With cacao we earn money"). In every community surveyed, people agreed their most serious agricultural problem was a lack of profitable markets for their cash crops, principally corn and cacao.[2]

Family incomes depend on the fluctuating prices received from middlemen who buy the crops in nearby towns or at road heads. Difficult physical access to markets exacerbates the problem of low prices. The distance of RECOKA communities to the nearest markets ranges from a short bus ride to a day's journey by bus, canoe, and foot. High bus fares, coupled with horse rental fees, can make the trip to market quite expensive; in farther communities, it may cost as much as $2 to get a quintal (100 pounds) of corn to market, when that quintal might eventually sell for only $5-7.[3]

Oil, organizations, and survival

It is from this vantage point, perched on the edge of subsistence, that Kichwa people eye both oil companies and NGOs. In the community surveys, those who mentioned any possible benefit of oil exploitation mentioned attractive material benefits: jobs and cash. When an oil company constructed a pipeline through the area in 2003, it paid off the affected communities and offered various goods, including buildings, soccer fields, electricity, potable water, classrooms, productive projects, and sometimes even computers or copy machines; some goods were delivered, while others were not (Lange 2004).

When community members spoke out against oil development in responses to this survey – giving responses based on information they had received from anti-oil education campaigns – the people likewise framed their opinion of oil development in terms of its impacts on their survival. In the Santa Monica community, one resident who had seen oil-affected areas elsewhere in Ecuador warned, "The rivers were pure black" with inedible fish and "The terrain was almost a desert; if one plants yuca, it doesn't give anything." In the Santa Rosa community, the opposition to oil was immediate and vocal in response to a survey question: "No!" "Out out!" "We reject it!" "Our products will produce worse." "We'll be left poor." On a walk through the forest, a utilitarian perspective offered by Gabriel Cerda, president of Shiwayacu community, was typical. After pointing out a dozen medicinal plants, he suddenly stopped and said, "Because of this we do not want petroleum… step by step there are medicines. If petroleum comes, it will destroy everything." Listing forest food sources – mushrooms, plantains, yuca, wild tubers – he said, "When the contamination comes, they don't serve for anything, they cannot be eaten. So from what are we going to live?"

A survival-based perspective also influences the way people view their affiliation with outside organizations, including RECOKA. Not surprisingly, those with the most positive feelings about the organization and with the most negative opinions about oil were those that had received the most projects or support from RECOKA – such as participation in a handicrafts marketing cooperative or a communal chicken-raising project, or tactical support in a land rights struggle. Communities view the relationship with the organization as one of give and take: in the words of Gabriel Cerda, whose community has been supported by RECOKA in a land titling conflict, "What they [RECOKA] ask, like to go to protests, we support, and they support the community."

People in the RECOKA communities frequently referred to themselves as "*dejado*" ("left behind") by their government. In the void left by inadequate government services, NGOs and oil companies have become parallel rural development organizations battling for indigenous people's allegiances. Communities perceive RECOKA and other organizations largely based on the concept of "projects" – in Spanish, "*proyectos*." Such relationships are an artifact of the high number of organizations – governmental and non-governmental, local and international – providing assistance to communities in the region. Various surveyed communities had received classrooms and musical instruments from the Spanish Red Cross, medical training from a private doctor, fish (to be raised in ponds) from the provincial council, water tubing from the municipal government, support from a private foundation for a daycare, and agricultural loans from an indigenous federation. Community leaders in Shiwayacu, where I lived, repeatedly asked me for help in obtaining "some *apoyo* [support], some *proyecto*," though they did not have a firmly defined idea of what such a project should entail. Cerda, the community president, believed that "The support of international foundations is the only path, because the authorities from here don't worry themselves for anything." The community joined RECOKA after becoming disillusioned with the larger regional indigenous organization, FONAKIN, because after 20 years of belonging to FONAKIN, Cerda said, "We have not had any *proyecto*."[4]

Cash crops and social movements: The link

Cash-generating *proyectos* may have multiple political outcomes. For RECOKA community members, a cash income is not just a matter of economic importance, but a matter of political importance directly affecting people's capacity to educate and organize themselves. Cash resources are important for both education and basic social mobilization, both of which are in turn important to the future of the movement.

Most directly, RECOKA members' access to cash influences their ability to participate in

a social movement at all. RECOKA illustrates the resource mobilization theory of social movement formation at its most basic: "more prosperity favours social mobilization" (Foweraker 1995: 16). Mobilizing the communities to assemble for meetings or other events was no simple task during my time there. None of the communities surveyed had any means of outside communication other than listening to radio stations. The Shiwayacu community president had to travel frequently to Tena to deal with the village's land rights case, paying 95 cents bus fare each way; on these days he might not eat during the day to save money, despite the hour-long walk from his home in the forest to catch the bus. The RECOKA director, earning only $40 a month for his work three days a week for RECOKA, had to spend $26 of his $40 on daily bus fare from his home community to the office, and was only able to support his family by doing outside work as a Christian missionary.

When local people complained of poor cash crop markets, they most often framed the problem in terms of their children's education. Comments from Shiwayacu and Bellavista Alta residents, respectively, typified this perspective: "There is no money to maintain and educate the children because there are no products to sell, only maize and cacao"; "There is no way to buy things and make the children [able to] study."

All communities reported shortages of schoolbooks and materials; many students share materials because they cannot buy their own. Only one community has a high school; youth from other communities must commute by bus or foot, study through distance-learning programs, or live with relatives in town. Parents in several communities complained that teenagers must drop out of school for lack of funds for materials and fees. Families' cash crop incomes thus directly determine the level of education which their children can attain.

The degree of education that people can afford has direct effects on social movement-building, creating capacity for political mobilization. Educated people are more likely to understand their legal rights, and are more able to garner external financial and political support for their cause. Even the most politically savvy indigenous federations in Ecuador have found themselves disadvantaged when negotiating with oil companies because of their lack of technical, environmental, and legal expertise (Rival 1997: 2). Cash is thus an important ingredient in building a strong movement, over both the short term (through basic mobilization) and long term (through education).

Conclusions: For Movements and Their Allies

This research is relevant not just to a theoretical understanding of the "environmentalism of the poor," but to the process of building local and international alliances to sustain such movements. Keeping oil companies out of the Ecuadoran Amazon has become a goal not only for indigenous people, but also for many Northern environmentalists who consider the area a global "biodiversity hotspot." Alliances between indigenous people and international NGOs have a history of environmental campaign victories in other Latin American countries, especially Brazil (Conklin and Graham 1995). But environmentalists attempting to form anti-oil alliances with local people must consider how people living on the margins of survival will act in accordance with their own subsistence needs. If people can be made to understand that oil activity threatens their own survival, they will oppose oil activity. Furthermore, people are more likely to support anti-oil organizations if they, in turn, feel their livelihoods supported by those organizations. Activists fighting to keep oil companies out of Amazonia need to think not only about oil economics, but also about the economics of agricultural commodities.

