

FOREST GOVERNANCE IN A FRONTIER:
AN ANALYSIS OF THE DYNAMIC INTERPLAY BETWEEN PROPERTY RIGHTS, LAND-USE
NORMS, AND AGRICULTURAL EXPANSION IN THE MOSQUITIA FOREST CORRIDOR OF
HONDURAS AND NICARAGUA

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This dissertation is dedicated to my family.

To my mother, Marian, my brother, Matt, and to the memory of my father, Stan

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ABSTRACT

Tanya M. Hayes

FOREST GOVERNANCE IN A FRONTIER: AN ANALYSIS OF THE DYNAMIC INTERPLAY BETWEEN PROPERTY RIGHTS, LAND-USE NORMS, AND AGRICULTURAL EXPANSION IN THE MOSQUITIA FOREST CORRIDOR OF HONDURAS AND NICARAGUA

Government legislation of protected areas is frequently prescribed as a means to protect forest lands. The effectiveness of protected areas is, however, highly questionable as protected areas have been found to fail as often as they succeed. This dissertation takes a nuanced approach to forest policy analysis by examining how specific property rights interact with resource users' institutions to either promote or thwart frontier forest conservation.

Frontier forests represent the last remaining swaths of tropical forest. They are also the homelands of indigenous peoples who have lived in these remote regions for centuries. A principal threat to frontier forests, and the people living within them, is agricultural expansion caused by mestizo (non-indigenous) migration.

This study integrates methods that include institutional analysis, ethnographic fieldwork, and land-cover analysis to examine how property-rights policies influence agricultural expansion in the Mosquitia Forest Corridor, a biological corridor that runs from eastern Honduras into northern Nicaragua. I compare the ability to stop mestizo expansion in two protected areas in the Mosquitia: one reserve under government management and the other governed by native residents who hold common-property rights to their lands. The variation between sites creates opportune conditions to investigate whether property rights are a determining factor in preventing mestizo encroachment, and the impact that different property-rights policies have on residents' resource institutions and the broader resilience of the social and ecological systems.

The study findings are that public policies that recognize local governance institutions promote resilient forest management systems. I find that native residents who hold common-property rights are better able to stop agricultural expansion than are public

managers. Forests under indigenous territorial management are better conserved than those under public management. Furthermore, the analysis of institutional change finds that native residents are better able to address market and demographic pressures introduced by mestizo settlers when they are supported by public policies that recognize their common-property claims.

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LIST OF COMMONLY USED ACRONYMS

ADEPCIMISUJIN	Association for the Development and Progress of the Miskito and Mayangna Communities of Jinotega
AFE-COHDEFOR	Honduran Ministry of Forestry
APDECOMBO	Association for the Protection and Development of the Mestizo Communities in Bosawas
CVT	Land Vigilance Committee
GTZ	German Society for Technical Cooperation
IAD	Institutional Analysis and Development Framework
IFRI	International Forestry Resources and Institutions
KfW	German Bank of Reconstruction and Development
MARENA	Nicaraguan Ministry of the Environment and Natural Resources
MASTA	Unity for the Mosquitia – Indigenous Federation
MITK	Miskitu Indian Tasbaika Kum Territory
MOPAWI	Mosquitia Pawisa Apiksa – Agency for the Development of the Mosquitia
MSB	Mayangna Sauni Bu Territory
NGO	non-government organization
RENARE	Honduran Natural Resources Institute
TNC	The Nature Conservancy
UNESCO	United Nations Educational and Scientific Organization
UNESCO-MAB	UNESCO Man and the Biosphere Programme

CHAPTER 1
CAN COMMON-PROPERTY RIGHTS CONSERVE THE MOSQUITIA FOREST CORRIDOR?
THE CHALLENGE OF CRAFTING INSTITUTIONS TO PROTECT ECOSYSTEMS AND SUSTAIN
SOCIAL SYSTEMS

1 INTRODUCTION: PROTECTING FRONTIER FORESTS

In 1992, the Earth Summit in Rio de Janeiro highlighted the environmental destruction occurring in the world and the need to craft international agreements and national conservation policies to protect the world's remaining biodiversity. Set in Brazil, the Earth Summit drew attention to the plight of the world's frontier forests as images of the Amazon aflame awakened many to the threats that agricultural expansion poses to remote forest lands. As a result of the Earth Summit, 150 government leaders signed the *Convention on Biological Diversity (CBD)* and agreed to "[e]stablish a system of protected areas or areas where special measures need to be taken to conserve biological diversity" (CBD, 1992, art. 8a). Today, over 100,000 protected areas have been established throughout the world and encompass roughly 10% of the world's forests (Chape et al., 2003; Molnar et al., 2004).

Frontier forests—large, relatively undisturbed natural forests—are particularly valuable safeguards of ecosystem communities and ecological processes. Their protection is vital for sustained ecological diversity (Bryant et al., 1997).ⁱ Frontier forests also serve as invaluable cultural and economic resources that range from sustaining traditional and indigenous peoples to providing lucrative benefits from timber exploitation and land speculation. The forested lands are characterized by ecosystems and socioeconomic arrangements operating on the fringe of mainland political and economic systems. As the number of forest users and their demands increase, these forests are disappearing at an alarming rate. A World Resources Institute report estimates that only 20% of the world's original forests remain in large intact stands, and that approximately half of these forests lie in the tropics. The report notes that between 1960 and 1990 approximately one-fifth of the world's entire tropical forests were cleared (Bryant et al., 1997).

In Latin America, clearing caused by agricultural expansion is the greatest proximate cause of deforestation (Angelsen and Kaimowitz, 1999; Geist and Lambin, 2001). The sources of agricultural expansion are twofold: first, the expansion of permanent crop and pasture land by “shifted” agriculturalists or colonizers, and, second, the land-use practices of traditional shifting (swidden) agriculturalists. Of the two sources, colonization accounts for the majority of the deforestation (Geist and Lambin, 2001).

Broadly speaking, three types of colonists migrate to the frontier: poor landless farmers, cattle ranchers, and land speculators. The colonists come for a variety of reasons. Many landless farmers move to the frontier because they have nowhere else to farm. In some cases, ranchers pay landless farmers to invade a piece of forest, clear the land to farm, and then leave it after a few years planted with pasture. In other cases, government colonization programs encourage farmers to settle remote forest lands. Generally speaking, the farmers, ranchers, and land speculators stake their claims in one of three ways: they buy lands from residents (often indigenous or traditional peoples), obtain titles from the government, or they invade. In deciding to clear frontier forest lands, neither the colonists nor the traditional swidden agriculturalists act in isolation. Economic, institutional, cultural, technical, and sociopolitical factors have all been found to influence farmers’ and ranchers’ land-use decisions (Blaikie and Brookfield, 1987; Boserup, 1965; Geist and Lambin, 2001; Hecht, 1993; Rudel and Roper, 1997).

Of particular concern are Central American forests where farmers and ranchers are moving into previously remote frontiers in search of land. World Resources Institute estimates that 87% of the frontier forests in Central America are under moderate or high threat due to land clearing and logging (Bryant et al., 1997, p. 44). Although deforestation in Brazil has typically been at the center of attention, according to a World Bank study, from 1990 to 1995 the rate of forest clearing in Central America was almost six times that of Brazil (Carr, 2004, p. 173).

The Mosquitia Forest Corridor, five million acres of tropical forest that runs from eastern Honduras into northern Nicaragua, contains the largest contiguous tract of tropical forest remaining in Central America. It holds indispensable concentrations of biological resources, and is considered to be the “heart” of the Mesoamerican Biological Corridor that extends from southern Mexico through eastern Panama (Herlihy, 1997;

Miller et al., 2001). The forests in the Mosquitia Forest Corridor are, however, presently threatened by agricultural clearing, ranching, and illicit logging (personal communication, J. Barborak, 2004; Herlihy, 1997; Stocks, 1996).

The Mosquitia is home to six different ethnic groups who struggle to balance the cultural, economic, and ecological demands on the land. Previous research (Chiriboga, 2002; Dodds, 1994; Herlihy, 1997; Stocks, 1996) demonstrates that native communities within the region are accustomed to living in relative isolation and have a history of crafting their own land-use institutions. Today, outside encroachment by mestizo (non-indigenous) farmers, ranchers, and timber harvesters challenges these traditional systems and threatens the social and ecological sustainability of the region (Dodds, 1994; Herlihy, 1997; Stocks, 1998).

2 CAN PROPERTY-RIGHTS POLICIES CONSERVE FRONTIER FORESTS?

Protected areas have been seen by many as the preeminent means for protecting forests (Brandon et al., 1998; Ghimire and Pimbert, 1997; Terborgh, 1999). In Honduras and Nicaragua, a series of protected areas was created to thwart agricultural expansion and protect tropical forests in the Mosquitia. The efficacy and legitimacy of these protected areas are, however, contested by residents, practitioners, and scholars who disagree over who should have legal rights to the land and the best way to protect the biodiversity in the region (AFE-COHDEFOR, 2000; Barborak, 1992; Herlihy, 1997; Miller et al., 2001; Stocks, 2003). As in many disputes over forest conservation policy and protected-area management, there is a division between those who advocate for government jurisdiction over protected areas and those who support protected-area policies that recognize resource users' property rights.

One of the weaknesses in forest conservation policy analysis is the limited understanding of the existence and dynamics of locally evolved land-use institutions, how they react to exogenous shocks, and how they relate to broader formal forest policies of national and international regimes. Despite conservationists' emphasis on laws, regulations, and rules, we lack a rigorous understanding of whether, or under what conditions, traditional peoples are able to sustain their resource systems and how broader

protected-area policies influence the evolution of traditional land-use norms to either thwart or support forest conservation (Agrawal, 2001; Berkes, 2001; Dietz et al., 2003; Ensminger and Knight, 1997; Redford and Stearman, 1993; Richards, 1997). The challenge we face is how to design forest governance regimes in which formal policies complement informal land-use rules and norms to recognize resource user rights and promote broader conservation goals.

2.1 Research Questions

The purpose of the study is to understand how the policies and laws that govern the Mosquitia lands interact with the norms and rules used by the Mosquitia residents, and how they ultimately influence land-use decisions with respect to agricultural expansion. A principal focus of the study is institutions. Institutions are the formal and informal norms and rules that shape the interactions between the actors. In analyzing land use in the Mosquitia forests, I consider the informal institutions recognized by the residents to regulate their property rights and respective land uses as well as the formal laws and policies that define the official tenure rights and land-use restrictions. The study asks four principal questions:

1. Are property-rights policies a determining factor in efforts to prevent mestizo encroachment? Is a reserve under government jurisdiction or a reserve under a common-property regime of the indigenous residents better able to control agricultural expansion?
2. Do indigenous residents change their traditional land-use institutions in response to the demographic and market pressures introduced by mestizo migration? Do these changes bolster indigenous residents' customary common-property institutions or are the traditional institutions collapsing?

3. Given that the indigenous land-use institutions do change in response to mestizo migration, what impact do the reserve property-rights policies have on the direction and development of these changes?
4. How do different property-rights policies impact the short-term outcomes and long-term prospects for sustained forest conservation and resilient indigenous governance institutions?

2.2 The Relationship between Property Rights, Encroachment, and Indigenous Land-Use Institutions

This dissertation tests whether a forest reserve under government jurisdiction or a reserve under a common-property regime of indigenous residents is better able to control agricultural expansion. I compare two protected areas in the Mosquitia Corridor: Río Plátano Biosphere Reserve and Bosawas Biosphere Reserve. The reserves were purposefully selected based on variation in land tenure rights and their similar ecological, economic, technological, demographic, and cultural characteristics. The two dependent variables of interest are mestizo encroachment and indigenous institutional change. The independent variable of interest is property rights.

In the context of the Mosquitia, I aim to show that property rights do influence mestizo encroachment, and that they do so by either supporting or thwarting indigenous peoples' customary rights over their land. My central thesis is that, in remote frontier regions such as the Mosquitia, property-rights processes and the resultant policies that legitimize indigenous common-property rights bolster the robustness of indigenous land-use institutions and by doing so, work to control outside encroachment. Property-rights processes and policies that do not support indigenous common-property rights detract from the robustness of indigenous governance systems, and, unless public agencies invest in consistent patrolling and enforcement of reserve boundaries, they will fail to control mestizo colonization in the region. Moreover, I contend that the formal establishment of indigenous land rights contributes to the ability of indigenous residents to address future land-use challenges and possibly promote long-term forest management.

In order to validate my central thesis, I must show (1) that property rights impact mestizo encroachment patterns, and (2) that mestizo encroachment disrupts indigenous land-use institutions. Furthermore, I must be able to link property rights to indigenous land-use institutions and the resultant encroachment patterns. Four hypotheses provide a foundation by which the findings will either support or oppose conjectures about the relationships between property rights, mestizo encroachment, and indigenous land-use practices. The hypotheses used to guide the research data gathering and to analyze the results are:

Hypotheses

1. In the Mosquitia, mestizo migration will have stopped on forest lands under indigenous common-property ownership; mestizo migration will continue on forest lands under public management.
2. Indigenous land-use institutions change in the face of demographic and market changes produced by mestizo migration.
3. Property-rights policies affect how indigenous land-use institutions change when faced with exogenous shocks caused by mestizo migration. Property-rights policies that support indigenous common-property customs will bolster indigenous land-use institutions and residents' responses to mestizo migration. Property-rights policies that disregard indigenous common-property customs will further stress indigenous institutions and hinder the ability of indigenous residents to address mestizo migration.
4. Indigenous communities that share common-property rights to their lands are better able to address future land-use challenges than are those that live on public lands.

Note that the hypotheses are interdependent, and one set of findings leads to the next hypothesis. If property rights have no effect on mestizo encroachment, I expect the findings to show that mestizo farmers and ranchers continue to migrate into both the Río Plátano and Bosawas reserves irrespective of whether the area has been designated as government reserve or indigenous territory. If however, the mestizos continue to migrate into one reserve and not the other, crucial questions are whether the migration patterns are linked to the robustness of indigenous land-use institutions, and, if so, whether the respective property-rights arrangements influence the fortitude of these indigenous systems.

Hypotheses 2 and 3 seek to answer these questions by showing results that demonstrate whether indigenous land-use institutions dissolve in the face of mestizo migration, thereby facilitating encroachment and whether the indigenous responses to mestizo migration differ depending on the particular property-rights regime the residents live under. Hypothesis 4 takes a broader approach to the issue and looks at some of the possible long-time effects on forest governance under different property-rights arrangements.

3 STUDY CONTEXT: THE RÍO PLÁTANO AND BOSAWAS BIOSPHERE RESERVES, MESOAMERICA

In the 1980s and 1990s, the Honduran and Nicaraguan governments created a system of protected areas to safeguard the biological and cultural wealth of the Mosquitia. The two largest reserves in the Corridor—Río Plátano Biosphere Reserve (Honduras) and Bosawas Biosphere Reserve (Nicaragua)—are internationally acclaimed United Nations Educational Science and Cultural Organization (UNESCO) Man and Biosphere Reserves. Río Plátano reserve, hereafter “Río Plátano,” and Bosawas reserve, hereafter “Bosawas,” provide an excellent setting to examine the influence of property rights on mestizo encroachment and indigenous land-use institutions. Río Plátano and Bosawas share similar geographic, cultural, and economic characteristics. However, they are governed by very different property rights regimes. Río Plátano is under the jurisdiction of the

Honduran Ministry of Forestry (AFE-COHDEFOR). In contrast, in Bosawas the indigenous residents hold common-property rights over their land and resources.

Figure 1.1 shows the location of the two reserves and the specific study sites in this dissertation. The Mosquitia Forest Corridor starts at Río Plátano in the north and runs south to Bosawas. There are two smaller forest reserves between Río Plátano and Bosawas that complete the entire Corridor. Both Río Plátano and Bosawas encompass roughly 8,000 km² of forest land.ⁱⁱ Río Plátano reserve lies in northeastern Honduras along the Caribbean coast and runs south into the interior of Honduras. It is located at the intersection of the departments of Colon, Gracias a Dios, and Olancho and bound to the east by the Sico River and to the west by the Patuca River. The Plátano River, the reserve's namesake, flows through the core of the park. To the south of Río Plátano reserve, Bosawas lies along the Coco River at the border between Honduras and Nicaragua. Its name comes from three geographically important sites in the Reserve: the Bocay River, the Saslaya Mountain, and the Waspuk River. The major ecosystem in the two reserves is tropical humid forest and the terrain varies from flat coastal plains and riparian zones to rugged mountains. In Río Plátano, the highest peak is 1,326 m, and mountains in Bosawas reach up to 1,750 m (UNESCO, 2002).

Río Plátano was created in 1980 and declared a World Heritage Site in 1982. In 1991, law 74-91 transferred management of Río Plátano from the Honduran Natural Resource Management Institute (RENARE) to AFE-COHDEFOR. Nonetheless, it was essentially a "paper park" until the mid-1990s. The reserve regulations were not publicized, monitored, or enforced, and few, if any, residents, in Río Plátano knew they were living in a reserve (Herlihy, 2001). In the mid-1990s, reserve policies were restructured in an attempt to gain greater awareness of, and compliance with, reserve regulations on the part of the residents. The process rezoned the reserve and established a management plan. Today, Río Plátano is divided into three management zones: a cultural zone for the indigenous residents, a buffer zone for the mestizo residents, and a core zone for strict preservation. All Río Plátano reserve lands are under the jurisdiction of the Honduran Ministry of Forestry.

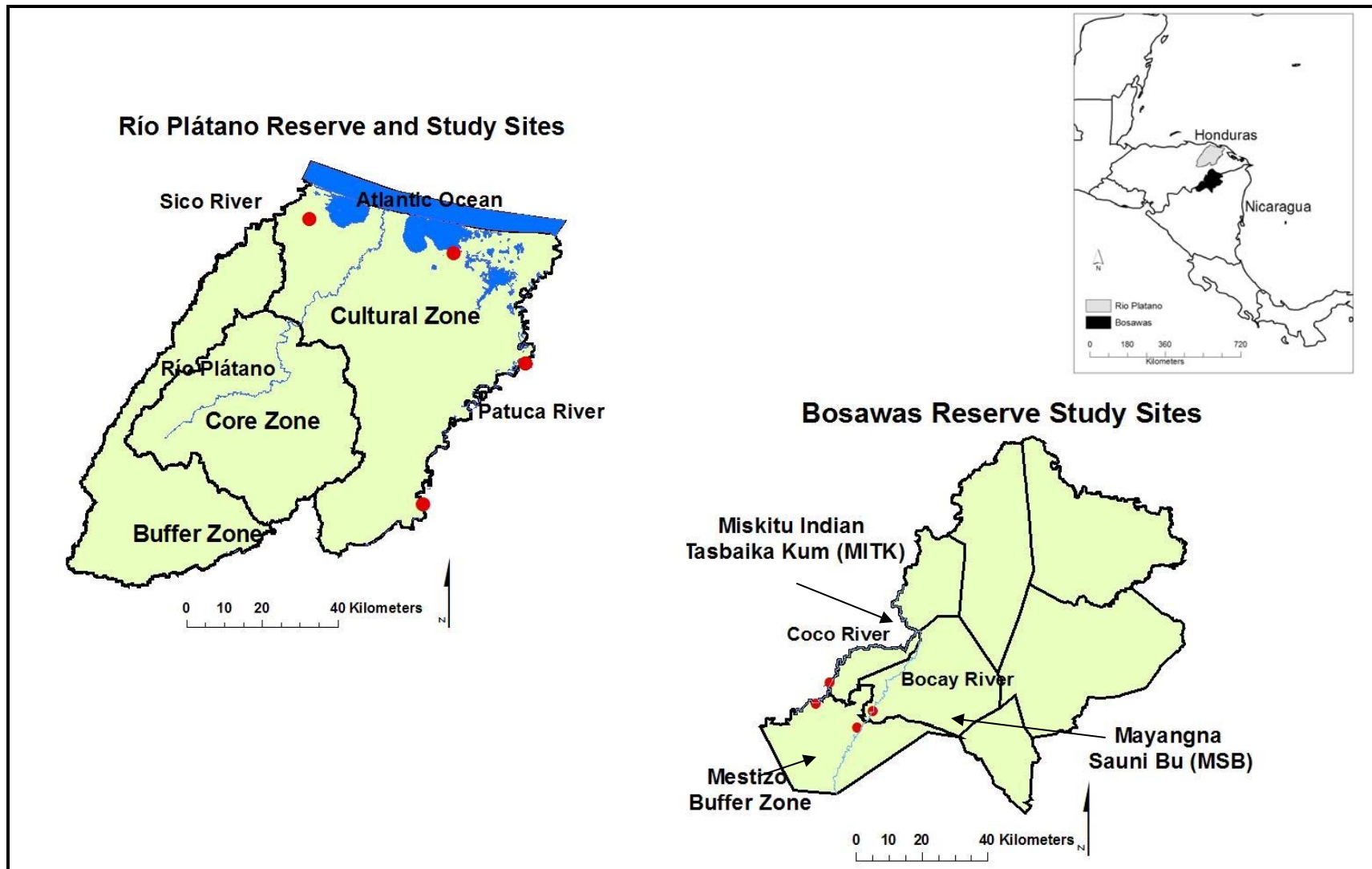


Figure 1.1. Mosquitia Forest Corridor Reserves and Study Sites

Bosawas was created by Executive Decree 44-91 in 1991 by the newly elected President Violeta Chamorro. With minimal recognition of the indigenous peoples living in Bosawas, the reserve was originally placed under the jurisdiction of the Institute for Natural Resources, now known as the Nicaraguan Ministry of the Environment and Natural Resources (MARENA), and zoned as a strict conservation area or “core zone” (Stocks, 2003). Similar to Río Plátano, in the mid-1990s, management of Bosawas was also restructured. As part of the process, the conservation area of Bosawas was rezoned into six separate indigenous territories and the indigenous residents in each territory established their territorial property rights and land management plans. By 1997, the indigenous residents had established de facto governing rights over their territories. The establishment of the de facto rights is the focus of this study. However, it is important to note that in May 2005, the Nicaraguan government formally recognized their tenure rights by granting them territorial titles to their lands.ⁱⁱⁱ A predominately mestizo buffer zone extends around the reserve. All buffer-zone lands lie under the jurisdiction of MARENA.

There are five different groups of indigenous or traditional peoples living in Río Plátano and Bosawas: Miskito, Mayangna, Garifuna, Pech, and Tawahka. In addition to the indigenous groups, mestizos live in each reserve, some of whom have lived in the region for decades; others are more recent arrivals. In this study, I focus on the activities of the Miskito and Mayangna peoples and the more recent mestizo settlers.

In each reserve, certain regions are designated specifically for the indigenous residents, and certain regions are predominately mestizo. In Río Plátano, a “cultural zone” is designated for the indigenous residents. In Bosawas, the indigenous lands are divided into six indigenous territories. The principal difference between the indigenous lands in Río Plátano and Bosawas is that only the indigenous peoples in Bosawas have established common-property rights over their lands. In both reserves, a buffer zone was created for mestizo populations. The buffer zone in each reserve is public land.

In this dissertation, I focus on activities in the Río Plátano cultural zone and the indigenous territories in Bosawas. The advantages of comparing the indigenous land in Río Plátano to the indigenous territories in Bosawas is that I am able to focus on the impact that the different property-rights processes and the resultant policies have had on

agricultural expansion while controlling for ecological, technological, cultural, infrastructural, and economic factors that might otherwise influence mestizo migration and indigenous land-use decisions. The regions are predominately humid tropical forests that are difficult to access and relatively isolated from mainland markets. Furthermore, the Mayangna and Miskito people that live in the reserves share similar land-use customs and practices. The similarities between the two regions make these two reserves ideal study sites to test whether a reserve under government jurisdiction or a reserve under a common-property regime of the indigenous residents is better able to control agricultural expansion.

4 RESEARCH DESIGN AND STUDY SITES

In this dissertation, I focus specifically on the activities in the cultural zone of Río Plátano, two territories in Bosawas (Miskitu Indian Tasbaika Kum [MITK] and Mayangna Sauni Bu [MSB]), and the Bosawas buffer zone. Taking the property-rights processes enacted in the mid-1990s as a starting point, I examine present land-use institutions and land-use practices across sites. The research design enables a comparison of land-use institutions and land-use practices in: (1) a cultural zone designated for indigenous residents but under the jurisdiction of the government; (2) indigenous territories with common-property tenure rights; and (3) a government-managed buffer zone that is predominately mestizo, but also has indigenous communities.

The cultural zone of Río Plátano is in the department of Gracias a Dios and encompasses 3,895 km² in the northern and eastern regions of the park. It is bordered to the west by the Sico River and to the east by the Patuca River. It is managed as a sustainable-use zone with permitted activities corresponding to the International Union for Conservation of Nature and Natural Resources' Category VI. Certain restrictions apply to the types of farming, forestry, and hunting activities the populations can partake in. Restrictions also limit entry into the zone to only those who are indigenous, or are "native" mestizos previously living in the zone. Approximately 21,300 people live in the cultural zone, the majority of whom are Miskito peoples. According to the 1997–1998 census, 84% of the population was Miskito, and only 10% were mestizo natives (PBRP,

1997/98). However, this number is changing as mestizo farmers and ranchers continue to move into the region.

To the west of the cultural zone is the valley of Sico-Paulaya, a region designated specifically for mestizo residents. The region of Sico-Paulaya consists of 676 km² of land that runs along both sides of the Sico River and into the northern region of the Río Plátano buffer zone. Much of the pressure on the cultural zone comes from mestizo migration to this region. In 1997–1998 there were approximately 5,019 people living in Sico-Paulaya, however this number was expected to reach 10,000 by 2000 due to migration (PBRP, 1997/98). Exact figures are not given for the entire region in more recent censuses; nevertheless, the 2001 census does give figures for the principal community in the region, Sico: an increase from 1,294 in 1997–1998 to 4,141 in 2001 (PBRP, 1997/98; INE, 2001).

In Bosawas, the territories investigated in this study are all located on the southwestern edge of the reserve in the department of Jinotega. The territories lie to the west of the North Atlantic Autonomous Region. MITK and MSB are both indigenous territories recognized by the Nicaraguan government. MITK is a Miskito territory that covers approximately 681 km² along the River Coco that divides Nicaragua from Honduras. In 1995–1996 there were 3,454 people living in 14 principal communities in MITK (TNC, 1997b). In 2006, the population was expected to reach 5,040.^{iv} MSB is a Mayangna territory covering 1024 km². In 1995–1996, 1,773 Mayangna lived in the region and, today, an estimated 2,442 Mayangna live in the territory (Stocks, 1998; TNC, 1997a). The Bocay River runs through MSB and the majority of the residents live along the Bocay.

The buffer zone investigated in this study lies just south of the two indigenous territories between the Coco and Bocay rivers. Within the buffer zone, the mestizos have divided the zone into two mestizo territories. This study includes mestizo and indigenous communities in one of the mestizo territories. The territory is not officially recognized by the Nicaraguan government and mestizos do not hold property rights to the lands. The territory in this study is, however, under the de facto jurisdiction of the mestizo political organization Association for the Protection and Development of the Mestizo Communities in Bosawas (APDECOMEBO). In 2005, 14,000 mestizos lived in the

region (personal communication, Mayor Plisito, September 2005). There are also four indigenous communities in the mestizo territory.

Table 1.1 shows the principal characteristics in each of the study regions including the predominant ethnicity of the residents living in the region, the population for the region, area in km², population density, and the type of tenure arrangement that governs the respective region. The population figures presented in Table 1.1 are from censuses conducted in the mid-1990s in each reserve. The figures for Río Plátano are from a census of the reserve conducted in 1997–1998 by the Río Plátano Biosphere Project (PBRP, 1997/98). The figures for Bosawas are from a census of the reserve conducted in 1995–1996 by The Nature Conservancy (TNC) (Hurtado de Mendoza, 2001; TNC, 1997a, 1997b).^v

Table 1.1. Demographic Characteristics of Río Plátano and Bosawas

	Predominant Ethnicity	Population	Area (km²)	Pop/km²	Tenure Regime
Cultural Zone, Río Plátano	Miskito	21,320	3,895	5.47	PUBLIC
Buffer Zone (Sico-Paulaya), Río Plátano	Mestizo	5,019	676	7.42	PUBLIC
MITK, Bosawas	Miskito	3,454	681	5.07	TERRITORIAL
MSB, Bosawas	Mayangna	1,773	1,024	1.73	TERRITORIAL
Buffer Zone, Bosawas^{vi}	Mestizo	4,193	569	7.37	PUBLIC

4.1 Research Design to Test Hypotheses

The research design and specific fieldwork sites are shown in Table 1.2. In total, I conducted fieldwork in four sites in the Río Plátano cultural zone and four sites in Bosawas. The study sites are shown in red in Figure 1.1. Each study site includes a principal indigenous community and, where appropriate, the satellite indigenous and mestizo communities in the region. The sites are, for the most part, located along rivers, and broadleaf tropical forests cover the surrounding hills. The settlements are inaccessible by car and have remained relatively isolated from mainland economic activities.

The research design presented in Table 1.2 shows how the property-rights differences between Río Plátano and Bosawas reserves facilitate a natural experiment to test the influence of tenure on mestizo encroachment and indigenous land-use institutions (Shadish et al., 2002). I compare the cultural zone of Río Plátano with the two indigenous territories (MITK and MSB) to test for differences in mestizo migration and indigenous land-use institutions under public management and indigenous common-property management. Mestizos began migrating to the cultural zone of Río Plátano and to the two indigenous territories in Bosawas in the late 1980s and early 1990s. In order to further substantiate the impact of the property-rights policies, I also contrast encroachment activities in the government-managed Bosawas buffer zone to encroachment in the Bosawas indigenous territories.

In order to test whether mestizo migration produces institutional change in Miskito communities, I selected three sites in the cultural zone of Río Plátano. The principal difference between the three sites is the history of mestizo migration to the area. The sites all contain Miskito communities that share similar geographical, economic, and cultural characteristics; however, mestizos have been migrating to one site since the late 1980s, whereas they just started to encroach on the second site in 2004 and mestizo migrants have not yet reached the third site. The natural variation in encroachment pressures enabled me to test if and how indigenous land-use institutions change.

Finally, in order to assess the long-term outlook for forest conservation and indigenous land-use institutions in Bosawas, I compare land management and forest threats in one community in the Miskito territory MITK to a neighboring Miskito community that lies on government lands. If property rights do not make a difference in current or future land management, I would expect to find similar land-use conditions and future challenges in each community.