Still, while indigenous people may oppose oil development because it conflicts with their

survival interests, as Anthony Bebbington and colleagues (1993) argue, economic interests promoted by indigenous organizations are not always ecologically sustainable. Environmental groups working with the indigenous anti-oil movement should be mindful that supporting these movements is one part of a regional sustainable development strategy, not an automatic route to forest preservation.

Ultimately, anti-oil movements will meet no lasting success as long as the Ecuadoran government's policies remain stuck on the same treadmill of pumping oil to pay debt service. In the year 2000, half of the national budget still came from oil revenues (Gerlach 2003), and more than half of the government's $2.4 billion oil revenues went toward paying off interest on the country's foreign debt (Barthélémy 2003). The above lessons to social movements therefore apply to the anti-oil campaign as a whole: opponents of oil development must also think about expanding the markets for other commodities if they wish for a different national strategy on oil. In the meantime, local people will likely continue struggling to fend off oil companies day by day, community by community – because they know their survival depends on it.

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Endnotes

[1] I wrote the survey in cooperation with RECOKA coordinator Fredy Alvarado and administered it in five communities: Atahualpa (*barrio* Pantanal), Bellavista Alta, Santa Rosa, Santa Monica, and Shiwayacu. The survey was administered in two more communities, Kachiwañushka and San Pedro de Auca Parte, by Ines Refenner, a representative of the Austrian NGO Horizont 3000, who was working with RECOKA at the time. The surveys were conducted through community meetings, with typically 12-15 adults participating; answers reported here, unless noted, appeared to be the general consensus of all those present. Surveys were a mix of basic factual queries (e.g. crop prices and distances to markets) and open-ended questions (e.g. "What is your most serious agricultural problem?").

[2] Communities living closest to road networks sell a wider variety of products, such as yuca, plantains, oranges, and papaya; but all communities sell corn and cacao because it is easily stored and transported. Coffee was a major cash crop in the area until international markets crashed in the late 1990s, yet another case of commodity-price dependence creating problems for the country's rural people.

[3] Since 2000, the currency of Ecuador has been the U.S. dollar.

[4] FONAKIN, the Federation of Kichwa Nationality Organizations of Napo, is a long-established organization claiming to represent Kichwa people throughout the province.

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Integrating Forest Biodiversity Conservation and Poverty Alleviation in Local Forest-Based Enterprises:

A Case Study of the Woodcarving Industry, Ghana

by Dora Nsuwa Cudjoe, MEM 2005

Introduction

Woodcarving is one of the informal employment sectors in the forested areas in Southern Ghana, notably in the Ashanti, Central, Western, Eastern and Volta regions. An otherwise part-time lean season activity, however, is being nurtured into a full-fledged trade as a result of regulatory and policy framework support for the tourism industry, which provides the main local market for carved products (Addo and Marshall 2000). Ghanaian woodcarvings are gaining increased recognition both locally and internationally, presently contributing approximately $500,000 annually to the Ghanaian economy and providing employment to about 20,000-30,000 people (Okrah 2002). The producers, individuals and cooperatives, rely almost solely on the natural forest for wood. Wood inputs usually tend to be a few specified hard wood species, some of which, like African mahogany (*Khaya ivorensis*), have been extracted almost to the brink of extinction. Woodcarving is therefore perceived as a source of forest biodiversity loss in Ghana (Dei 1990).

Dora Cudjoe is originally from Ghana. She obtained her B.Sc. from the Kwame Nkrumah University of Science and Technology, and then worked with the Environmental Protection Agency in Ghana prior to attending F&ES. Dora spent the summer of 2004 with the UNDP in Ghana, and plans to work with the Global Environment Facility on graduation.

Since woodcarving is an industry important to two vital aspects of human social welfare – rural economy and forest biodiversity conservation – it becomes imperative to find alternative wood sources that are more environmentally benign. In this study, I describe the woodcarving industry of Ehwiaa, the largest woodcarving center in the Ashanti region. Ehwiaa, a tourist town located five miles from the regional capital, Kumasi, has gained local and international recognition for its carvings. I investigate the industry's structure, discuss ways in which its production could be spurred, and evaluate the potential for using byproducts from the timber industry to provide a sustainable source of wood for artesanal woodcarving. I draw inferences from a similar woodcarving enterprise, the 'Ecocraft', which uses strictly byproducts from the timber industry rather than directly from the forest. Finally, I address plausible conclusions and recommendations towards sustaining the woodcarving industry.

Methodology

Research design

I conducted field surveys; a method through which I could extract substantial amounts of data at relatively low cost within the limited time available for this research (Babbie 1989). I targeted woodcarvers from Ehwiaa after preliminary interviews with retailers in New York revealed that over 60% of woodcarvings sourced from Ghana come from

this town. Interviews in Ghana confirmed Ehwiaa's suitability as the study site: of the 150 woodcarving export companies in Ghana, "almost all source their products from Ehwiaa."[1]

I surveyed the following actors: one-man (individual) carvers who form about 70% of total woodcarvers; association woodcarvers who constitute about 30% of the town's woodcarving population; industrial carvers (Ecocraft project); and finally government and non-government institutions such as the Forestry Commission, Ghana Export Promotion Council, Aid to Artisans-Ghana, and the Director of UNDP-GEF, by virtue of their influence on the industry. One hundred woodcarvers were targeted, but only 20 carvers could be interviewed.[2] Nonetheless, I obtained a representative number of people from the various categories within the woodcarving sector (carvers, retailers, and exporters). Questions were directed at eliciting information on the social background of woodcarvers, the production chain from sourcing of wood to retailing both locally and by export, and the factors that account for changing trends in production.[3]

Results and Discussion

Current status of Ehwiaa woodcarving

The backbone of the town's economy and an embodiment of the rich Ashanti cultural legacy, Ehwiaa woodcarvings date back to the 19th century.[4] Back then, the art of carving wood was seasonal, done during the lean agricultural seasons. Two main tree species, *Khaya ivorensis* (African mahogany) and *Holarrhea wifsbergii* (sese), were used.

Woodcarving in Ehwiaa has since evolved from serving a strictly local market to being an almost entirely export-based activity. Currently the export market to Europe and the US accounts for 65% of all products made in the town, while the remaining local market includes tourist travel to Ghana. The quality of labor force (as producers and exporters), tree species used, and product lines have changed over the years in response to economic policies (such as redundant labor from the formal sector), availability of required tree species, and market forces.

> *we used to source wood from the town's vicinity but residential facilities are reducing at a fast pace the availability of wood. We have to travel for about 60 miles into the forest in search of the required species...* [5]

According to Okrah (2002), the retrenchment of workers from the formal sectors as part of the World Bank's Structural Adjustment Program led to more and more people resorting to informal sectors of the economy, such as woodcarving. Over 60% of Ehwiaa's population was woodcarvers about three decades ago, until receding access to the required tree species resulted in a shrinking number of carvers. Woodcarvers presently make up 10% of the town's population of 20,000 (Table 1).