Table 1.2 Principal Research Questions and Associated Research Sites

Are property-rights policies a determining factor in controlling mestizo encroachment?			
<p>The impact of property rights on mestizo migration is tested by comparing encroachment in the cultural zone of Río Plátano to encroachment in the two indigenous territories in Bosawas. I also compare mestizo activities in the two indigenous territories to mestizo activities in the buffer zone. If property rights matter, I expect to find differences in mestizo encroachment across sites.</p>			
Study Sites	Tenure	Ethnicity	
Cultural Zone, Río Plátano	Government	Miskito	
Miskitu Indian Tasbaika Kum (MITK), Bosawas	Territorial	Miskito	
Mayangna Sauni Bu (MSB), Bosawas	Territorial	Mayangna	
Buffer Zone, Bosawas	Government	Mestizo	
Does mestizo migration produce change in indigenous land-use institutions?			
<p>The impact of encroachment on indigenous institutions is tested by comparing land-use activities in three study sites in the cultural zone of Río Plátano. Each site is a Miskito community that has experienced different histories of encroachment. If mestizo migration produces change, I expect to find differences in land-use institutions and land-use practices between the three communities.</p>			
Study Sites	Encroachment	Ethnicity	Reserve
Banaka	YES, since late 1980s	Miskito	Cultural Zone, Río Plátano
Wampusirpe	YES, since 2004	Miskito	Cultural Zone, Río Plátano
Ahuas	NO	Miskito	Cultural Zone, Río Plátano

Table 1.2. continued

What impact do the property-rights policies have on the robustness of indigenous common-property institutions?			
<p>The effect of property-rights processes on the robustness of indigenous land-use institutions is examined by comparing how the different property-rights processes impacted decisions to create, monitor, and comply with indigenous common-property rules. I compare the perceived costs and benefits of rule making and compliance in Río Plátano and Bosawas reserves. If the processes had no impact, I expect to see no difference with respect to rule making and compliance.</p>			
Study Sites	Tenure	Ethnicity	Reserve
Brus Laguna	Government	Miskito	Cultural Zone, Río Plátano
Banaka	Government	Miskito	Cultural Zone, Río Plátano
Wampusirpe	Government	Miskito	Cultural Zone, Río Plátano
Pueblo Nuevo	Territorial	Miskito	MITK and MSB, Bosawas
Wina	Territorial	Mayangna	MITK and MSB, Bosawas
Are indigenous residents who share common-property rights better able to address future land-use pressures than those who live on public lands?			
<p>The long-term governance prospects are explored by comparing two Bosawas communities: Pueblo Nuevo and Plis. The two communities share similar cultural, social, and economic characteristics but have different property rights. The analysis considers different hypothetical challenges to the current institutional regimes and examines the stresses these challenges would place on the two communities.</p>			
Study Sites	Tenure	Ethnicity	Reserve
Pueblo Nuevo	Territorial	Miskito	MITK, Bosawas
Plis	Government	Miskito	Buffer zone, Bosawas

4.2 Site Specifics

The four sites in the cultural zone of Río Plátano are Banaka, Ahuas, Wampusirpe, and Brus Laguna. Banaka, Ahuas, and Wampusirpe are the principal study sites, and I chose them specifically to examine the effect of outside encroachment on resident land-use practices and institutions because the regions share similar geographies and levels of market integration, but each region faces a different level of outside encroachment. Brus Laguna serves as the center for much of the Miskito political activity occurring in the cultural zone and is an excellent site for learning about the constitutional and collective-choice decisions made by the Miskito leaders in the region.

The four sites in Bosawas include Wina, Yapuwas, Pueblo Nuevo, and Plis. In MITK and MSB, I chose to study one indigenous community located just inside the territorial boundaries and one indigenous community located just outside the respective territory. The sites were specifically selected to test for the impact that the indigenous territorial rights have on mestizo encroachment. Wina is a Mayangna site that is located just inside the Mayangna territory MSB. Yapuwas is a Mayangna site just outside the border of MSB, on government lands in the buffer zone. Similarly, Pueblo Nuevo is a Miskito site that is located just inside of the Miskito territory MITK. Plis is a Miskito site in the buffer zone just outside of MITK. I also conducted fieldwork in four mestizo settlements located near the principal indigenous sites.

4.3 Possible Threats to Validity

I structured the study to control for factors such as roads or market access that might also influence mestizo migration and indigenous institutional change (in addition to property-rights policies). Nevertheless, as in any research design, and particularly in a fieldwork investigation, there are possible threats to the validity of the results. A difference between Río Plátano and Bosawas that did raise some concern is the Nicaraguan civil war (1980–1990). At the start of the civil war, the residents of Bosawas were evacuated and did not return to their homes until 1991. It is difficult to determine the impact the war had on

indigenous land-use practices and organizational capabilities. I tried to account for this difference by asking elders, community leaders, and residents about impacts the war had on land-use practices, integration with the market, and community cohesion. I cannot attribute any significant differences in indigenous land-use decisions to the war.

Nicaraguan land distribution policies after the war encouraged migration to the Bosawas region. However, similar policies were also enacted in Honduras. I do not consider the civil war to threaten the validity of the results. Considering the difficulties of performing policy experiments in real-life settings, I consider Río Plátano and Bosawas to be an exceptional natural experiment that transpired by happenstance.

5 DATA SOURCES AND METHODS

Understanding land-use institutions and behavior in the frontier depends on knowledge of the different actors' perspectives, the geophysical and geopolitical factors that influence their behaviors and the current institutions in operation. Data were collected per fieldwork in the respective reserves as well as per interviews with government and non-government personnel working in the reserves, but stationed in the capital cities. I spent a total of approximately 15 months in Honduras from 2002 to 2006. Roughly half that time was spent in Río Plátano and half in Tegucigalpa, the capital. I conducted fieldwork in Bosawas and research in Managua in August 2004 and August–October 2005.

Data on the resource users, policy context, land use, and institutional change were gathered via three different data-gathering methods. The following provides an overview of the principal data-collection methods. The specific interview methods and sampling procedures are specified in the relevant chapters.

5.1 International Forestry Resources and Institutions (IFRI) Protocols

I used the IFRI protocols to gather data on the individuals living and working in the reserves, their institutional practices, and the land-use outcomes. IFRI is a set of research protocols that enable scholars to examine the impact of diverse ways of owning and

governing forests on protection and management activities and their consequences on forest conditions (CIPEC, 2004; Gibson et al., 2000). The IFRI protocols include an interview guide to gather information on the attributes of the people that use the forests, attributes of the forests, and the institutions that influence forest use and management practices. In addition to the IFRI protocols, I added specific questions with respect to agricultural expansion and mestizo encroachment. The IFRI protocols also ask forest users to map their forests and include any characteristics that the community deems important. In addition, researchers and community members conduct walks through the forest to qualitatively assess forest use and forest condition.

In each study site, I followed the interview protocols and conducted in-depth individual and group interviews with community residents. The residents were purposefully selected based on leadership, age, gender, and their specific activities within the community (for example, if someone was known for cutting timber or having cattle). I also conducted interviews with territorial leaders, indigenous organizations, public officials, and non-government personnel working in the region. Archival records from The Nature Conservancy, other non-government organizations (NGOs), and the ministries for the environment and protected areas provided a foundation for understanding the past policy processes within the region and indigenous institutional and organization histories.

5.2 Questionnaire of Land-Use Institutions and Land-Use Preferences

I administered a questionnaire to purposefully selected samples of reserve residents in order to compare resident perceptions of encroachment, land-use institutions, and their own land-use preferences. Sample selection was based on the geographic location of the houses within the settlements, gender, and ethnicity. Interviewees were asked to respond to a series of statements that asked (1) who should own the Mosquitia forests, (2) whether the residents believed that they could control mestizo migration, (3) the types of property rights that should be appropriated to the entire region and specifically the forests, and (4) their participation in the land market.

The questionnaire consisted of a series of portrait statements that gave the opinion of a fictitious person, Miguel. The respondent was then asked to respond whether he/she thought that his/her household thinks like Miguel and then to explain. This statement strategy was used so the respondent did not have to respond directly to the question and would feel less interrogated. This technique was roughly based on work by Schwartz and colleagues (Schwartz et al., 2001) on questionnaire techniques to gather information on attitudes towards different value statements from a cross-cultural sample. In Schwartz and colleagues' questionnaire, respondents are asked to compare a portrait statement that expresses a value preference to their own preferences. For example, in order to understand how a person values wealth, Schwartz et al. might use a portrait statement "He wants to have a lot of money and expensive things" and then ask the respondent, "how much like you is this person" (Schwartz et al., 2001, p. 523). Schwartz and colleagues found the technique of using concrete examples and asking the respondent how much the person in the example is like them to be a particularly effective means of soliciting opinions from rural respondents.

My own set of statements were more content specific and drawn from earlier interviews on customary Miskito land-use practices and some of the conflicts emerging in the communities as a result of mestizo encroachment. The questionnaire responses were first coded as strongly agree with this person, somewhat agree, or do not agree. However, for many statements, respondents expanded their answers, and these responses were then coded and included in the present analysis of attitudes toward land-use institutions. The specific questions and response codes are given in Appendix A. The total number of respondents interviewed in each community is specified in Appendix B. The questionnaire responses are used for different analyses in several of the chapters; in each analysis I specify the community and the number of respondents for the particular questionnaire statement. The questionnaire is hereafter referred to as the "Miguel questionnaire."

5.3 Spatial Analysis of Land Use and Land Cover

I combined fieldwork with satellite images of land cover to assess agricultural expansion and encroachment in the study sites. I used geographic position system (GPS) units on forest transects and field walks within each community to geographically locate the community boundaries, forest edges, indigenous farms, and mestizo settlements and farms. I then mapped these points onto satellite images of land cover. I obtained Landsat images of Río Plátano from AFE-COHDEFOR and Landsat images of Bosawas from MARENA. The images were already classified by the respective ministries. In my analyses, I used geographic information systems (GIS) to calculate the amount of land under agriculture, pasture and forest. When possible, I also calculated land-cover change. The fieldwork and images enabled me to examine the association between encroachment and land-cover changes in the respective regions.

6 THEORETICAL FRAMEWORKS AND KEY CONCEPTS

Institutions are tricky to investigate. They're often ill-defined and never act in isolation. Furthermore, analysis of actors and institutions operating in the frontier is particularly challenging, given (1) the nature of the resource, (2) the value-laden relationships that many actors have toward the land, and (3) the complex configuration of formal laws and informal land-use norms that ultimately determine land-use activities.

I combine two theoretical frameworks to analyze institutional change and forest conservation in the two reserves: the Institutional Analysis and Development (IAD) framework created by Ostrom and colleagues at Indiana University (Ostrom, 1986, 1990, 2005) and the policy sciences (Clark, 2002; Lasswell, 1951, 1971). The frameworks help map out the characteristics of the participants, attributes of the resources, the costs and benefits of different property rights and land-use decisions, and the outcomes and effects of the current governance regimes. The IAD framework disentangles the web of interactions by considering the physical conditions of the resource to be managed, the attributes of the community of actors, and the rules shaping their actions (Ostrom 1990, 2005). Similarly, the policy sciences analyze the context of the policy issue by

considering the actors and their perspectives, values, and goals. The policy sciences also consider how previous policies and interactions have shaped the actors' present behaviors and future expectations (Clark, 2002; Lasswell, 1971).

6.1 Framing the Context

Both frameworks begin by considering the geophysical and geopolitical characteristics of the situation, the specific attributes of the resource to be managed, and the individuals involved. Works by Feeny, Ostrom, and colleagues (Feeny et al., 1990; Ostrom, 1990, 2003; Poteete and Ostrom, in press) on common-pool resource management are particularly useful in the analysis. Frontier governance arrangements are challenged by the dilemmas that plague common-pool resource management: it is difficult to exclude users from the frontier, and one person's use of frontier lands subtracts from total resource availability.

The ability to mediate the different interests and enforce the respective agreements depends largely on the attributes of the different actors working and living in the frontier. This study assumes that all actors in the Mosquitia frontier draw on their values, ideologies or identities, and the information available to them to make decisions that support their preferred outcomes. I consider institutions to result from decisions made by individuals. Institutions may be consciously crafted or they may arise out of particular behavioral patterns. Nevertheless, I presume that individuals are conscious of their decisions and that behaviors are context specific.

In this study, I expect that actors behave in ways characterized by Lasswell's (1971, p. 16) postulate that states that all individuals act in ways that each perceives will leave the individual better off than if he had acted differently. The key word in this analysis of decision making is *perceives*. Unlike the completely rational actor, the individuals in this study are considered to be boundedly rational with information and time limitations. Furthermore, the individual's perception of the costs and benefits of different institutional choices is assumed to heavily influence his/her behavior.

Analysis of the actor's perspective is central in the policy sciences. In particular, the social process as mapped per Clark (2002) highlights how to identify the participants'

perspectives, their identities, their values and demands with respect to the resource in question, and their strategies for achieving their demands. In Lasswell's (1971) work, the set of values an individual holds (base values) and those that he/she hopes to gain (scope values) play an important role in understanding individual decisions. Identity is closely linked to one's values and largely shaped by the myths that orient one's life by giving meaning to daily experiences (Clark 2002, p. 37). For example, many mestizo colonists identify with the myth of the *campesino*, the farmer who takes pride in the struggle to feed his/her family by working the land. As a *campesino*, the colonist draws on a set of base values such as skill and enlightenment, or knowledge of the land and farming to achieve wealth (crops) and secure his/her family's well-being. The world views, ideologies, and social groups that the farmer identifies with provide insights into his/her values, goals, and the institutional choices he/she might prioritize.

Ultimately, my interest in the actors' identities and perspectives is in how these factors influence their abilities to act collectively. Frontier forest conservation requires that the individuals living and working in the region agree to some common land management strategies and restrictions. Many authors point to the importance of community characteristics in determining the types of rules and collective activities that arise out of different social dilemmas (Libecap, 1994; McCay, 2001; Olson, 1965; Poteete and Ostrom, in press; Taylor and Singleton, 1993). Taylor and Singleton (1993) characterize different degrees of community based in part on the perspectives, expectations, and identities of the actors and their shared institutions. They hypothesize that the ability of actors to overcome collective-action problems depends on the number and types of interactions members of the group have, whether the relations are fairly autonomous, and whether members of the group share similar beliefs and preferences.

Thus, for example, colonists might be considered to have a high degree of community due to their shared identities, numerous and varied interactions, and similar land-use preferences; however, they form only one of several actors operating in the frontier. I consider how the identities and values of different actors in the reserve influence their actions and abilities to act collectively in greater detail in the following analyses of the ability to control outside encroachment under the different property-rights regimes.

6.2 Actors and Institutions Interacting in the Action Arena

In IAD language, outcomes are produced by the decisions made by actors in an *action arena*. Actors, their previous experiences, information and preferences, the current institutions, and the resource with its specific attributes all come together in an action arena (Ostrom, 1986). In Río Plátano and Bosawas, there are a variety of actors, all with their own institutions, goals, and strategies for interacting with other actors in the reserves. In broad terms, the actors can be divided into those who are “on-the-ground” residents of the reserve, and those who work in the reserve or influence reserve policy—“influential actors.” The on-the-ground actors include the indigenous residents and the colonists. The primary influential actors are the in-country NGOs, government ministries that deal with the environment and land, and international non-government and government organizations that donate money, and at times personnel, to influence land-use policies in the Mosquitia.

Each actor works with various sets of institutions that may be either informal or formal. North (1990) distinguishes between formal institutions, such as laws or regulations that are consciously created and legally binding, and informal institutions, which may be customs, norms, or rules that are respected by the actors in a given situation but are not legally binding. Informal institutions may be tacitly understood or collectively decided upon, and compliance is based on informal constraints that may range from community gossip to fines and shunning.

Both formal and informal institutions may be created and operate at different decision-making levels. The IAD framework traces decision-making processes at four decision-making levels: meta-constitutional, constitutional, collective-choice, and operational. Decisions at the meta-constitutional and constitutional levels determine who is eligible to craft the rules and the framework for how the rules will be shaped. The actors working at this level in the Mosquitia are generally the national and international government agencies. Nested within the constitutional rules, collective-choice rules decide how a particular good or service will be accessed and allocated. Collective-choice rules stipulate who is authorized to make policy decisions and what regulations govern their procedures. Decisions made at the collective-choice level affect the provision and

distribution of a resource as well as specify the expected input from each user and the sanctions to be applied for failure to comply with the rules. At the ground level, the operational rules regulate the day-to-day activities concerning the use of a specific good. These activities include harvesting, protecting a resource, monitoring users, providing information, and rewarding or sanctioning (Ostrom, 1990).

It is important to recognize that the decision-making levels are not necessarily neatly nested and several decision-making levels may be in parallel operation. For example, in Río Plátano, AFE-COHDEFOR may make collective-choice decisions in relative isolation from the collective-choice rules created by the Miskito peoples. Furthermore, not all formal rules are necessarily *rules-in-use*. Both Ostrom and Lasswell distinguish between rules that are created on paper and those that are actually applied. Ostrom (1986) notes that a formal institution such as a law is not necessarily a rule-in-use. To be a rule-in-use, the law or regulation must be recognized and applied. Similarly, Lasswell (1971) distinguishes between the prescription, invocation, and application stages in the policy process. A rule or law may be prescribed, but that does not necessarily mean it will be fully invoked or applied. For example, many protected areas are prescribed or created on paper, but the appropriate management, monitoring, and enforcement mechanisms are not invoked or applied. In accordance with Ostrom, these “paper parks” are *rules-in-form* only; they are not rules-in-use.

An emphasis in this dissertation is on understanding disjuncture between different rights, rules, and norms created by different actors at the respective decision-making levels. Specifically, I focus on the formal property-rights rules, the informal land-use institutions, and their relationships in order to understand the ability to control agricultural expansion and the long-term forest management prospects for the region.

6.3 Evaluating Outcomes and Effects

In his work, Lasswell (1951, 1971) calls on the policy analyst to define the preferred outcomes for a region. As stated, the two outcomes of interest in this study are agricultural expansion caused by mestizo encroachment and indigenous institutional change. In evaluating outcomes, I consider forest conservation as the immediate policy

goal for the Mosquitia Corridor. This is a goal generally shared and stated by all actors in the reserve (the mestizo colonists also state concern over widespread forest destruction, particularly of watersheds).

Nevertheless, this shared concern should not disguise the conflicting demands and degrees of conservation that the actors aim for in the Mosquitia. Ecological conservation may be one of the benefits of institutional arrangements that grant rights to the resource users; however, environmental conservation is not necessarily guaranteed, and at times it may not be the preferred outcome of all the participants. Therefore, in considering the long-term effects of different institutional alternatives, it is important to keep the conflicting demands and means for mediating the demands at the forefront of the analysis of governance alternatives in the region.

In evaluating the long-term effects of the different institutional arrangements, I deviate from prioritizing the ecological goals for the region and instead emphasize how each property-rights regime supports citizens' rights and responsibilities in making land-use decisions. The work of Dewey (1927) shapes my perspective of my role as a researcher and analyst of the institutional dynamics and land-use outcomes in the Mosquitia. Specifically, Dewey recognized that one of the greatest challenges to the democratic system in the United States is the ability of citizens to identify common problems, understand their sources and the relevant consequences, and then mobilize themselves as a public capable of defining and expressing its interests (p. 146).

The greatest challenges for residents in frontier regions such as the Mosquitia are understanding how their actions are part of the changing environment within which they live, defining their particular interests, and organizing to act accordingly. The remote location, limited information, minimal level of political organization and organizational experience, and the high levels of conflict all demand a management regime that provides a means whereby citizens can make educated land-use decisions and resolve their conflicts peacefully. Therefore, in evaluating the different institutional alternatives for managing the Mosquitia, I pay careful attention to how each system works not only to promote forest conservation, but also how the systems facilitate the acquisition of information and support local organization so that frontier residents can participate in the land-use decisions that will effect their livelihoods and the sustainability of the region.

7 SCOPE AND STRUCTURE OF THE DISSERTATION

This introductory chapter has pointed to the key problems in frontier forest management and the need to understand how individuals devise institutions to address agricultural expansion and promote forest conservation in the region. The scope of the dissertation is limited in that I focus primarily on the activities of on-the-ground actors, the indigenous and mestizo residents, and consider the influential actors only in how their activities and policies affect the behavior of reserve residents. In considering forest conservation, I focus specifically on agricultural expansion, largely due to mestizo migration. I do not consider other types of exploitative activities such as logging or hunting, nor do I provide detailed analyses of the sustainability of the indigenous agricultural practices, although this is addressed partially in chapter 5.

Furthermore, in my analyses, I do not question indigenous rights to their traditional homelands. I recognize that granting indigenous peoples rights to their homelands is a politically costly and at times an ethically questionable, constitutional decision. The purpose of the dissertation however, is not to question the indigenous land rights in themselves, but rather to narrowly examine whether by establishing common-property rights over their lands, indigenous peoples are able to control agricultural expansion.

The key questions this dissertation does tackle are how indigenous residents are addressing agricultural expansion in the Mosquitia Forest Corridor and the impact that different protected-area property-rights policies have on indigenous land-management institutions and the ability to control the agricultural frontier. I intend for these analyses of the interplay between formal property rights, informal land-use institutions, and agricultural expansion to contribute to our understanding of ways to craft forest governance systems that promote conservation while recognizing citizen's rights.

In chapter 2, I use the policy sciences and concepts from institutional analysis to describe the context of agricultural expansion and forest conservation policy in the two reserves. Chapters 3–6 are the empirical analyses of institutional change and forest management in each reserve. In chapter 3, I examine the influence that different property rights have on the ability to control outside encroachment, and in chapter 4 I analyze how local land-use institutions are changing in the cultural zone of the Río Plátano, given

different levels of outside encroachment. In chapter 5, I explain why the property-rights processes have produced different outcomes. I dig deeper into the property-rights analysis and analyze if and how specific factors in these processes impacted indigenous and mestizo land-use decisions and the supply, monitoring, and compliance with indigenous common-property institutions. Chapter 6 further substantiates differences in agricultural expansion under government and common-property regimes as I consider the long-term ecological and institutional sustainability of the territorial property-rights structure in Bosawas. Finally, in chapter 7, I summarize the contributions made by this dissertation, offer policy suggestions for future frontier forest management, and discuss areas for future research.

Endnotes for Chapter 1

ⁱ A World Resources Institute report defines frontier forests as being primarily forested; of sufficient size to support viable populations of the full range of indigenous species with that particular forest ecosystem given periodic natural disturbance episodes; and exhibiting a structure and composition shaped largely by natural events, as well as by limited human disturbance from traditional activities (Bryant et al. 1997, 40).

ⁱⁱ In Bosawas, 8000 km² constitutes the six indigenous territories that make up the core zone of the reserve. It does not include the buffer zone that was added later. Total area of the reserve including the buffer is approximately 20,000 km².

ⁱⁱⁱ In May 2005, the indigenous associations were given titles to their respective territories. Nevertheless, as of April 2006 the Nicaraguan government had not yet registered the titles.

^{iv} Indigenous population statistics are based on the The Nature Conservancy census conducted in 1995–1996, and the natural fertility rate is estimated to be 0.035 (Stocks, 1998).

^v I have chosen to present the population data for 1997–1998 for Río Plátano and 1995–1996 for Bosawas because in these years censuses were conducted specifically to assess population in each reserve. Although the Honduran Institute of Statistics conducted a census in 2001, this did not necessarily include all of the communities in Río Plátano. Similarly, although individual communities in Bosawas have conducted more recent population counts, I did not have recent numbers for all communities in the two territories. Furthermore, all current and future estimates of the population of indigenous residents in Bosawas are based on the 1995–1996 census conducted by TNC.

^{vi} The mestizo study region does not coincide directly with the TNC mestizo study sites and respective population counts. Therefore, the population estimates for the mestizo buffer zone, as demarcated in this study, are based on present-day population counts given by mestizo leaders and the 1995–1996 census conducted by TNC (Hurtado de Mendoza, 2001).

CHAPTER 2
AN OVERVIEW OF THE PROBLEM:
THE LAND, THE PEOPLE, THEIR PRACTICES, AND THE POLICY CONTEXT

1 INTRODUCTION

Hardin's (1968) "Tragedy of the Commons" exemplifies some of the challenges to managing frontier forests and highlights the important role that property rights may play in forest conservation. In Hardin's commons, much of the difficulty lies in the high costs of excluding other herders from the pasturelands, the presumed inability of the herders to act collectively to regulate their use of the land, and the subtractability of the pasturelands. Hardin predicts that, under these conditions, the herders will overexploit the commons because it is in each person's best interest to use the commons until it is utterly degraded. He assumes that the herders are unable to assess their collective impact on the commons and incapable of jointly constructing rules to sustain the pasturelands. In order to prevent the tragedy of the commons, Hardin contends that the government must either own or privatize the resource in question.

The land and forest management challenges found in the Mosquitia and other frontier forests are similar to the challenges posed in Hardin's commons and are, in large part, characterized by the regions' geopolitical, ecological and spatial dimensions. By definition, frontiers are relatively distant from market centers and central governance systems. They are often considered lawless regions where every person must fend for him/herself. In economic terms, the frontier begins at the point where the net present value of land just covers the opportunity costs to the claimants (Alston et al., 1997, p.147). In ecological terms, frontier forests are considered to be those areas that are relatively undisturbed by human activities and of sufficient size to support a viable population of native species (Bryant et al., 1997, p.40).

As in Hardin's commons, one person's use of the frontier detracts from the total benefits available to others. However, unlike Hardin, who focused primarily on a single benefit of pastureland for each herder, frontier forests offer a variety of benefits to different users, many of which are mutually exclusive. For example, when a settler clears

a hectare of forest land for crops, his clearing detracts from the total benefits available in several ways. First, less land is now available for others to farm. Second, the clearing may negatively impact the ecological services that the forest provides, such as the prevention of erosion and protection of water sources. Furthermore, the settler has reduced others' access to forest products, because they are no longer able to gather timber and non-timber forest products from that area.

The difficulty in managing frontier lands is finding a way to mediate the competing demands for the land and its resources, and to monitor and enforce the respective decisions. In the search for a solution to these governance challenges, Hardin's theory of environmental demise has greatly influenced forest management policy and provides a staunch rationale for government-owned protected areas and forest reserves (McKean, 2000; Terborgh, 1999, 2000; Wilshusen et al., 2002). Presuming Hardin's *theory* to be *fact*, many advocates of government-owned protected areas maintain that resource users will necessarily destroy the natural resource systems unless the government steps in to regulate their use (Redford, 1991; Redford and Stearman, 1993; Terborgh, 1999, 2000).

While it is true that it is difficult to coordinate activities to manage the commons, Hardin's work is a hypothetical scenario. Overexploitation of the resource is one possible outcome; Hardin wrongfully assumes, however, that without government regulations, resource users will necessarily act individually without jointly constructing rules that affect what each can do and how their combined actions impact the resource in question (Feeny et al., 1990; Ostrom, 1990). Furthermore, in his scenario, Hardin examines some of the obstacles to collective rule making on the part of the resource users, but he fails to examine the difficulties encountered in government or individual ownership. He implies that public or private property rights are somehow inherently capable of sustaining resource systems. Unfortunately, resource management is not so simple. No single property-rights system will necessarily conserve common-pool resource systems; management is context specific.

Nevertheless, Hardin's work does highlight some significant challenges to common-pool resource management and the effect that different property-rights arrangements may have on resource use. If Hardin's tragedy is examined as a *theory*, not as a fact, his work serves as a foundation for gathering empirical evidence to test if and when resource users

act collectively to create resource management rules and under what conditions a resource is sustained.

In real-world resource management, a variety of contextual factors may influence if and how a resource is exploited and the impact that different property-rights policies may have. Does the location or scale of the resource matter? How does resource-user heterogeneity influence collective rule making and resource use? By understanding the characteristics of the resource, the resource users, and the institutional systems they operate within, we may be able to adapt property-rights systems to specific contexts and provide incentives to maintain resource systems.

In the case of the Mosquitia, the immense scale and the political and geographical isolation of the region pose thorny governance challenges for forest management. Before we consider how the current property-rights policies impact forest governance in the Mosquitia, we must first examine the attributes of the region, the people, their land-use customs, and the broader institutional systems they interact within.

In this chapter, I provide a context in which to ground the study of land-use decisions and institutional arrangements in the Río Plátano and Bosawas reserves. I highlight important differences in the specific property-rights processes and resultant policies enacted in each reserve. In subsequent analyses, I examine the link between the policy processes and the ecological and institutional outcomes in each reserve.

2 DATA SOURCES AND METHODS

The data on the reserve residents, principal organizations working in the reserve, the political structure, and policy processes that occurred in Río Plátano and Bosawas are primarily based on my own fieldwork in the region. I also draw on previous research conducted by other investigators (principally Anthony Stocks, Peter Herlihy, and David Dodds). I used the International Forestry Resources and Institutions protocols (as discussed in chapter 1) to gather information on the community characteristics, land-use practices, and political structures.

Information on the design, prescription, and application of the reserve property rights and resource management processes and policies was gathered from interviews with

residents, government and non-government employees, and reserve consultants who participated in the reserve restructuring processes. In July–August 2004, I conducted research that aimed to understand the policy processes enacted in Río Plátano in the mid-1990s. At that time, I spoke with mestizo and indigenous leaders in all but one of the municipalities in Río Plátano about their rights and responsibilities in the reserve, their actual governance activities, and their opinions about the participatory process. I also spoke with AFE-COHDEFOR and Biosphere Project personnel and reserve consultants, including Peter Herlihy, about the Río Plátano management plan. In the spring of 2005, I followed up this work by asking reserve leaders and residents in the study sites their opinions on their rights and the management plan.

In Bosawas, I also interviewed indigenous and mestizo leaders and residents about the property-rights process that occurred in the mid-1990s. In August 2005, I visited four of the six indigenous territories in Bosawas to gain a better understanding of the process. In addition, I spoke with municipal mayors, employees from MARENA, and reserve consultants, including Anthony Stocks, about the process that occurred in Bosawas. In 2005, I revisited two of the territories (MITK and MSB) and spoke with residents in greater depth about their opinions and activities with respect to the property-rights process and current territorial governance activities. The following is an overview of the two reserves, the land, the inhabitants, the existent political structures, and the policy processes that produced the present property-rights regimes.

3 CHARACTERISTICS OF THE MOSQUITIA AND ITS INHABITANTS

3.1 The Land

The Mosquitia Corridor is one of the most remote regions in Central America and is geographically and politically isolated from mainland Honduras and Nicaragua. The region is approximately the size of the state of New Jersey, and for the most part, it is inaccessible by car. While some parts can be reached by small plane, many are only accessible by small boats or on foot. At the northern end of the corridor, the coastal region of Río Plátano contains beaches and lagoons and is dominated by pine savannah

and marshes. The interior sector of Río Plátano is a hilly to mountainous region covered by very humid tropical forest (Herlihy, 1997; House et al., 2002). To the south, the tropical forest continues into Bosawas, where the interior of the reserve is predominantly hilly to mountainous and the dominant ecosystems are humid and very humid tropical forest (UNESCO-MAB, 1999).

3.2 The People and Their Land-Use Practices

The Mayangna and Miskito Indians and the mestizo immigrants are the principal populations living in the Mosquitia. The Mayangna and Miskito both hold historical claim to the lands. The Mayangna consider themselves to be the original inhabitants of the Mosquitia. They are descendents of Amerindian groups that in pre-Hispanic times occupied much of Nicaragua. Today about 75% of the Mayangna live in Bosawas (Stocks, 2003). The Miskito identity and ancestral links to the region are more complex. Miskito origins date back to at least the 1600s when the Amerindians living in the region began to mix with European colonists, pirates, and African slaves on the shores of eastern Honduras and northern Nicaragua (Dodds, 1994; Herlihy, 1997; Stocks, 2003). The Miskito consider the Mosquitia to be their native homelands.

In contrast to the indigenous residents, the mestizos are relative newcomers to the region. Although some moved to the Mosquitia in the 1950s–1960s, mestizo migration to the cultural zone of Río Plátano and the southern region of Bosawas began in the late 1980s and early 1990s.

3.2.1 *Mayangna and Miskito Land-Use Systems*

The Miskito of Río Plátano and Bosawas and the Mayangna of Bosawas share similar land-use practices and cultural characteristics. The Miskito and Mayangna subsist predominantly by farming, hunting, and fishing. Occasionally, individual families sell a few quintals of beans to traveling merchants or work for mestizo ranchers to earn a bit of money. In addition, some of the Bosawas residents travel to harvest coffee in the

neighboring regions, and some residents of Río Plátano obtain temporary jobs on lobster boats off the Caribbean coast.