Constituting over 60% of wood volume used now, *Cedrella odorata* (gyenegyene) is said to have replaced African mahogany as the most popular carving tree species. *Cedrella odorata*, in addition to having a similar coloration as the African mahogany, has the prized forestry value of a fast regenerative capacity. Logs from this species located at the research site came from 8-10 year old trees with diameter at breast height ranging between 0.4 and 0.8 meters.[6]

Interviews revealed that although forest plantations could serve as an alternative wood input, lack of access to land limits this source's potential. Since Ehwiaa is only five miles from the region's capital and has comparatively cheaper land prices, home owners and estate developers are increasingly buying lands that could otherwise have been used for tree plantations. Moreover, the Forestry Commission of the Ashanti Region allocates an annual quota of only 40 trees from production forests to all woodcarvers in the region, enough to supply

Table 1. Categories of Woodcarvers in Ehwiaa

Association	Description	Number of active carvers
Unity Carvers	Basically carve the Unity design	120
Ehwiaa Woodcarvers Woodcarvers	who own retail stores	40
Non-associational woodcarvers	Do not belong to any of the associations	1,500
Woodcarving Export Association	Network with local and International wholesale buyers	10

only one-fiftieth of the approximately 2,000 Ehwiaa woodcarvers for a month.[7]

Production and marketing

Analysis of the rate of production revealed that, generally, an individual woodcarver utilizes about six m^3 of wood annually, creating a cumulative total of 12,000m^3 for the whole carving community in Ehwiaa. According to the carvers, this volume of wood is sourced mainly from farmlands since informal price negotiations with farmland owners for trees are far cheaper than via permits from the Forestry Commission. Previously, a Legislative Instrument, LI 1518, granted permits to carvers, but this has been repealed on the grounds that carvers frequently abused these permits.[8] As dwindling access to off-reserve sources therefore loom, illegal sourcing from the natural forest becomes the last resort. Woodcarvers clearly stated that they have taken to carving products at felling sites or in remote villages to evade security checks by the Forestry Commission Task Force for illegally harvested timber. Woodcarvers employ very simple locally made hand tools, which include the hammer, knife, and axe. This limits the diversity of wood species they can use, the quality of finish, and the intricacy of designs.

On entering Ehwiaa Township, a visitor is welcomed by a stream of woodcarving retail stores that lines both sides of the main road. Retailers carry the same set of items, the only differences being in sizes and colors. Products were mostly for decorative purposes – animal and human figurines – with no little household use. Observational studies revealed that cultural artifacts which served dual purposes, such as flower vases, book-stops, cutlery, lamp stands, fruit bowls, and furniture, had greater market value. This was confirmed by Bob Hewes, Manager in charge of product sourcing nationwide for Pier 1 Imports.[9] Commenting on carved products from Ghana, he suggested that woodcarvers exploit avenues for more utilitarian products since "the interest among our customers for traditionally based ethnic wood carvings is not as strong as it was."

The framework within which the woodcarving industry operates

Although a fairly small and informal sector of the Ghanaian economy, the woodcarving trade interlinks with a host of formal governmental and nongovernmental institutions (Figure 1). These linkages undoubtedly are centered on the production, financing, and market extension at levels that are, however, not involved enough to optimize the potential of the industry. There is not enough attention given to sustaining the wood resource base, an effort that will demand the regulatory and policy support from the Forestry Commission and environmental NGOs. Aid to Artisans, Ghana (ATAG), an NGO, has embarked on a forest plantation program that is geared towards establishing

1,500 ha in forest plantations. One hundred and forty-four hectares of this has already been planted. Educational institutions like colleges and vocational schools could be a source of logistical support in production and business skills training, as well as research.

The 'Ecocraft' project

A new model has emerged to address the growing gap between the dwindling supply of trees and the growing demand for wood to carve. Since a substantial quantity of products are currently being carved from smaller diameter trees,[10] wood waste from timber companies may support the shrinking supplies from off reserve forests such as farmlands. The Samartex Timber and Plywood Company, which has stated "the need to utilize all raw materials," has established a woodcarving unit called Ecocraft that follows this model.[11]

Samartex Timber and Plywood Company is a privately-owned German company located in the Western Region of Ghana, which has a well-developed woodcarving industry like that of the Ashanti Region. Samartex is situated about 240 kilometers from the Western Regional Capital, Takoradi.

Ecocraft was initiated three years ago as part of Samartex Timber and Plywood's quest to maximally utilize all their industrial waste. The concepts behind this project are (i) to add value to harvested trees; (ii) to increase recovery from the timber industry waste; and (iii) to create jobs and increase awareness about the various valuable uses to which non-conforming wood could be put.[12]

By channeling all industry waste (non-conforming timber forms,[13] round core, unwanted veneer) to the Ecocraft woodcarving unit, Samartex is able to maintain its electricity and heat generation and also increase earnings from recovered waste wood. By giving added value to waste wood, sometimes values higher than that obtained from equivalent timber volume, woodcarving is serving as an added source of income without direct pressure on the natural forest for virgin timber.[14]

The company produces lumber, veneer plywood, and tongue and groove boards mainly for export from 25 tree species, 14 of which are utilized by the woodcarving unit. Eighty percent of products are for the international market. Of this, 60% goes to Europe, 30% to USA, and 10% to the Far East and other destinations.

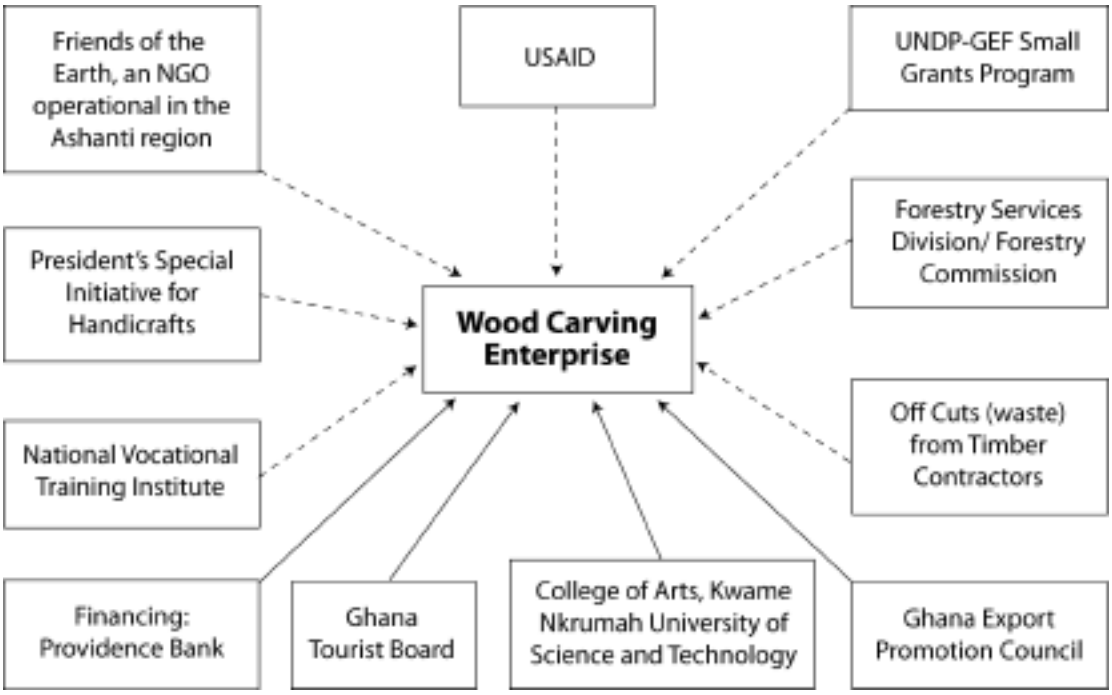
The saw mill, veneer mill, plywood mill, and molding departments demand a monthly wood volume of 9,500 m^3. Forty-two percent of this volume is made of species that cannot be carved. Of the 5,500m^3 carveable tree species, 2,750 m^3 – a startling 50% – is generated as off-cuts, or byproducts. Of this volume, 1,000m^3, a monthly supply of carveable wood is made available to the carving unit. The rest, which is composed of cracks, slabs, heartwood, and sawdust, goes to feed the cogeneration plant. Samartex also ensures that timber harvest meets the soil nutrient replenishment and forest landscape restoration standards set by the Forestry Services Division.

It is interesting to note that the volume of wood generated from industrial waste to feed Ecocraft per annum is the same as that required by the carvers in Ehwiaa (approximately 12,000m^3 annually).

Product comparison

Products made by Ecocraft and by woodcarvers from Ehwiaa differed substantially in terms of product diversity and quality of finish. Samartex products are diverse and cross-cutting: both useful household items, such as furniture and house wares (bowls and cutlery), and purely decorative pieces like human and animal figurines. Ehwiaa products, conversely, focus largely on the decorative pieces. Samartex is also able to utilize 14 species of wood,[15] as compared to the two main species used in Ehwiaa. Although these two production lines have characteristics peculiar to them and thus cannot be directly compared, artistic creativity and available technology appear to be the main factors that account

Figure 1. Perceived Stakeholders Partnerships and Relationships



The links represent the various existing or proposed linkages between the stakeholders in woodcarving. Solid lines represents existing working relations; dotted lines represents no or very weak relations. Taking a cue from India and Kenya, the UNDP-GEF Small Grants Program is targeted as the main source of donor support for this industry. The Friends of the Earth may also act as a medium between woodcarvers and the donor.

for differences in product diversity and quality of finish. Samartex employs design service support from German-trained nationals and the Ghana National Vocational Training Institute, and adopts the use of simple but efficient carving and finishing tools such as the hand-held sand paper machine, the circular saw, and the bend saw. Woodcarvers from Ehwiaa, meanwhile, still use less-efficient indigenous handmade tools. Carvers in Ehwiaa are also slow in adapting their cultural designs into products preferred by customers.

Conclusions and Recommendations

Woodcarving, as an informal employment sector, contributes to strengthening the Ghanaian economy. Having been given a facelift by the tourism industry and its supporting policy regulations, woodcarving is continually expanding its market both locally and internationally. Expansion is, however, at the expense of the biodiversity of the natural forest via illegal harvesting. It is posited that this effect is partly due to lack of support from the governmental and nongovernmental institutions in sustaining the input material base; as such, woodcarvers are forced to thrive on illegal harvesting.

Ecocraft therefore provides an important example of an alternate wood source, demonstrating the possibility of an industrial ecology relationship between woodcarvers and timber concessionaires, if given the necessary logistical and financial support by the Forestry Commission and donor organizations such as the UNDP-GEF.

I do not suggest that this relationship could serve to provide all the wood material needs for the woodcarving industry, but it could effectively meet at least 10-15% of annual inputs. It must be recognized, of course, that some concessions may not be close enough to woodcarvers to be economically viable to feed byproducts into carving. The Ashanti region has enough timber concessions to substantially support woodcarving with industry waste. Samartex is not supplying its wastes to other carvers in the Western region since the Ecocraft unit absorbs it all.

This relationship undoubtedly will require a "medium of transfer" such as an environmental NGO (ENGO).[16] The ENGO could provide the production policy framework needed to raise and sustain funding for the industry in the areas of education, skills and technology, marketing strategy, and forest plantations. If a linkage like this is successful, eventually Ghanaian woodcarvings may be able to compete with ecologically friendly products being promoted in Kenya and India (WWF 2003; Sudipto et al. 2003).

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Endnotes

[1] Interview with Isaac Okyere, exporter, July 2004.

[2] In order to evade routine checks by the Forestry task force, woodcarvers have taken to carving on felling sites and transporting the semi-finished products to Ehwiaa.

[3] I could not obtain a copy of the Development Plan for the Kwabre District (referred to as the "Bible" by the District Development Officer). There has not been any prior study of the woodcarving industry in Ehwiaa and so, without the Development Plan, research was based mostly on oral data.

[4] The original designs are the queen-mother stool (*asesedwa*) and the fertility doll (*akuaba*).

[5] Interview with Kwadwo Dwomoh 2004.

[6] Interviews with Samuel Opoku, Woodcarver and Treasurer of Ehwiaa Woodcarving Association, June-July 2004.

[7] This is based on the estimate that an average carver uses a volume of six m^3 of wood annually.

[8] Interview with George Atta-Wusu, Regional Director, Forestry Commission, Ashanti Region, 2004.

[9] Pier 1 Imports, AMC Mar/Maxx, Cost Plus, and TARGET are all USA stores that source products from Ehwiaa.

[10] Unity woodcarving designs use logs of diameters between 40 cm and 60 cm.

[11] Interview with Al-Helou Raymond. General Manager, Samartex. Smarerobio, West Region, Ghana, 2004.

[12] It is also worth noting that Samartex cogenerates electricity and heat from wood residues mostly saw dust from its log yard, sawmill, plywood mill, and veneer mill. Electric power and heat generated from such waste is used to run the company's 24-hour operation schedule and to supply energy to company's residential facilities as well as the Sameraboi Township

[13] Tree boles that are buttressed are not straight enough or have scars or ring shakes.

[14] Interview with Richard Nsenkyire, Production Manager, 2004

[15] Note, however, that not all 14 species have been proven to be very viable for carving.