The relationship that the Mayangna and Miskito have to their lands is closely aligned with their ethnic identities. In conversations with Miskito and Mayangna natives, many stated that God created the Mosquitia land and its forests for the native people to work and subsist on. Several stated that man has no right to own a forest that God created. The native residents emphasized that their land-use traditions enable all to benefit from the forests and to work the land. Traditionally, all land is shared by the natives and formal or physical boundaries do not divide one community's land from another. In Río Plátano, although each community has a general idea of where its lands lie, the boundaries are not clearly defined. Residents emphasize that their property rights are based on a "trasape" system, or sets of overlapping customary rights in which residents from one community can use the land and forest products from another community.

Forests are held in common and all residents may extract timber and non-timber forest products. Usufruct rights are given to the first person to clear a plot of land for agriculture. Traditionally, native residents clear plots of less than one hectare which they rotate through the forest, generally staying close to stream and river banks. Once a resident clears a piece of forest for agriculture, that individual retains de facto usufruct rights to the field and no one may use the land without the owner's permission.

To an outside eye, individual property lines are not well demarcated and recognition of rights often depends on historical knowledge of the region and the residents. All agricultural land is held in the family and, while an individual may loan a piece of land to a neighbor, land sales are not customary. Land disputes tend to be resolved within the community, often referring to an elder to determine who has rights to what lands. While timber corporations have periodically extracted timber from different parts of the Mosquitia, the lands have historically remained under the dominion of the native peoples.

3.2.2 *Mestizo Land-Use Systems*

The mestizos in the Mosquitia are predominately farmers and ranchers. They typically plant corn, beans, and rice and often maintain cattle for dairy products or meat; the cattle

may be for personal consumption and at times, commercial sale. A principal difference between the indigenous and mestizo land-use systems is their forest clearing and planting patterns. Figures 2.1a and 2.1b show Miskito land uses as compared to mestizo land uses. Whereas the Miskito tend to have small plots intermixed with different crops and trees, the mestizos completely clear the land, often to plant pasture.

Like indigenous residents, the mestizos identify themselves by their relationship to the land. However, their perceptions of the value of the land and how it should be used are quite different. The mestizo often identifies him/herself with the *campesino*—the farmer who works the land to the best of his/her abilities to support the family. The *campesino* colonist believes that it is each individuals' right to own and work a piece of land. Therefore, neither the government nor the indigenous peoples can set aside unoccupied lands when there is so much need for land to be worked. Unlike the indigenous residents who are minimally connected to market systems, particularly land and agricultural markets, the mestizos perceive the land to be a market commodity and source of wealth, either through land sales or crops and cattle.

Mestizo land-use practices and norms conflict with the indigenous customs and values. Mestizos do not understand the fluid boundary lines recognized by the indigenous residents. Upon arriving in the frontier, mestizos immediately lay claim to their lands by physically marking trees and clearing a border around their property. Unlike the indigenous farmer, who clears small plots for agriculture and rotates the plots along the rivers, mestizo settlers often claim relatively large expanses of land (approx. 50–60 ha) that have a major impact on forest fragmentation. Mestizos typically maintain both permanent crops and pasturelands (Carr, 2004; Hayes and Murtinho, 2005; Stocks, 1998). Any unmarked forest is presumed to be available.



Photos by T. Hayes, 2005–2006.

Figure 2.1a. Miskito Land-Use Practices

Photos above: photo 1 shows a Miskito agricultural plot recently burned and ready to be planted; photo 2 shows a Miskito agricultural plot; photo 3 shows a Miskito homestead.



Photos by T. Hayes, 2005–2006.

Figure 2.1b. Mestizo Land-Use Practices

From above: photo 1 shows mestizo plot burned to plant pasture; photo 2 shows mestizo pasturelands; photo 3 shows a mestizo homestead.

3.3 Political Structure

Both the Miskito and Mayangna are accustomed to living apart from the rest of Honduras and Nicaragua as the Mosquitia has historically been disconnected from mainland politics and economic systems (Dodds, 1994; Herlihy, 1997; Kaimowitz, 2002). In the 1600s, the region was a stronghold for British colonists and pirates, and the British retained indirect control over the region until 1860, when the English signed the Anglo-Nicaraguan Treaty and agreed to end territorial claims in the Nicaraguan coast (Dodds, 1994). Nevertheless, the Honduran-Nicaraguan Mosquitia remained relatively united as residents generally traveled freely along the Coco River between Honduras and Nicaragua until 1960 when the Coco was declared the official boundary between the two countries (Helms, 1971).

Today, although both reserves remain physically isolated, the political and economic dynamics in the region are changing. In response to the environmental destruction occurring in the Mosquitia, large international organizations such as TNC, the development agencies German Society for Technical Cooperation (GTZ) and German Bank of Reconstruction and Development (KfW), and UNESCO have stepped in to promote environmental conservation in the region. Likewise, the Honduran and Nicaraguan governments have tried to exercise greater dominion over the region and promoted oft-times conflicting policies and programs that include municipal development, conservation programs, and colonization projects. As national farmers organizations push to open the Mosquitia to agricultural development and encourage mestizo migration to the region, other national NGOs support sustainable development and indigenous autonomy. Finally, among the various programs and projects, the Mosquitia residents themselves are trying to define their own goals and objectives for the region. The result is a complex milieu of organizations, actors, and policies with overlapping and, often ambiguous, rights and responsibilities.

Tables 2.1 and 2.2 show the principal organizations and actors relevant for this study of protected-area management, property rights, and agricultural expansion. This list is in no way exhaustive of all the organizations and actors in each reserve. Recall that in the IAD framework, there are four principal decision-making levels in which actors may interact. The metaconstitutional level includes actors that make decisions that influence

who is eligible to craft rules and how rules will be shaped. At the constitutional level, actors make decisions with respect to who can make and change the rule structure. The specific rules regarding provision, distribution of a resource, as well as the responsibilities of a resource user are made at the collective-choice level. Finally, at the operational level are the decisions that regulate the day-to-day use of a specific good (Ostrom 1990).

Table 2.1. Principal Organizations and Actors in Río Plátano Study

Actor	Type of Organization	Approximate Date	Overarching Goal of Actor/Organization for Region
<i>Meta-Constitutional Level</i>			
GTZ and KfW	German Govt. Development Org.	1996	Forest conservation
MOPAWI	National NGO	1985	Conservation/Development/ Indigenous rights
UNESCO World Heritage	International Org.	1982	Biodiversity and cultural conservation
<i>Constitutional Level</i>			
Honduran President/Legislature	Government	1980	Conservation and development
MASTA	Indigenous Federation	1974	Autonomous territory
<i>Collective-Choice Level</i>			
AFE-COHDEFOR	Government	1991	Forest management
Biosphere Project	Quasi Govt./Intl. Org	1997	Biodiversity conservation
CVT	Indigenous Community Org.	1992	Protect homelands / Autonomous territory
GTZ and KfW	German Govt. Development Org.	1996	Forest conservation
MASTA and Federations	Indigenous Regional Org.	1974	Autonomous territory
MOPAWI	National NGO	1985	Conserv./Development/Indigenous rights
Municipalities	Government	1996	Authority over lands and tax base
<i>Operational Level</i>			
CVT	Indigenous Community Org.	1992	Protect homelands / Autonomous territory
Miskito	Individual Citizens	1600s	Rights to forest and farm lands
Colonists	Individual Citizens	late 1980s	Individual land rights

Note: Bold text indicates which organizations and actors usually make decisions at the specified decision level.

Table 2.2. Principal Organizations and Actors in Bosawas Study

Actor	Type of Organization	Approximate Date	Overarching Goal of Actor/Organization for Region
<i>Meta-Constitutional Level</i>			
UNESCO-MAB	International Org.	1997	Biodiversity and cultural conservation
Centro Humboldt	National NGO	1990	Conserv./Development/ Indigenous rights
TNC	International Org.	1993	Biodiversity conservation
<i>Constitutional Level</i>			
	Indigenous Political		
ADEPCIMISUJIN	Association	1992	Autonomous region
	Mestizo Political		Tenure and infrastructure support
APDECOMEBO	Association	1997	(schools, health, etc)
Nicaraguan President/Legislature	Government	1991	Conservation and development
<i>Collective-Choice Level</i>			
	Indigenous Political		
ADEPCIMISUJIN	Association	1992	Autonomous region
	Mestizo Political		Tenure and infrastructure support
APDECOMEBO	Association	1997	(schools, health, etc)
			Conserv./Development/ Indigenous rights
Centro Humboldt	National NGO	1990	
		Amerindian/	
Mayangna/Miskito	Individual Citizens	1600s	Rights to forest and farm lands
Mestizo Colonists	Individual Citizens	late 1980s	Individual land rights
Municipalities	Government	N/A	Access to resources
TNC	International Org.	1993	Biodiversity conservation
<i>Operational Level</i>			
Coordinators	Community Leaders	1960s	Apply management plan
			Monitor management plan /
Forest Guards	Indigenous Org.	1997	territory
		Amerindian/	
Mayangna/Miskito	Individual Citizens	1600s	Rights to forest and farm lands
Mestizo Colonists	Individual Citizens	late 1980s	Individual land rights

Note: Bold text indicates which organizations and actors usually make decisions at the specified decision level.

In Tables 2.1 and 2.2, I divide the types of organization and actors by reserve and decision-making level. When relevant, I have included the members' overarching demands or stated goals for land use in the Mosquitia. It is important to recognize that the rights and responsibilities that each actor holds are often ill-defined, and that many actors may partake in activities at more than one decision-making level. In the tables, I list the actors in all relevant levels in which they make decisions.

In the meta-constitutional level I have grouped the international actors and organizations that wish to influence the constitutional decisions that determine who has

the right to make what rules. For example, UNESCO promotes the establishment of protected areas that restrict resource use in both Honduras and Nicaragua. It influences activities at the constitutional level through international conventions and funding in support of protected areas. Similarly, the German development agencies KfW and GTZ have greatly influenced who has rights to Río Plátano by providing the Honduran government with funds so long as the government restricts exploitative activities. While many of the activities of the international agencies and the NGOs trickle down into the collective-choice decisions, due to their wide and varied influence, I have chosen to group them in the meta-constitutional level.

In the Mosquitia, who has the right to govern the region and make policies with respect to resource use is highly contested. This contestation is illustrated by the different actors' making decisions at both the constitutional and collective-choice levels. At many times, two different sets of actors are independently making decisions to assert their governance rights and make land-use rules for the region. In Río Plátano and Bosawas, there is tension over whether the government and its respective agencies hold sovereignty and management rights over the region, or whether the native residents hold the rights to govern the Mosquitia.¹ Although the respective governments may hold the formal rights, many of the indigenous (and mestizo) organizations have decided to implement de facto land-use rules at the collective-choice level in order to assert their authority and demonstrate that they in fact, govern the region. For example, the creation of a management plan is a collective-choice activity. However, whoever asserts the right to make a management plan is, in a sense, asserting their right to make constitutional decisions with respect to governance of a region.

In Río Plátano, the Honduran government holds the formal rights to govern the Mosquitia and granted AFE-COHDEFOR (in conjunction with the Biosphere Project, a joint operation of KfW, GTZ, and AFE-COHDEFOR) the right to make resource-use policies and regulations. I have therefore classified the Honduran government as a constitutional decision maker and AFE-COHDEFOR as an actor that makes decisions at the collective-choice level.

The indigenous federation Unity for the Mosquitia (MASTA) and its regional federations will be discussed in greater detail in subsequent chapters. MASTA does not

hold de jure rights to make constitutional-level decisions with respect to governance of Río Plátano. Nevertheless, the mission of the organization is to establish an autonomous territory for the indigenous residents of the Honduran Mosquitia.ⁱⁱ In order to assert their autonomy, the federation and its regional subfederations have created a set of land-use rules that restrict resource use in the area. I argue that the decisions they have made, such as the prohibition of land sales and mestizo settlements, are rules made at the collective-choice level that are intended to support the indigenous peoples' constitutional decision-making rights over the region. In Río Plátano, the indigenous federations have not established de facto constitutional rights to govern, but they are making de facto land-use policies that they hope will eventually further their ability to establish an autonomous region.

In contrast, in Bosawas, the indigenous peoples were able to use their land-use rules to establish first their de facto governance rights over Bosawas, and eventually their formal governance rights over their territories. The process by which the indigenous associations, namely the Association for the Development and Progress of the Miskito and Mayangna Communities of Jinotega (ADEPCIMISUJIN), established their constitutional decision-making rights will be discussed in greater detail in the following chapter. In structuring a management plan to govern the territories, the indigenous residents (and the mestizo organizations) essentially developed a de facto constitution of how the indigenous lands would be governed. It is important to recognize, however, that the basis of this constitutional agreement came from the land-use rules that the indigenous associations worked to implement at the collective and operational-choice levels.

At the operational level are the individuals and community organizations that make land-use decisions with respect to the day-to-day use and monitoring of the Mosquitia forest lands. In Río Plátano and Bosawas, operational-level decisions include the activities of community or territorial forest guards to monitor the respective regions and also the informal institutions and individual decisions made by residents that shape land use and resource rights.

It can be difficult to follow the various organizations and actors living and working in the Mosquitia and the specific decision-making influences they have. In the discussion

below, I further untangle some of the organizations and actors in the reserve and their rights, responsibilities, and practices.

3.3.1 Governing Río Plátano

At the meta-constitutional level, UNESCO, KfW, and GTZ have been instrumental in promoting conservation in the Mosquitia and encouraging the Honduran government to designate protected areas and create a management plan. Although the Honduran government created Río Plátano in 1980, it was virtually a “paper park” until 1997 when the Honduran government signed an agreement with KfW and GTZ to establish a management plan for the reserve. At that time the Honduran government gave all management rights to AFE-COHDEFOR.

Today, Río Plátano is owned by AFE-COHDEFOR and managed by the Biosphere Project. The Biosphere Project has the right to make all collective-choice decisions with respect to reserve management.

However, within the reserve several municipalities also have collective-choice decision-making rights (CNH, 1990). In the cultural zone of the Río Plátano, there are four municipalities that pertain to the department of Gracias a Dios. The department of Gracias a Dios was created in 1957, but the respective municipalities were not established until the mid-1990s. Departmental activities are largely dictated by the municipalities. In each municipality there is a municipal seat where the government offices are located. In most cases, municipal activities remain within the municipal seat. The relationship with respect to the rights and responsibilities assigned to the municipalities and those assigned to the Ministry of Forestry are not clearly defined. Generally speaking, the municipalities govern “urban” activities occurring in and around the municipal seats, while AFE-COHDEFOR is responsible for the forest management within the reserve.

The municipalities are responsible for resolving conflicts among individuals in the communities, registering land, and collecting taxes on land and timber products. In each community there is a community mediator who is assigned by the municipal mayor to resolve community conflicts. In interviews, mediators reported that most conflicts are over crop damage done by a neighbor’s cow or pig, customary landholdings, and

informal agreements between residents that were not complied with. If the mediator is unable to resolve the conflict, or if it is a more severe crime, the disputants may be sent to the municipal justice of the peace. If the justice of the peace cannot resolve the problem, the police may be called to arrest the perpetrator(s) and the case would be sent to court in the departmental capital.

It is important to note that most residents said that they rarely went to the community mediator and even fewer cases ever make it to the municipal justice of the peace. Residents stated that they preferred to resolve conflicts among themselves. A typical form of retribution for crop damage is that the inflicted resident destroys the neighbors' crops or farm animals so that both suffer equivalent damage to the farms. Residents also noted that there is always the threat of black magic and that in general, Miskito do not like to have quarrels with their neighbors. Furthermore, the threat of police action is fairly remote as the closest police station is in a departmental capital that is, at a minimum, a full-day boat trip up river (for most communities it is farther).