[16] Friends of the Earth is already operational in the Ashanti Region. This middle link will mitigate

the mistrust that has been mentioned as a problem in past relations between the Forestry Commission and the carving community.

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Innovated Tradition:

Transformation of *Palakaw* Fishing among the Amis of Fataan, Taiwan

by Po-Yi Hung, MESc 2005

Introduction

Fataan, located in a relatively unpolluted area of eastern Taiwan, is a popular ecotourism spot where tourists throng to experience wetland scenery and the indigenous culture of the Amis people. Visitors are mostly attracted by the wetland's blossoming lotus plants, which have become the most flamboyant image of Fataan. The area is also known for having one of the biggest Amis villages in Taiwan, and visitors therefore expect to witness the traditional heritage of the Amis people. As a result, the traditional fishing practice, *palakaw*, has come to represent the unique knowledge and tribal heritage of Fataan's Amis people and is the characteristic indigenous image used to promote tourism development in Fataan.

Palakaw, as practiced by the Amis people, is the practice of constructing "fish homes." In the Amis language, "*pa*" means "throwing away," and "*lakaw*" means "branches of plants." The term, literally "throwing away the plant branches," thus indicates the act of construction. The "fish home" is constructed from three distinct layers of local plants, and different species of fish reside in the different layers of the construction. Usually, the Amis people conduct *palakaw* in the middle of a local stream named Fu-Deng Stream (see photo below).

Palakaw appears in every guidebook, tour manual, website, TV program, or promotion about Fataan, pre-defining for tourists a certain of notion of what the site's nature and culture should be like. Palakaw, to outsiders, suggests the relatively primitive natural environment in Fataan, which allows local Amis people to maintain their traditional fishing in unpolluted streams. The image of palakaw has created a romanticized notion of Fataan's nature, which contrasts tremendously to the highly urbanized society in Taiwan. Therefore, the symbolic meaning of palakaw, closeness to pristine nature, provides a great attraction to urbanized tourists.

Questions about how the local Amis people will respond in the face of these strong and vividly imposed representations of palakaw, in conjunction with ecotourism and cultural tourism development, remain unresolved. I conducted summer master's project fieldwork in Fataan from May through August 2004 to uncover how palakaw was perceived by outside society, as well as by local Fataan people.

Outside Images and Official Rhetoric of Palakaw

Image construction via popular media

In late May 2004, the summer vacation season was starting for most people in Taiwan. The biggest chain bookstore in Taipei held a series of tourism book sales and exhibitions called "Escape from Your Mundane City." Not surprisingly, when I perused the local tour guidebooks, images of Fataan appeared in almost every book that mentioned Hualien county or eastern Taiwan. When addressing Fataan, palakaw was described as the Amis peoples' "ecological fishing" and as the major local indigenous tradition or culture.

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Two tribal elders demonstrating Palakaw for tourists.
Photograph by Po-Yi Hung.

An example from the most popular guidebook in Taiwan, *Outdoors Life*, is illustrative: "Fataan, the green land with interlacing creeks, is a productive place where the Fataan's people plant and fish. Palakaw, constructed by the myrtle branches, nurtures stream fish and shrimp; additionally, palakaw confers a life ethic which is inherited from generation to generation" (Hu and Liu 2003: 170). Here palakaw is depicted as tied closely to the local natural environment and the abundant natural resources. The green land, creeks, myrtle branches, and flourishing fish and shrimp all have placed palakaw in a natural and unpolluted setting, which stands in sharp contrast to the Taipei streets, full of modern skyscrapers and noisy motorcycles and cars, just outside the bookstore. This short description not only creates an image of cultural heritage, but also invokes an urban nostalgia for nature and tradition.

During the traveling season, newspapers in Taiwan also wrote more reports on tourism activities. As a popular tourist spot, Fataan was mentioned in every major newspaper in Taiwan – and palakaw, of course, was written about in the tourism articles. On June 28, 2004, a column about Fataan in *Keng Sheng Daily News* called palakaw the "best representation of Fataan's Amis culture," promising that "experiencing palakaw will allow you to learn the ecological wisdom of indigenous culture, and will also steep you in the natural environment… Fataan is like the Arcadia where you will experience an alternative life during this summer" (Huang 2004). Palakaw was thus connected explicitly to an "alternative" way of life. If Fataan is Arcadia, then palakaw serves as the proof of Arcadian life, which is necessarily away from urbanized and industrialized modern living.

Obviously, popular media has constructed a dichotomy in which to situate palakaw. This dichotomy is *de facto* parallel with a "binary opposition" (Smith 2001: 104) between modern society and indigenous communities in Taiwan. While modern society signifies the problems resulting from urbanization and industrialization, such as environmental degradation and complicated human relations, indigenous communities denote the pre-urbanized and pre-industrialized natural environment and an unsophisticated way of living. Hereafter, the indigenous communities become, as Cronon (1995: 69) states, "the places [people] can turn for escape from [their] own too-muchness." In other words, the binary opposition is underpinned by modern Taiwanese society's nostalgia for nature and tradition, which apparently drives urban people to travel to indigenous communities, where they can feel pure nature and traditional culture and escape from the modern "city of mundanity."

Palakaw is positioned by the media as a way to fulfill people's search for nature and local place. Through guidebooks, newspapers, TV programs, and tour brochures, popular media cultivates the expectations for palakaw and constructs the outside definitions of Fataan's nature and culture. However, the purity and the tradition of such a practice can be overly romanticized under such a socially constructed binary opposition.

Official rhetoric via the state

June 18, 2004 was the inauguration day of the Indigenous Cultural Industry Promotion Center, located alongside the main road in Fataan. A tall totem, which represents Taiwan's indigenous peoples, stands at the entrance of the Center. Situated behind the building is a spacious square where various cultural performances occur; along the edges of the square, local vendors sold indigenous handicrafts, souvenirs, and foods under bamboo and straw canopies. Opposite the Center's entrance was a temporary pond, purposely dug for palakaw demonstrations during the inaugural ceremony.

The magistrate of Hualien County arrived at ten o'clock in the morning. Opening the speech in front of the Center, he emphasized that both central and local governments expended effort to preserve indigenous culture and improve the tribal economic condition. Furthermore, he argued that indigenous communities owned abundant "natural capital" and "cultural capital" and could develop tourism to reach "tribal sustainability." According to the magistrate, the Indigenous Cultural Industry Promotion Center was an important initiative to simultaneously preserve culture and promote tribal tourism development.

Before leaving the center the magistrate walked around the square and spoke to the local vendors. He stopped at the temporary pond to see the palakaw demonstration, and extolled palakaw as "the paradigm of industrialization of indigenous culture," a practice important as cultural capital and thus to the promotion of Fataan's tourism. Indigenous people would benefit economically by performing their tradition, and, at the same time, their traditional culture would be passed from generation to generation. He concluded that palakaw had "bridged the dichotomy between cultural preservation and economic development."

This incident illustrates that the state, like the media, constructs a dichotomy between modern society and indigenous culture – but here palakaw is positioned in the middle, as a bridge to reconcile the conflict between indigenous cultural preservation and tribal economic development. According to the simple logic of governmental rhetoric, palakaw will attract tourists to Fataan and thus increase development of many related profitable tourism services, such as hostels, handicrafts, and souvenirs. Palakaw thus becomes a cultural performance through which the local Amis performers gain revenue. At the same time, this tradition, as the magistrate said, will be "preserved forever" due to the boom of tourism development. In other words, the official rhetoric has situated palakaw as the catalyst for reciprocity between economic improvement and cultural preservation through tourism. This construction has given palakaw official recognition as Fataan's cultural heritage, and this label, in turn, has prompted the government to endow resources to Fataan for conducting so-called "cultural revitalization."

Inside Reactions to Palakaw

Fataan culture and history workshop: palakaw for industrialization of culture

Most guidebooks depict the Fataan Culture and History Workshop as the best place to learn about Fataan's Amis culture. Chang, the host of the Workshop, is a local Amis in his fifties. "While you Han people are struggling for sustainable development, let me tell you, we Fataan Amis reached sustainability long time ago. No wonder we have the palakaw culture," Chang told me on

one occasion. The term "ecological fishing," used to promote palakaw, he explained, was mainly his idea. He insisted that this term best fit palakaw, which for him, is a unique indigenous knowledge engendered from an adaptation to the wetland environment. Regardless of what truly inherent ecological wisdom palakaw embodies, Chang also admitted that the term "ecological fishing" might attract the attention of the government. "Everybody talks ecology, conservation, and sustainability everyday, especially those governmental officials. Calling palakaw the ecological fishing can draw their attention." He informed me that university academics and Environmental Protection Agency officials came to his Workshop to learn and document how the Amis people utilized palakaw to sustain their wetlands.

At the Indigenous Cultural Industry Promotion Center's inauguration ceremony, Chang narrated the palakaw demonstration for the Hualien County magistrate. Chang once mentioned the occasion in his talks to me. He said that his Workshop has emphasized the concept of "Industrialization of Culture" since its establishment. In order to put this concept into practice, he exerted his efforts to promote palakaw as a tourism attraction. His recognition as an Amis cultural restorer by the Council of Cultural Affairs led to media exposure, causing him to realize the importance of cooperating with media to promote palakaw. "Popular media are networking," he said; "once you have a positive relation with one media, everybody would come to talk to you. I provide what they want, and they help me to propagate Fataan's tourism." Chang felt that indigenous culture could not just be revitalized. Restoration or revitalization was not the ultimate purpose; rather, the ultimate purpose was to improve the lives of Fataan's people. He hoped that, one day, young Amis people would not have leave home to earn a living. Thus, he saw the current progress towards the "Industrialization of Culture" as optimal for indigenous people and hoped to make palakaw one of the best examples of this progression.

Greater Fataan community development association: A local voice of resistance

One local Amis who expressed dissent towards the Workshop said he regards the organization as more of a "cultural seller" than a "cultural restorer." He thought that the Workshop host, Chang, was running "his own palakaw business," unconcerned with providing benefits for the whole of Fataan. "He sold aluminum before," this person told me, "and came back to Fataan to sell palakaw." The Workshop is actually very controversial at the local level, and most of the Fataan's Amis people I have talked with hold a negative perception of the work the Workshop has done. In fact, a group of Amis people have gathered together to form a competing voice against the Workshop, named the Greater Fataan Community Development Association.

According to members of the Development Association, before Chang began working with the Fataan community, everyone used to work together and discuss ways to preserve and revive Fataan's Amis culture. Siou, the spokesperson of the Development Association, informed me that the idea of reviving palakaw activities actually originated from everybody's thoughts, but it was Chang who suggested writing the proposal about palakaw to the Council of Cultural Affairs. When the proposal was approved by the Council, therefore, Chang received abundant governmental resources, which he used to establish the Workshop in the wetland area. Siou told me that, at the very beginning, everybody thought it was good that Chang could help Fataan to obtain outside resources and could contribute to revitalizing palakaw. Gradually, however, people discovered that all outside resources went straight to the Workshop, without any contribution to the whole community.

Since outside society sees the Workshop as the place to learn about Fataan's Amis culture, the Development Association is trying to reverse this perception. In fact, the Development

Association has promoted another destination to represent Amis culture: Kakidaan, an ancient house located in the Fataan community. Kakidaan, in Amis language, means "abundance with rice," with the additional meaning of "the affluent family." Within the house, traditional rice planting tools, daily clothes, household instruments, and other artifacts are exhibited (see photo elow). Rather than being in the "wetland area," Kakidaan is located on a main street in the "residential area" of Fataan's Amis people. The Development Association sees the location of Kakidaan as ideal for attracting people to walk into the "real Fataan community" and to experience the "authentic Fataan Amis culture."

However, the Development Association has found it difficult, compared to the Workshop, to receive attention from outside society. They indicated to me that the Workshop has much more political and social power. Many Fataan's Amis people believe that Chang cultivated his political power and networks by promoting the palakaw concept. As a local Amis said, "[Chang] used palakaw to lure officials, and all the officials from the central to local governments liked palakaw and listened to him." In addition to the support from the state, the Workshop also capitalized upon positive relations with popular media.

Feng, one member of the Development Association, supposed that palakaw received government attention not only because it represented the uniqueness of Amis culture, but also because of its "ecological" characteristic: "The fancy name 'ecological fishing' is just fit for what the government wants," Feng said. Compared to palakaw, however, Feng felt that Kakidaan was neither ecological nor related to indigenous knowledge. Although she did think Kakidaan represented an authentic element of Fataan culture, she argued that the Development Association needed to increase its creativity in promoting Kakidaan to outside society in order to attain more political power for the association.

Tourists listening to a narration within the Fataan Ancient House, known as Kakidaan. *Photograph by Po-Yi Hung.*

Beyond "Ecological Fishing": Palakaw for What and for Whom?

Packaging palakaw for outside rhetoric

Given the increased treatment of 'indigenous' subjects in contemporary intellectual and cultural atmospheres, Li (2000: 153) stresses the importance of "locating the tribal slot in shifting fields of power." Different factions of society, including the state, NGOs, and other activists, have criteria, formal or conceptual, to specify which group fits into the tribal or indigenous slot. Chang packaged the workshop and palakaw to gain recognition and resources from broader society. The Workshop members use palakaw to situate themselves in accordance with the images, discourses, and agendas that outside society produces for or about them. Palakaw helps the Workshop articulate their identity when negotiating with outsiders. The Workshop furthers this process by fitting palakaw to the governmental rhetoric about "industrialization of culture." Additionally, the Workshop uses palakaw to suit the media's

need for exotic imagery about tribal culture. Moreover, Chang labeled palakaw as "ecological fishing" to fit the current rhetoric about "indigenous knowledge," in which this knowledge is regarded as a local wisdom that sustains communities' natural resources. Outside society creates the dichotomy between "indigenous" and "non-indigenous" discourses, and the Workshop has strategically situated palakaw within the former.