Other responsibilities that the municipalities have include registering lands and collecting taxes on land and timber harvests. Although all lands are technically owned by AFE-COHDEFOR, the municipalities will register usufruct titles to individual holdings within their jurisdictions. According to one registrar, a resident must pay three Honduran Lempiras (approximately 12 U.S. cents) per square meter. Most residents do not register their lands. One municipal registrar estimated that only 40% of those living in the municipal seat had registered their land and less than 10% of those living outside the seat had land titles.

The municipality may also facilitate land sales. Land sales in Río Plátano reserve are complicated and, more often than not, illicit activities. Technically, no resident may buy or sell land because all land belongs to AFE-COHDEFOR. Nevertheless, residents are permitted to sell their *mejoras* (improvements) to one another. A *mejora* could be pasture, farm, or cleared land. For example, if a resident clears a piece of forest, he/she may now sell this *mejora* (the cleared land) to another resident. Residents may go to the municipality to draw up papers to sell their *mejoras* to fellow natives. However, few reported doing so, and most said that land sales (or "improvement" sales) are based on informal agreements between the seller and the buyer. Furthermore, although land sales

to non-natives are prohibited, both residents and, in several cases, the municipal mayors themselves, have been accused of drawing up false papers and selling municipal lands within Río Plátano to mestizos.

In addition to the land registry, the municipalities also issue permits to cut timber and collect taxes for timber harvests. None of the municipalities I visited had any records of timber permits or taxes. Most residents complained about the tax system and the illegitimacy of the municipality to have any rights over the native residents lands; nevertheless, few reported ever having paid a timber tax. For the majority of the residents, the municipal offices in the municipal seats are difficult and costly to get to, and the likelihood of getting caught for cutting a tree illegally is minimal.

In general, residents in Río Plátano expressed distrust over government involvement in the region. Although many residents would like the support of government services such as schools, health centers, and roads, they are not willing to pay taxes and do not want the government to manage their lands. In Río Plátano, almost all of the residents interviewed stated that the forests of the region belong to the native residents and that they should be governed as part of an autonomous indigenous territory.

In many instances, Río Plátano residents are working independently of the municipal governments to develop their own political leaders and organizations (Herlihy, 1997). Each site in this study is connected to a regional, indigenous political federation that falls under the broader indigenous political association MASTA. In 1976, indigenous leaders in the department of Gracias a Dios created MASTA to defend indigenous cultural preservation and advocate for indigenous territorial rights to the Mosquitia (Herlihy, 1997, p.109). Today, MASTA serves as an umbrella organization to the indigenous federations in the region. In the cultural zone of the Río Plátano, there are four regional indigenous federations of MASTA. The regional leaders and the leaders of larger federations are all elected by the communities as their representatives in the respective regions. I provide a greater discussion of MASTA and its activities in chapter 4. In general, MASTA's activities focus on obtaining land and resource rights, resource management, and development assistance.

Thus far, MASTA has not gained any official property rights over the Mosquitia. MASTA is, at times, consulted about some of the management plans for Río Plátano

reserve. However, independent of the government management plans, MASTA has prescribed rules with respect to land use and indigenous property rights in Río Plátano.

MASTA and its respective regional federations are often supported by the Honduran NGO Mosquitia Pawisa Apiksa (MOPAWI), Miskito for Agency for the Development of the Mosquitia. MOPAWI is the principal NGO active in Río Plátano and frequently promotes projects for community-based resource management, indigenous land rights, and governance capacity building.

3.3.2 *Governing Bosawas*

Political development in Bosawas is similar to that in Río Plátano. The indigenous residents have long considered themselves to be the rightful owners of the region. The reserve was originally established under the jurisdiction of MARENA. As will be discussed in the following section, in 1997 the indigenous communities established a set of de facto property rights over their territories. This produced greater rule-making and enforcement activities on the part of the indigenous associations in Bosawas.

The two indigenous territories MITK and MSB are the primary governing units in this study. The territories originally began organizing under a single indigenous association, ADEPCIMISUJIN; however, the Mayangna of MSB later split to form their own association—MAKALANA. The territorial association received initial support from Centro Humboldt, a national NGO based out of Managua and TNC. Today, each territorial political association has a board of seven members who are elected by the communities to represent the interests of the territorial residents. The political associations' primary responsibilities include promoting development in the respective territories and defending their territorial claims.

Within the territories, in each indigenous community, there is a community coordinator who acts as community leader. The coordinator position started during the Somoza dictatorship and was further expanded by the Sandinista government that appointed community coordinators.ⁱⁱⁱ The community coordinator is now an elected position in each community, and each coordinator serves as the community representative to the broader territorial political associations (i.e., ADEPCIMISUJIN and

MAKALANA). The community coordinator speaks on behalf of the interests of his/her community, is responsible for organizing community meetings to discuss community issues, helps to monitor land use, and mediates community conflicts. In addition, there is a justice of the peace assigned to each community to help resolve conflicts. This position was created circa 1995 by the Organization of the American States. Whereas the community coordinator is active in every community, it is less evident how active the justices of the peace remain.

The relationship between the indigenous territories, MARENA, and the respective municipalities has yet to be defined. Today, MARENA is responsible for the buffer zone of Bosawas and holds rather vague advisory responsibilities in the indigenous territories. By and large, MARENA has minimal presence in Bosawas. Due to insufficient funds and personnel, MARENA employees are unable to travel deep into the reserve.^{iv} Although MARENA has a set process for investigating and prosecuting illicit activities in the reserve, employees noted that the investigations rarely occur because of the high costs incurred and insufficient funds.^v On occasion, MARENA officials and the Nicaraguan military may be called in to enforce territorial rules; however, the indigenous residents assert that MARENA cannot sanction any indigenous resident without permission from the territorial governing body.

The municipalities have virtually no influence over activities in the two indigenous territories in this study. The residents do not pay taxes to the municipality, and the representatives from the respective municipalities rarely visit the territories.^{vi} In an interview with the mayor of one municipality, he complained that the municipality had little authority in Bosawas and had not been included in the management plan (interview, Bosawas, August 3, 2004).

Outside of the indigenous territories, in the Bosawas buffer zone, the mestizos are also trying to develop their own independent governance system. The mestizo region is divided into two unofficial territories that are governed by their respective mestizo associations: Farmers Association for the Protection of Bosawas (ACAPROBO) and APDECOMEBO. This study includes mestizo communities under the jurisdiction of APDECOMEBO. Today APDECOMEBO has an elected board of leaders that govern approximately 34 communities in the region. Each community has a mayor who forms

part of APDECOMEBO. The mission of the organization is to obtain mestizo tenure rights, obtain development assistance for schools, farming, ranching, and other community needs and promote environmental conservation of the region.^{vii}

4 THE PROBLEM: COLONIZATION FRONTS IN RÍO PLÁTANO AND BOSAWAS

The principal problem that this dissertation aims to examine is agricultural expansion produced by mestizo migration to the Mosquitia. Colonization trends in the region were (and continue to be) driven by a variety of underlying geographic, cultural, political, and economic factors. One of the principal underlying factors is land distribution and property-rights policies. Aggressive agroindustry policies initiated after World War II in southern Honduras pushed many farmers off their land and, to date, contribute to the problem of rural landlessness (Jones, 1988; Stonich, 1993; Utting, 1993). Similarly, land pressures and poorly coordinated agricultural reform policies created a land crunch in Nicaragua in the early 1990s. In particular, government policies enacted by President Violeta Chamorro (1990–1997) re-concentrated land distribution and encouraged migration to the Bosawas region after the end of the Nicaraguan civil war (Abu-Lughod, 2000; Cupples, 1992; Everingham, 2001; Stocks, 1998).

Migration into the cultural zone in Río Plátano began in the late 1980s. At that time, over one-quarter of the rural populace was landless in Honduras (Salgado, 1996, p. 92). The colonization front started when national farmers' organizations began exploring the Mosquitia and encouraging farmers to organize and move out to the region and pressured the government to open up the Mosquitia to colonization. Much to the dismay of the reserve residents, in 1995, the Honduran government declared the northwestern edge of Río Plátano a region for agrarian reform and encouraged thousands of families to move to the area. A top-down declaration, the Agrarian Reform was poorly organized and did not consider that the local population already occupied 80% of the arable land. Upon arriving at the edge of the reserve, the migrant families found all the land occupied and many decided to move further inside the reserve in search of land (IUCN/ORMA, 1995; Messen, 1995). In 1996, UNESCO listed Río Plátano as a World Heritage Site in Danger due to unregulated encroachment by cattle ranchers and farmers from outside the region

and the absence of an effective management plan (UNEP-WCMC, 1997). By 1997 there were approximately 2,200 mestizos living in the cultural zone of the reserve (PBRP, 1997/98).

In Bosawas, residents reported that colonization pressures began to build after the civil war, in the early 1990s. During the 1980s, Bosawas was a region of heavy conflict between the Contras and Sandinistas. At this time, most of the Mayangna and Miskito peoples were either forced to serve one of the militant groups or removed to camps in Nicaragua and Honduras (Stocks, 1996). After the war, Nicaraguan politicians encouraged ex-Contra and ex-Sandinista combatants to relocate in “development poles” on the edge of the Bosawas forests. While some came with government-issued land titles, others moved to the region by either buying land from native residents or invading apparently unoccupied forest lands. According to a study conducted by TNC, in 1980 there were only 191 mestizo families living in the southern region of Bosawas. By 1996, 1,977 families had moved to the area (Hurtado de Mendoza, 2001, p. 41).

5 INDIGENOUS STRATEGIES AND DEMANDS IN RESPONSE TO MESTIZO MIGRATION

5.1 Río Plátano Residents Respond to the Mestizo Migratory Threat

Residents in the cultural zone of Río Plátano first became aware of outside encroachment into their homelands in the early 1990s. In 1992, the Honduran NGO MOPAWI began a participatory analysis of land use in Río Plátano in which leaders from the various communities in the reserve participated in an exploration of those living in and using their lands. On this trip, residents saw areas in the northwestern region of the reserve deforested by colonizers for farm and pasture lands. Upon returning to his community in the coast of the Lagoon of Ibans, one leader called a regionwide meeting of the coastal communities to call attention to the threat of outside encroachment. While outsiders had not yet intruded into the coastal communities, they were staking out properties on lands farmed by the Miskito.

At the regionwide community meeting, participants decided to create The Land Vigilance Committee [Comite Vigilancia de Tierra (CVT)] to monitor outside intrusions, organize groups to tell outsiders that they were not welcome, and report any invasions to

the authorities. The CVT was based out of the coastal community Ibans and had subcommittees organized in approximately 15 communities in the cultural zone. While all monitoring activities were voluntary, MOPAWI supported the organizational development of the committee.

In addition to monitoring outside encroachment, the CVT also demanded that the government either give indigenous peoples their own territory to manage or implement a management plan to control the colonization process. Residents said that they felt they needed greater government support and, if the government truly wished to conserve Río Plátano, they needed to work with the residents in its protection.^{viii}

5.2 Bosawas Residents Respond to the Mestizo Migratory Threat

In Bosawas, when the Mayangna and Miskito peoples returned to their communities after the war in 1991 they were confronted with two shocks. First, the lands that they considered to be theirs had been declared a natural resource reserve to be governed by MARENA, and second, mestizo farmers were moving into their homelands in mass.

In response to the in-migration and threats to their homelands, the Miskito and Mayangna joined forces and organized themselves to defend their land and their livelihoods. In 1993, the leaders from each group formed the indigenous association ADEPCIMISUJIN. The goal of the group was to establish indigenous rights to their lands and defend them from mestizo colonizers. One of the first steps of the group was to go to Managua to seek financial and political support. Centro Humboldt, an NGO in Managua, and two Nicaraguan politicians offered initial financial and legal support and the group received official recognition from the Nicaraguan government as a territorial association in 1994.

6 POLICY RESPONSES: RESTRUCTURING THE RESERVES' PROPERTY-RIGHTS REGIMES

In the early 1990s, Río Plátano and Bosawas struggled to conserve the ecological and cultural diversity in the region. At this time, both reserves were government owned and

managed. However, in the mid-1990s, each reserve initiated participatory processes to rezone the reserves and create new management plans aimed at controlling agricultural expansion and other illegal activities. After the World Heritage Commission declared Río Plátano a World Heritage Site in Danger, the Honduran government agreed to implement a new management plan with the help of the German development agencies GTZ and KfW. Similarly, in the early 1990s, as part of their Parks in Peril program, TNC began to work in Bosawas. The process in Río Plátano was primarily concerned with creating reserve management rules and guidelines. The Río Plátano process did not strengthen residents' rights to the land and resources. In contrast, the Bosawas process focused on establishing indigenous property rights and then working with the existent indigenous associations to devise an appropriate management plan. As will be shown in subsequent chapters, the respective processes and resultant property-rights policies have produced very different outcomes in terms of forest conservation and governance in the region.

6.1 Restructuring Río Plátano

In 1996, the Honduran government signed a bilateral agreement of assistance with the German government in which they agreed to bolster the Río Plátano reserve and create the Biosphere Project. In 1997, a presidential decree declared that the reserve would be managed under a co-management policy. The decree determined that the reserve would fall under the jurisdiction of AFE-COHDEFOR, but that AFE-COHDEFOR would develop a participatory process in which all those with a stake in Río Plátano would participate in the decisions with respect to the conservation and resource use (AFE-COHDEFOR, 2000, p. 40; CNH 1997). At this time, the Germans began to work with AFE-COHDEFOR to establish a management plan for the reserve. With the help of a geographer from the University of Kansas, Peter Herlihy, the Biosphere Project developed a participatory decision-making process to rezone the reserve.

6.1.1 Implementation

In the first stage of the project, Herlihy, residents, and reserve officials worked to create a management plan. As part of the process, the residents mapped out the areas of the forest that they used and specified what types of regulations should be applied to each zone (AFE-COHDEFOR, 2000; Herlihy, 2001). All of the mapping was done on paper and none of the community boundaries or land-use zones were physically demarcated. In addition to the mapping, the Biosphere Project organized the residents into two levels of conservation committees: community-level conservation committees to monitor daily activities and municipal-level committees to provide oversight and monitor the resources. The community-level and municipal-level conservation committees were supposed to support AFE-COHDEFOR and monitor the resource-use rules designated in the participatory mapping process (interview, Río Plátano consultant, 2003). It is important to note that the committees were created by the Biosphere Project and the process did not support the local land vigilance committees, such as CVT, already in operation.

6.1.2 Application

The second stage was the application of the management plan. The application of the management plan differed significantly from what was proposed to the communities during the initial mapping and rule-making activities. The final management plan (AFE-COHDEFOR, 2000) did not include the communities' rules nor did it recognize the community conservation committees.^{ix} The Biosphere Project completely abandoned the community-level conservation committees and gave minimal support and recognition to the municipal-level committees. The municipal committees were not given any management rights or responsibilities.

In 2004, I interviewed members of all but one of the municipal-level committees. Most members were disinterested and frustrated with the organization due to lack of direction and support. The president of one committee said he was simply waiting until the Biosphere Project returned and called new elections so he could be relieved of his position (Hayes, 2004). In 2005, in interviews with Biosphere Project personnel, officials stated that the municipal conservation committees were no longer in operation.

Today, residents complain that the rules that govern the Río Plátano are not the ones they helped create. The reserve residents hold no property rights or management responsibilities. Lack of funds and personnel, however, translates into a minimal government presence in the reserve. At the time of my visits in 2005–2006 there were *no* AFE-COHDEFOR or Biosphere Project forest guards working in Río Plátano. Furthermore, given the high levels of tension in Río Plátano and lack of judicial support, AFE-COHDEFOR employees that do visit the reserve are ill-equipped to deal with the conflict and illegal activities in the region. ^x

6.2 Re-Defining Bosawas

In 1993, TNC began a conservation project in Bosawas. During the first meeting, the indigenous residents requested help in demarcating their territories and defining their territorial rights (Stocks, 2003). In 1994, under the guidance of Idaho State University professor Anthony Stocks, TNC started to work with the indigenous residents to document the territorial claims of the Miskito and Mayangna peoples and create a system of norms to manage their natural resources.

6.2.1 Implementation

The process began with a participatory mapping project in which the indigenous communities identified and mapped six indigenous territories. The mapping was followed by physical demarcation along the frontiers most threatened by colonists and a group of forest guards were organized to patrol the borders. Consultants also worked with the leaders of ADEPCIMISUJIN and the individual communities to create land-use management plans. Through a series of community and territorial meetings, each territory denoted areas for agriculture, forest-product gathering, and strict forest conservation. In addition, the territories created a system of management rules that regulated entrance into the territories and the residents' withdrawal and access rights. The forest guards in conjunction with the community coordinators and the territorial associations were

responsible for monitoring. Enforcement continued to be largely informal and based on the traditional customs of shame and community disapproval (Stocks, 2003).

The demarcation process was highly contentious. Upon hearing about the indigenous plan to demand territorial property rights, the mestizos just south of the indigenous territories, MITK and MSB, organized themselves into the two mestizo associations: ACAPROBO and APDECOMBO. During the demarcation process, the associations fought to maintain mestizo rights to the land. Both mestizo and indigenous residents recall incidents of violent conflict between the two groups. At one point, a group of mestizos kidnapped the leaders of ADEPCIMISUJIN and held them hostage until they agreed to change the territorial boundaries of MITK and MSB. Eventually, the two groups engaged in a series of negotiations facilitated by TNC and the Nicaraguan NGO, Centro Humboldt. In 1997, the territorial boundaries were finally agreed on and all parties signed a series of accords that defined indigenous and mestizo property rights in the territories.

The participants from each association agreed that the indigenous peoples retained property rights to their territorial lands. The participants also agreed that mestizos currently living in the indigenous territories would be allowed to remain so long as they complied with indigenous management rules. The territorial boundaries would be monitored by indigenous forest guards. Both the indigenous and mestizo associations would be responsible for ensuring that their constituents complied with the accord. The accords created a de facto set of property-rights rules for the region.

6.2.2 *Application*

In interviews, the reserve residents (mestizos and indigenous people) often referred to the de facto agreements signed in 1997 as “the law.” Nevertheless, the process did not end after the physical demarcation of the territories. Centro Humboldt continued (and continues) to provide financial and technical support to the territorial associations and the corps of forest guards. Furthermore, the territorial associations in conjunction with Centro Humboldt persisted in their pursuit of legal recognition of the indigenous territorial property rights from the Nicaraguan government. In 2003, Law 445 passed by

President Enrique Bolanos Geyer recognized indigenous rights over the region and created a process by which they could legally obtain their territorial titles. In May 2005, the territories were given their titles, however, as of April 2006 the Nicaraguan government was still in the process of registering the titles.

7 DO DIFFERENT PROPERTY RIGHTS PRODUCE DIFFERENT OUTCOMES?

The Bosawas and Río Plátano property rights processes both had the same goals of controlling agricultural expansion into the reserves and promoting forest conservation. However, the Río Plátano process differed from the Bosawas process in four significant ways.

First, Río Plátano remains a government reserve whereas Bosawas residents share common-property rights to their ancestral lands. Second, the Río Plátano process did not physically demarcate any of the land-use areas or territorial boundaries; the land-use maps were defined only on paper. Third, the residents were not fully incorporated into collective-choice decisions with respect to management, monitoring, and access to their lands. Unlike Bosawas, where indigenous and mestizo residents participated in the collective-choice decisions that in a sense created a constitutional agreement with respect to land rights and uses in the region, in Río Plátano, residents did not agree to the rules and no residents were able to establish property rights. Furthermore, no negotiations were held with mestizo residents. The mestizos were informed that only those living in the reserve before 1997 could remain; no newcomers were permitted. However, no effort was made to ensure that the mestizos would comply with these rules. Finally, the Río Plátano process failed to establish resident monitoring and enforcement mechanisms. All enforcement activities remained the responsibility of AFE-COHDEFOR.

The following chapters show the different outcomes and effects of the property-rights policies enacted in each reserve. The chapters examine how property rights influence two outcomes of interest: (1) the ability to control agricultural expansion and (2) the development of land-use and governance institutions for continued land and forest management. In chapter 3, I compare agriculture expansion, specifically mestizo colonization, in Río Plátano and Bosawas since the mid-1990s. However, it is not enough

to show that property rights make a difference; the crucial question is what specific factors contribute to these differences. In chapters 4–6, I probe deeper into institutional change and how and why property rights influence institutional resilience and how the different arrangements impact future land management challenges in the Mosquitia Forest Corridor.

Endnotes for Chapter 2

ⁱ Arguably, this has been largely resolved in Bosawas, but it is still unclear how much authority the MARENA believes it holds (and actually holds) over the indigenous territories.

ⁱⁱ This mission was stated at a regionwide MASTA meeting held in Ahuas, March 2005. In interviews, leaders of the regional federations consistently stated that their goal is an autonomous territory.

ⁱⁱⁱ Interview, MSB leader, San Andres, September 2005.

^{iv} Interviews with MARENA engineers, Jinotega, August 2, 2004, and Bonanza, August 11, 2004; MARENA technician, Bocay, August 3, 2004; lieutenant-colonel of Nicaraguan Army, Jinotega, August 2, 2004; official of Protected Areas, MARENA, Managua, September 25, 2005.

^v Interview with MARENA engineers, Jinotega, August 2–3, 2004.

^{vi} Interview, mayor of Bosawas municipality, August 3, 2004.

^{vii} Interviews with mestizo leaders of APDECOMEBO, Tortuga, August 30, 2005, and Plis, September 12, 2005.

^{viii} Interviews with CVT leader, Belen, April 23, 2005; CVT member, Banaka, April 29, 2005.

^{ix} Interviews with Río Plátano reserve consultant, 2003; Miskito leader, Belen, Honduras, April 23, 2005; Río Plátano official, Tegucigalpa, Honduras, November 8, 2005.

^x Hayes, 2002; interview, AFE-COHDEFOR employee, Tegucigalpa, November 8, 2005.

CHAPTER 3
DOES TENURE MATTER?
COLONIZATION TRENDS IN RÍO PLÁTANO AND BOSAWAS BIOSPHERE RESERVES

1 INTRODUCTION

Many Mosquitia residents complain that tenure insecurity is at the root of the deforestation occurring in parts of the region.ⁱ Although some conservationists and policy makers contend that publicly managed lands serve to safeguard forests from overexploitation, indigenous residents in the region argue that public management of the Mosquitia forests fails to control agricultural expansion and violates their ancestral rights to the land and its resources. They demand communal tenure rights in order to protect their lands from outside encroachment.

In 1997, the Honduran government responded to the threat of mestizo expansion into Río Plátano reserve by creating a new management plan. The management plan established the cultural zone in the reserve as a region specifically for the indigenous residents of Río Plátano, and the plan prohibited mestizo entry into the zone. However, the management and ownership of the cultural zone (and the entire reserve) remained under AFE-COHDEFOR. At the same time, in Nicaragua, the indigenous residents of Bosawas, in association with international and national NGOs created a new management plan for Bosawas. In contrast to the plan established in Río Plátano, the management plan in Bosawas designated a set of indigenous territories and established indigenous property rights over their territories. This process was recognized by the Nicaraguan Ministry of the Environment and Natural Resources and the rights have since been codified by the Nicaraguan legislature.

Are the protected-area policies enacted in Honduras and Nicaragua equally successful in thwarting outside encroachment and promoting forest conservation in the region? In this chapter, I use institutional analysis and GIS analysis to identify the different property rights policies enacted in Río Plátano and Bosawas and to examine whether and how the specific rights are working to prevent further encroachment. I find that both the Río Plátano and Bosawas reserves have broadly similar rules that restrict mestizo settlements

on indigenous lands; however, who made the rules and how they are invoked and applied in everyday life vary between the two reserves. The ability to make and enforce the land-use rules—collective-choice rights—is the crucial difference between the two reserves. I find that mestizo expansion is better controlled in Bosawas, where the property-rights process established indigenous residents' collective-choice rights that they used to clearly demarcate boundaries, invoke land-use rules, apply monitors, and create mechanisms for conflict resolution.

2 THE PROTECTED-AREA DEBATE: LOCAL RESILIENCE VS. GOVERNMENT STABILITY

Dispute over forest conservation policies in the Mosquitia echo the debate in the broader protected-area arena. At the heart of the debate are (1) the rights and responsibilities to be delegated to resource users and (2) the resiliency of traditional natural resource institutions, given economic, ecological, and social change.

Indigenous and traditional peoples often argue that if governments recognize traditional residents' communal property rights to their lands, they will be better able to conserve frontier forests and fend off outside encroachers (Bray et al., 2005; Brosius, 2004; *The Indigenous Peoples' Declaration*, 2003). Many scholars and practitioners support their claims (Freire, 2003; Godoy et al., 1998; McSweeney and Aarps, 2005; Stocks, 1998, 2003). Advocates for community-based conservation approaches contend that resident peoples have successfully managed their resource systems, often for hundreds of years, and that by excluding residents, conservationists fail to benefit from local knowledge and, at times, destroy local governance systems (Borrini-Feyerabend, 2002; McNeely, 1995; Stevens, 1997; Western and Wright, 1994; Wilshusen et al., 2002). More recently, some scholars have also begun to address resource users' demands for resource rights and question the legitimacy of protected areas that are often heavily financed and governed by government and non-government agencies outside the host country (Alcorn, 2005; Romero and Andrade, 2003; Wilshusen et al., 2002).

At the other end of the spectrum, some conservationists contend that the only way to ensure sustained forest conservation is to increase the area of forest reserves under strict

government management, monitoring, and enforcement (Bruner et al., 2001; Putz et al., 2001; Rice et al., 1997; Terborgh, 2000). Many advocates for government-mandated reserves suggest that traditional resource management systems are not robust and that said institutions will fail when confronted with market integration, conflicts between heterogeneous resource users, political influx, or demographic change (Redford, 1991; Redford and Stearman, 1993; Terborgh, 1999). In the context of agricultural expansion, conservationists worry (1) if indigenous residents are able to control outside encroachment and (2) if by recognizing indigenous property rights, the conservation community is simply trading the rapid threat of outside encroachment for a slower, but inevitable, threat of indigenous resource exploitation as population increases and traditional peoples adopt market values (Terborgh, 2000; interview with employee of Saint Louis Zoo, Managua, September 2005). Rather than depending on the whims of local systems, many put greater faith in the legal systems and argue that, in the long term, only legally recognized and publicly managed nature reserves will ensure sustainable conservation (Chapman, 2003; Redford, 1991; Redford and Richter, 1999; Terborgh, 2000).

Despite the heated debate, studies show that no single property-rights arrangement necessarily ensures environmental conservation. Although many conservationists insist on publicly protected areas; public, private, and common-property arrangements may all sustain (or exploit) natural resource systems (Dietz et al., 2003; Ostrom, 1990, 2005; Schlager and Ostrom, 1992). The key question for policy makers and planners is what factors influence how different institutional arrangements function in specific contexts.

3 DEFINING THE PROPERTY RIGHTS IN FOREST MANAGEMENT

In order to understand how tenure affects resource management, we must specify the property rights in a particular tenure arrangements and disentangle the bundle of rights within the context of a specific region, resource, and set of resource users. Schlager and Ostrom (1992) distinguish between five different property rights related to resources operating at two decision-making levels: operational and collective-choice. These five rights include the ability to access, withdraw, manage, exclude, and alienate a resource.

At the operational decision-making level, individuals are entitled *access to* and *withdrawal from* a resource system. Decisions made at the operational level do not determine rules about resource use. Those with collective-choice decision-making rights are entitled to make rules that *exclude* others and make *management* decisions that determine future access and withdrawal rights and potentially define zones for use patterns and change the physical layout of the resource (such as demarking boundaries in diverse ways). *Alienation* is also a right decided at the collective-choice level and entitles one to sell or lease access, withdrawal, and management rights. Table 3.1 shows the five different rights and their respective decision-making levels.

Table 3.1. Bundles of Property Rights

Property Rights	
Operational Level	
Access	Use rights
Withdrawal	
Collective-Choice Level	
Management	Right use and transform resource
Exclusion	Right to decide access rights
Alienation	Right to sell or lease rights

Table adapted from Schlager and Ostrom (1992).

Schlager and Ostrom emphasize that different bundles of property rights, whether they are de facto or de jure, affect the incentives individuals face, the types of actions they take, and the outcomes they achieve. Of particular importance are the collective-choice rights, as those who hold collective-choice rights have the right to make decisions about who will have future rights. For example, in Río Plátano, community residents have the right to cut a certain number of board-feet each year. Therefore they hold withdrawal rights. However, AFE-COHDEFOR holds the management rights to decide who can cut timber and how many board feet. In this case, AFE-COHDEFOR has collective-choice rights that determine the future rights assigned to the community. In contrast, in Bosawas, residents hold all the collective-choice rights to decide who can

access and withdraw resources and to make rules about how the resources will be managed.

3.1 Clusters of Rules to Specify the Rights

While it is important to identify who has the right to make specific decisions, it is equally important to understand how the right-holder is exercising that right. Management, exclusion and alienation rights all enable the right-holders to specify rules that characterize the property-rights regime. Ultimately, the types of rules that the right-holders decide to make (or not make) define the property-rights regime and influence the use of the resources. McKean, Ostrom, and colleagues note that within a property-rights system, different configurations of rules may affect the ability to successfully manage a resource over time. Specifically, rules with respect to management, monitoring, and enforcement have been found to be important components of successful common-pool resource systems (McKean, 1992; Ostrom, 1990; Schlager and Ostrom, 1992).

In order to better understand the different types of rules that influence resource management systems, Ostrom and colleagues (Crawford and Ostrom, 1995; Ostrom, 1999, 2005) categorize the rules into different clusters, depending on their specific functions. For example, boundary rules are all rule statements that specify who the participants are and can be used as part of a rule configuration to restrict access rights. However, the boundary rule may not be complied with unless it is configured with position rules that specify who will monitor and enforce the boundary rule and a pay-off rule that specifies a sanction. In this chapter, I focus on five clusters of rules and consider how they are configured to define the broader property-rights regimes in Río Plátano and Bosawas reserves. Table 3.2 shows the different clusters of rules as defined by Ostrom (1999, 2005) and Crawford (Crawford and Ostrom, 1995).

Table 3.2. Property-Rights Rules

Property-Rights Rule Clusters	
Boundary	Specify who the participants are
Scope	Specify the spatial and temporal constraints on land use
Choice	Specify what is permitted, required, or forbidden
Payoff	Specify the sanctions to be applied
Position	Specify who will monitor and enforce

Table adapted from Ostrom (2005).

The institutional statements in Table 3.2 define who uses a resource, how it is used, and whether/how that use is monitored and enforced. The specification of the rules and their configuration with other rules can be particularly useful in understanding natural resource management. Say, for example, that a community owns exclusionary rights to its land and has crafted the following set of rules to manage their forests:

1. Only those living within the community have the right to use the forest (boundary).
2. The forest boundaries that lie between the two rivers belong to the community (scope).
3. Any outsider caught felling trees in the forest must forfeit all the timber that he or she has cut (payoff).

In the case above, the forest access rights are well defined—only those living in the community can use the forest between the two rivers. The rules also specify a sanction for outside encroachment. However, the rule configuration does not assign a position rule that specifies a monitor or enforcer. Therefore, in this example, it is not clear if there is anyone out in the forest looking for outside encroachment and, furthermore, if an outsider were caught, who would make him/her forfeit the timber?