Although denounced by the local Amis, Chang did not think he had done anything detrimental to the community; on the contrary, he thought he had improved the community by promoting Fataan to outside society and by fighting for outside resources. Moreover, Chang thought cultural revitalization would be "nothing but idealism" if Fataan's Amis people could not actively communicate with outside society. He argued that the first step was to receive recognition from the outside world, and that this recognition and supply of resources would give Fataan's people the autonomy to manage their affairs, including the tasks of cultural revitalization.

From my perspective, the Workshop and Chang are struggling for access to power from the outside Taiwanese society. Palakaw has become the tool through which the Workshop keeps positive relations with the government, popular media, academia, and other outside sources. The practice has been intentionally packaged by the Workshop in order to establish a network with outside societies, and the Workshop expects that this networking will provide more powers to Fataan. Although Chang's original expectation may have been for an increase in power and resources for the Fataan community at large, the local Amis people claim that the power and resources garnered seemed to provide only for the Workshop and Chang. As a local Amis told me, "All Chang cares about are politics and power, and he is not a cultural restorer, because he just wants to use palakaw to become a real politician, who can have much more power to earn more money and do whatever he wants to do." This person also informed me that Chang would like to campaign to become a local legislator. While these intentions and actions may be overstated, what is obvious in this conflict is that palakaw is an instrument used to address power struggles, articulated in terms of cultural empowerment and revitalization.

Extra- and intra-local expectations

While the Development Association denounced the Workshop's use of palakaw to "sell Amis culture," they also realized that, in order to promote their alternative attraction, Kakidaan, they should be more "creative" in the search for increased political powers. Furthermore, while they condemned officials who had been fooled by the workshop, they also admitted that the term "ecological fishing" did fit governmental needs. It seems that the Development Association is trapped between inside and outside expectations of Amis culture.

The Development Association wants to label Kakidaan as the authentic Amis culture; moreover, they argue that promoting Kakidaan should be beneficial to the whole community. They hope to promote Kakidaan's emergence as another popular cultural symbol for tourists, government, and popular media. In order to draw this attention, it is inescapable that the Development Association must understand the expectations of these outside actors. Currently, the Association proclaims to outside society that palakaw is only one part of Fataan's Amis culture, and that Kakidaan should be visited in order to experience the "comprehensive and authentic" Amis culture. This declaration of "comprehensive and authentic" culture itself is actually a form of cultural packaging, fitting with outside society's expectations.

In addition, while the Development Association staff reprehend the Workshop's use of palakaw to "lure officials" to gain more power, they also acknowledge that the Development

Association needs more political power to promote Kakidaan and to benefit the Fataan community. Apparently, the Development Association is also eager to gain approval and recognition from the state.

The Development Association is evolving in resistance to the Workshop, and its future evolution remains uncertain. Nevertheless, it is clear that the Association is now trapped in the predicament of balancing the extra- and intra-local expectations on representing Amis traditional culture. In trying to avoid the route of the Workshop and palakaw, they may actually follow the same track.

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Personal Reflections on the IUCN and World Conservation Congress

by Lauren Baker, MEM 2005

The TRI and IUCN partnership

The past two years has seen a growing partnership between the Yale School of Forestry and Environmental Studies (F&ES) and the World Conservation Union (IUCN). The IUCN is a unique member organization that includes 77 nations, 114 governmental agencies, and over 800 non-governmental organizations (NGOs), as well as over 10,000 experts that advise the union on its policies and programs. Efforts to strengthen ties between these organizations were jumpstarted in the spring of 2003, when Aban Kabraji, the IUCN Asia Regional Director, came to F&ES as the Dorothy McCluskey visiting lecturer. The partnership was affirmed through the signing of a memorandum of understanding in January 2004 and has subsequently given rise to a variety of opportunities. As a student who has been the beneficiary of this partnership in several aspects, I will reflect below both on my own experiences and on the role of the IUCN as an international conservation organization.

Courses at F&ES

As an initial step, a course titled "Current Issues in Conservation: Toward the World Conservation Congress and Beyond" was taught in spring 2004 by Gordon Geballe, the F&ES Associate Dean. The course examined top environmental issues through the lens of the IUCN in anticipation of the World Conservation Congress, a major international environmental conference hosted by the IUCN. This course also provided the basis for a group of students to travel to the Congress in Bangkok in November 2004. In order to prepare for this event, my classmates and I worked outside of class to develop a presentation on the issue of increasing opportunities for young environmental professionals (18-35 years of age), a topic that had been raised initially by F&ES students at the 2003 World Summit on Sustainable Development in Johannesburg, South Africa. One half of our class wrote and submitted a motion that promoted the "professional and meaningful contribution of young people to conservation efforts at local, regional, and/or global levels," to be voted on at the Congress. The other half of the class wrote and distributed an online survey in English, Spanish, and French to young environmental professionals worldwide in order to assess which skills or experiences have been helpful for young professionals thus far in their careers and to garner their thoughts on emergent environmental issues.

IUCN internships

A second major manifestation of the F&ES-IUCN partnerships has been through the facilitation of internships. This past year, I went to Thailand to work on a community-based water conservation and management project in the Mekong river basin, while another student went to work in the Sri Lanka regional office on a medicinal plant conservation project.

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It is hoped that the partnership will bring mutual benefits to F&ES and IUCN. It has already provided unique and valuable opportunities for students to apply knowledge learned in our classrooms and to network with environmental professionals worldwide. Furthermore, the IUCN is able to benefit from the influx of highly competent individuals bringing new thoughts and energy into the organization and its projects.

The partnership also creates a vantage point for students to understand the role that large international environmental organizations play in conservation and development. There are, increasingly, questions and criticisms of larger environmental organizations and large international conferences. These organizations have been criticized, notably by Mac Chapin in his 2004 *WorldWatch* article, "A Challenge to Conservationists," as failing to engage seriously with local people due to unequal power relationships, and for promoting preservationist policies or projects that curtail the access rights of resource users (ibid.). In addition, large global conferences have been questioned with respect to their productivity or effectiveness, as well as critiqued for being out of touch with on-the-ground realities since they often exclude the participation of local 'subjects' of conservation and development. My time as an intern and as a participant in the World Conservation Congress has allowed insight into the role of this particular international environmental organization and event.

Seeing multiple aspects of IUCN's work in the Mekong river basin left me impressed with the role the organization could play. My internship was at the field/demonstration site in northeast Thailand with the US$30 million, four-country Mekong Wetlands and Biodiversity Programme (MWBP). I observed and wrote reflections and analyses of the Thai Baan Research approach, which was carried out by village members in four villages. This participatory research project had been operating for a year and was part of the preparatory phase of the MWBP; it was done in cooperation with a Thai NGO and involved a high degree of participation and an equal partner basis with local people during the planning and implementation phase. I also attended the MWBP signing ceremony, which officially initiated the project and was a high profile event in which the government ministries from Thailand, Lao PDR, and Cambodia, as well as the heads of the UNDP (United Nations Development Programme) and IUCN Asia offices, were present.

I found that the IUCN played an important and unique role in this project. Using Thai Baan participatory research as a foundation, they were able to work on the local scale in an engaged and meaningful way that had strong promise in benefiting the livelihoods of the locals involved. As Rattaphon Pitaktapsombut, the IUCN Sri Songkhram Project Manager reflected,

> *this research is simple, is clear in itself: how livelihood links with the social and natural. . . From the research made simple we have a process for learning, and at the end of the research the people not only have the information but they also have learned how to work together and they know about the role of organization. The process is dynamic – it does not stop, it keeps going, and in the future they have a plan.*

As an international environmental institution, the IUCN is also able to work on large-scale projects, engaging the governments of multiple countries, a task that would be almost impossible to achieve for smaller, national NGOs. Using a mosaic of approaches and encouraging cooperation is necessary to address complex environmental issues, and to my mind IUCN had the ability and promise to foster cooperation and effective work on multiple scales.

The World Conservation Congress

The global Congress was also a thought-provoking experience, although I had mixed feelings about its output and value. The event was both a forum that featured plenary sessions and workshops on an enormous variety of topics and, during its second half, a business meeting

during which IUCN member organizations voted on sponsored motions and on the new IUCN leadership. There were 5,000 participants from around the world in attendance; the Yale delegation, with 23 people, was one of the larger delegations from a single organization.

The conference functions, in part, to publicly and symbolically display the growing power of the environmental movement on a global scale. The opening ceremony, which featured royalty such as the Queen of Thailand, the Princess of Japan, and the former prime minister of Thailand, highlighted the prominence of environmental awareness and concern among high-level government officials. Keynote speakers during plenary sessions – who included Nelson Mandela and Wangari Maathai by video message, and other powerful figures like Jeffrey Sachs – demonstrated that the Congress warranted the attention of the most influential people in our field. It also provided a sense of coming together as a global environmental community – and it seemed like the IUCN Congress was in a special position to do this, since it is an organization with members that include governments, academia, and non-governmental organizations worldwide. Further, the IUCN Congress is broad in scope, rather than built around one particular issue like most international conferences.

Was the WCC "productive"? There certainly seemed to be new connections forged, to an extent, within existing circles of interest and work, but there seemed to be less meaningful engagement between different focal areas. One of the themes stressed at the Congress was the need for multiple approaches and cooperation with new partners, including, in particular, the importance of working with the private sector more than we have in the past. Despite this encouragement for cooperation and new partnerships, the Congress seemed to maintain a sense of segmentation, perhaps partly because of its size. There were, for example, approximately 250 sponsored workshops offered during the 3-day forum, each of which tended to be very small (15-20 people on average in the ones that I attended). People, I sense, tended to go to the workshops about issues in which they were already involved, knowledgeable, or interested; while this may have led to new connections between people already working on similar issues, the format did not encourage people to learn about and embrace new ideas or approaches.

The submitted motions, such as our own addressing young professionals, were another way that IUCN members could expand their vision of environmental issues and approaches. Motions highlighted new areas or issues of concern to be noticed and voted upon by all of the IUCN members. Their wording and intent was hammered out in contact groups for two days prior to the voting, and once on the floor for general voting virtually all of the motions were passed. This seemed to be a productive way to push the agenda forward – 80 resolutions and 38 recommendations were adopted, and will be followed up upon by the IUCN.

Was the WCC inclusive? Without having done any systematic observation, I would say that there seemed to be some groups of people less represented at the Congress, presumably because the expense of travel limited who could attend. Many organizations could send only a few representatives and often these were the more experienced or senior people, with younger people less represented. Small-budget NGOs were undoubtedly less represented; some representatives of smaller, developing country-based NGOs were present but they were certainly in a minority. Furthermore, English was the major language of the conference, both formally and informally. Although plenary sessions and some of the larger workshops had headphones with translation, language barriers limited meaningful participation by all people.

International environmental institutions are fallible, and global conferences are not without limitations. That said, I come away from

my coursework, internship, and conference participation impressed, on the whole, with both the IUCN and the World Conservation Congress. I am delighted that I have been able to benefit personally and professionally through my interactions with and insights about the IUCN, and I hope that this burgeoning partnership will continue to benefit the next generation of F&ES students.

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Announcing the 2005-2006 Fellows

Once again TRI Fellows have an exciting line up of research projects around the world. **TRI Endowed Fellowships** are designed to support Master's and Doctoral students interested in conducting independent research in tropical countries. This year twenty-four Master's and two Ph.D. students received TRI Fellowships for summer research. The 2005 recipients and the countries where they plan to conduct research are: **Jessica Albietz,** Madagascar; **Rebecca Ashley,** Ghana; **Imelda Bacudo**, Peru; **Dan Braden**, Panama; **Janette Bulkan**, Guyana; **David Butman**, Indonesia; **Dylan Craven**, Panama; **Rishiraj Das**, India; **Radhika Dave**, Madagascar; **Wendy Francesconi**, Costa Rica; **Oscar Franco**, Peru; **Jesse Grossman**, Indonesia; **Emily Hicks**, Loas PDR; **Taek Joo Kim**, Panama; **Linda Kramme**, Indonesia; **Hugo Lam**, Panama; **Michael Lichtenfeld**, Indonesia; **Ikuko Matsumoto**, Philippines; **Kevin Ogorzalek**, Australia; **Krupa Patel**, South Africa; **Sarah Price,** Guyana; **Catherine Schloegel**, Ecuador; **Alexander Shenkin**, Guinea; **Kristen Welsh**, Costa Rica; **Larissa Yakom**, Panama.

The World Agroforestry Centre (ICRAF), for the fourth year will sponsor a Master's student interest in pursuing research on the interface of agroforestry and conservation. This year's receipt of this award is **Caroline Simmons** who will research the effects of road construction on agricultural and forest resources in two rural villages in Malawi.

The Compton Foundation's Program aims to contribute to the capacity-building of young professionals from Central America and Sub-Saharan Africa, to improve policies and program relating to peace, population, sustainable development and the environment. This year's recipients are and their home countries are: **Godfred Ohene-Gyan** from Kenya, **Oliver Enuoh** from Nigeria, and **Rugemeleza Nsala** from Tanzania.