3.2 Analysis of Rule Configurations

Two important criteria apply to an analysis of rule configurations. First, if a right-holder does not define the right by a set of institutional configurations, the default is that there is no rule. For example if whoever holds an exclusionary right to a forest does not further specify the right by specific institutional statements, then the default rule configuration would be that anyone is able to enter and use the forest anywhere (Crawford and Ostrom, 1995; Ostrom, 1990). Second, if the rule is not invoked or applied, it may be only a rule-in-form and not actually recognized by the resource users. Kaimowitz, Faune, and Mendoza (2003) note that in many frontier forests, governments frequently have few (if any) personnel, and laws are rarely invoked or applied. In the context of the Mosquitia, many laws and regulations that are prescribed are in fact never applied or recognized. Therefore, in analyzing how the configuration of property rights and their respective rules influence forest conservation in the Mosquitia, I consider not only the prescribed rights and rules, but also what monitoring and enforcement mechanisms are invoked and applied in each reserve.

4 CONTEXT: RIGHTS AND RULES IN RÍO PLÁTANO AND BOSAWAS RESERVES

This chapter compares property rights, rules, and encroachment in the cultural zone of Río Plátano and in the two indigenous territories, MITK and MSB, in Bosawas. I focus specifically on institutional differences in: (1) who holds what property rights and (2) how those rights are exercised (i.e., the configuration of rule clusters associated with each right).

Table 3.3 shows the specific configuration of rights and rules prescribed in each reserve. There are two differences that I want to highlight. First is the difference in right-holders (government versus indigenous residents) and second are the differences in the right-holders' decisions of whether and how to exercise their rights. The Honduran Ministry of Forestry and the indigenous residents in Bosawas share similar collective-choice rights. However, there are significant differences in how they have chosen to exercise and apply those rights.

Table 3.3. Property Rights in Río Plátano and Bosawas

RÍO PLÁTANO		
Property Right	Right-Holder	Rule (IN-FORM)
Exclusion	Ministry of Forestry	No new non-natives permitted since 1997
Alienation	Ministry of Forestry	No land sales permitted to non-natives
BOSAWAS		
Property Right	Right-Holder	Rule (IN-USE)
Exclusion	Indigenous residents	No new non-natives permitted since 1997
Exclusion	Indigenous residents	Territorial boundaries physically demarcated and patrolled
Alienation	Indigenous residents	No land sales permitted to non-natives

There are two principal ways that mestizos obtain land: invasion and purchase. The broad, formal rules to control these means of encroachment are very similar in each reserve. Both forbid mestizos from entering specific zones or territories and both prohibit land sales to mestizos. However, the specific rule statements and their applications differ in significant ways between the two reserves.

4.1 Right-Holders and Rules in Río Plátano

In Río Plátano, all formal reserve rules are determined by AFE-COHDEFOR (in conjunction with the binational Biosphere Project, as discussed in chapter 2). In 1997, AFE-COHDEFOR and the Biosphere Project prescribed a management plan for each zone in Río Plátano reserve. The cultural zone of Río Plátano reserve was designated as a region specifically for the indigenous people. In an effort to control mestizo encroachment into the cultural zone, the management plan prohibited new mestizo settlements. Only those mestizos who were in the zone before 1997 could remain. Likewise, indigenous residents were forbidden from selling land to those outside the cultural zone. The management plan included scope and boundary rules that demarcated

the limits of the cultural zone (*on paper*) and restricted mestizo access. The management rules were, however, largely a paper plan.

Today, Río Plátano rules are essentially rules-in-form. In Río Plátano, the cultural zone is identified on a map, but the boundaries are not physically demarcated for the zone. In interviews, many indigenous residents stated that they did not know where the cultural zone begins or ends. Furthermore, although the Río Plátano management plan prescribed monitoring activities to the forest guards, this rule has only been sporadically applied. During fieldwork I conducted in 2003, I found only two forest guards working in the cultural zone (3,895 km²) (Hayes, 2004). In 2006, *no* forest guards were employed in the cultural zone of Río Plátano. Although the management plan prescribed sanctions that included fines and possible jail time for forest destruction, the government's weak monitoring and enforcement mechanisms have meant that few, if any, sanctions have ever been applied.

4.2 Right-Holders and Rules in Bosawas

In Bosawas, the indigenous residents established shared access and withdrawal rights as well as collective-choice rights to manage their territorial lands. In 1997, the indigenous residents of Bosawas also created a management plan. Similar to the plan proposed in Río Plátano, in order to control mestizo encroachment, the residents created rules that forbid new mestizo settlements and prohibited indigenous residents from selling territorial lands to mestizos. The property rights and the associated rules were drawn up into a contract that was signed by indigenous and mestizo leaders in the region. The property-rights rule configuration included boundary and scope rules that stated that only those mestizos living in the territories before 1997 could remain.

The Bosawas property-rights rules clearly designated the boundaries of the indigenous territories by cutting a *carril*, or swath of land several meters wide along the border of the territorial boundaries. The residents also demarcated the boundaries by planting specific trees, and placing yellow posts and signs along the southern territorial boundaries that border mestizo lands. Forest guards monitor the land-use rules and the boundaries. Figure 3.1 shows two of the boundary markers along the southern borders.



Photo on the left shows a yellow post in the boundary *carril* of Mayangna Sauni Bu. Photo on the right is a sign posted on the southern boundary of Miskitu Indian Tasbaika Kum. It says, “Welcome to the Indigenous Reserve Miskitu Indian Tasbaika Kum. Stop Destructive Colonists”

Figure 3.1. Boundary Markers in Bosawas

Contrary to Río Plátano, Bosawas rules are rules-in-use. The residents not only created a plan that prescribed the boundary, scope rules, and position rules to prohibit and monitor mestizo encroachment, they applied the rules by physically demarcating the boundaries of their territories. The physical demarcation clarified indigenous property-rights boundaries to the mestizo settlers and the indigenous residents. Furthermore, as part of the property-rights process, indigenous residents established shared rights to the lands. This meant that no individual could sell lands inside the boundaries of the territories.

The boundaries and land-use rules were further established by the position rule that created a group of indigenous forest guards to monitor the land-use rules and boundaries. The forest guards are a select group of residents who conduct monthly patrols of the territorial lands and clean the boundary *carriles*. Today, they receive technical and financial support from the Nicaraguan NGO Centro Humboldt. Enforcement of the rules remains largely informal and depends on public shaming, verbal warnings, and

negotiations between the territorial indigenous associations and the mestizo political associations (Stocks, 2003).

The discussion above shows clear differences in right-holders and the application and invocation of the reserve rules. At the crux of this dissertation is the question, do the rights and rules make a difference in the ability to control mestizo encroachment? Institutional differences in Río Plátano and Bosawas provide an ideal opportunity to test whether property rights do, in fact, matter.

5 STUDY SITES

I compare mestizo settlements, encroachment patterns, and attitudes toward the respective land-use rules in the cultural zone of Río Plátano and the two indigenous territories, MITK and MSB in Bosawas. Figures 3.2a and 3.2b show the study region, the study sites, and the mestizo migratory fronts. Note that the study region of MITK includes only the southern half of the Miskito territory. I chose to focus on the southern half of MITK because it is the region most threatened by mestizo encroachment. In the analyses, I present only the southern half of the territory because I was unable to obtain a Landsat image for the northern half of the territory. In both MITK and MSB, I focus primarily on communities and land-use activities in the regions that border the mestizo buffer.

In Río Plátano and Bosawas I conducted interviews at the zonal and territorial levels, respectively, and within specific communities in each reserve. In Río Plátano, I conducted interviews with indigenous leaders, non-government personnel, and reserve officials working in the cultural zone to understand the property rights prescribed in 1997 and their present application.

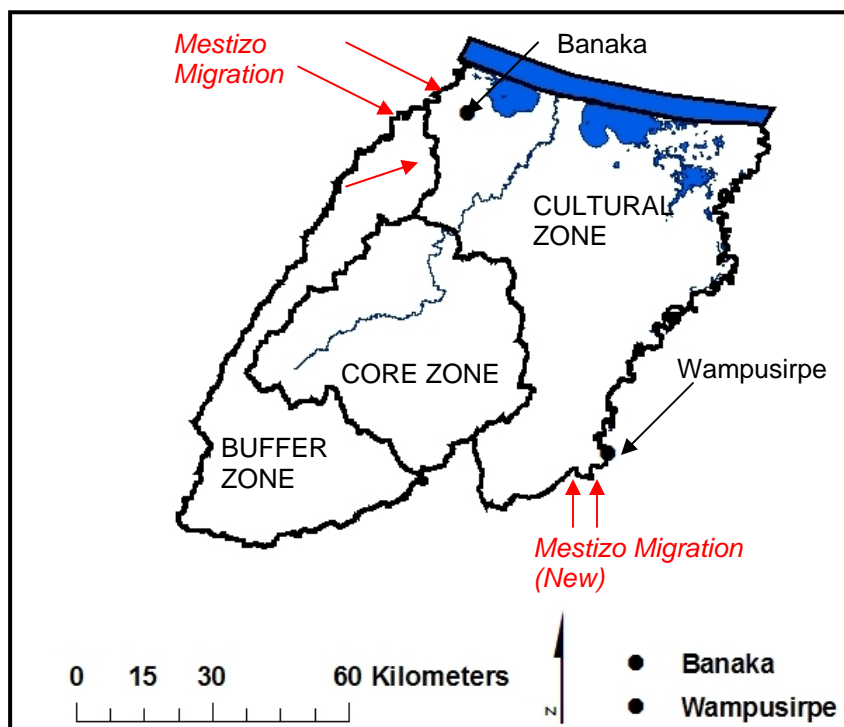


Figure 3.2a. Río Plátano Study Sites and Mestizo Migratory Fronts

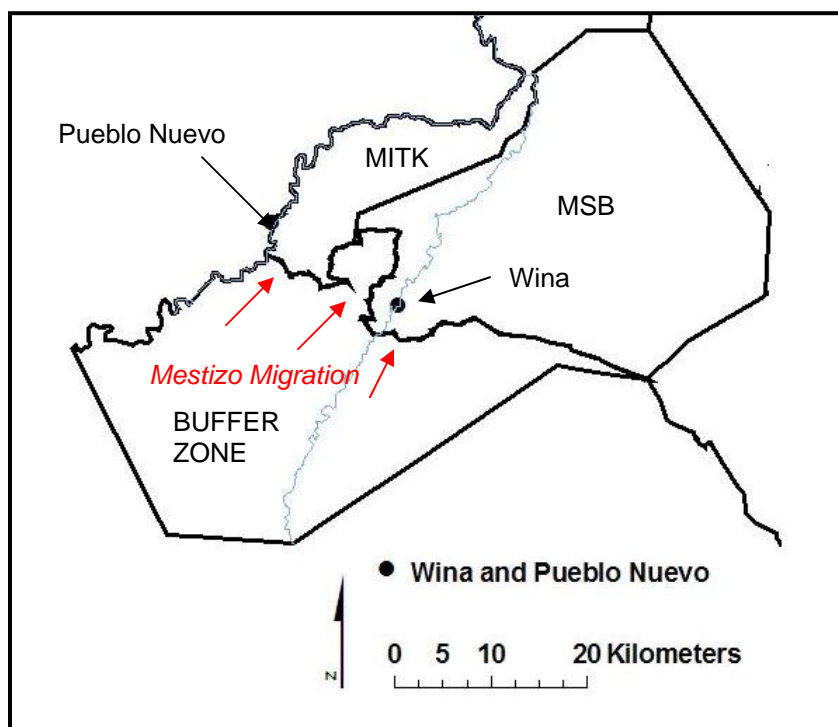


Figure 3.2b. Bosawas Study Sites and Mestizo Migratory Fronts

In this analysis, I present fieldwork I conducted in two communities: Banaka and Wampusirpe. Both communities are in the path of mestizo migratory fronts. In this chapter, however, the land-cover analyses focus primarily on fieldwork and data from Banaka. Banaka lies in the western half of the cultural zone, and the region is bound to the west by land that is outside the reserve and predominately a mestizo region. It is bound to the southwest by the buffer zone designated for mestizos living in Río Plátano reserve. Banaka is a predominately Miskito community and, in 2006, had 50 houses. I chose to focus on Banaka (over Wampusirpe) because it has a longer history of encroachment in the region. Banaka's history is similar to that of Bosawas. Encroachment from the south toward Wampusirpe started after 2000. Wampusirpe has 260 houses in the region. I show Wampusirpe on the map and discuss the interviews and findings from Wampusirpe briefly in the analysis, but the land-cover images that I have for Río Plátano are not recent enough to visually capture mestizo activity in the region.

In Bosawas, I also conducted interviews at the territorial level with indigenous leaders and government and non-government personnel working in the region. I conducted fieldwork in two indigenous sites: Wina and Pueblo Nuevo. Wina is a Mayangna community inside the territory of MSB. In 2005, Wina had 23 houses. Wina is the first community just inside the Mayangna territory and at the edge of the mestizo migratory front. Similarly, Pueblo Nuevo is a Miskito community in the Miskito territory MITK. It is also just inside the territorial borders. There are approximately 20 houses in the community. I chose to study Wina and Pueblo Nuevo because they are the southernmost communities in each territory. This means that they border the mestizo buffer zone and would be the most likely to experience mestizo encroachment from the south.

6 DATA AND METHODS

I use three principal data sources to analyze the relationships between mestizo encroachment and the different property-rights arrangements: geographic coordinates of

mestizo settlements in each reserve, classified Landsat images, and interview responses and questionnaire data

I used GIS analysis in conjunction with coordinates that I took of mestizo settlements to locate and compare the physical presence of mestizo settlers in each reserve. In each study site I visited mestizo settlements in the region and identified indigenous and mestizo land-use practices. I used GPS units to record the coordinates of the mestizo and indigenous settlements and farms. I used GIS to map the sites onto classified Landsat images of land cover in the reserves to examine where the mestizo sites are relative to the specific boundary lines and what the associated land cover is the region.

Landsat images classified by AFE-COHDEFOR and MARENA complement the fieldwork and serve to compare outside encroachment in the respective reserves. For Río Plátano, I was able to obtain relatively cloud-free images for 1995 and 2001 to conduct an analysis over time. In Bosawas, I obtained one image from 2003.ⁱⁱ Analysis of land cover in Bosawas is further supported by an analysis of land-cover change over time conducted by Stocks et al. (in press).

In order to identify whether the specific boundaries make a difference in encroachment patterns, I compared land use inside and outside boundaries. In the analysis of the cultural zone, Río Plátano, I used GIS to create a 2-km buffer along the edge of the border that divides the indigenous cultural zone and the mestizo buffer zone. I then calculate land-cover change between 1995 and 2001 to see if designation of the cultural zone made a difference in mestizo encroachment across the border. In Bosawas, I used GIS to compare land cover and population densities in 2003 within the indigenous territories (MITK and MSB) and in the mestizo buffer zone outside the territories. I also draw on the analysis by Stocks et al. (in press) of land-cover change inside and outside the territories to discern if the territorial boundaries are controlling mestizo encroachment.

In each community, I conducted introductory community and group meetings and in-depth, semi-structured individual interviews with a purposefully selected sample of community residents. The community meetings were held at the beginning of each site visit and served to introduce myself to the communities, learn about the principal natural resource and development issues in the communities, and gain insights into community

dynamics. In addition to the communitywide meetings I also held group meetings, when appropriate, with women's groups, forest management associations, and other relevant community organizations.

The individual semi-structured interviews were aimed at getting information on the land-use and forest management rules, monitoring and enforcement mechanisms, and community governance structures. Participants for the semi-structured interviews were selected via a snowball process that started with key informants who had been recommended by employees of government and non-government organizations working in the respective regions. When asking for key informants I specified that I was interested in talking with community leaders, those involved in natural resource management, community governance (particularly conflict resolution), and community development. I also asked to speak with elders. Each of these leaders and elders was then asked to recommend others. In all cases, I tried to create a list of key informants that included both men and women with diverse interests. For example, if only certain members of the community had cattle or owned a chainsaw I made sure to speak with them and with those who did not.

Land sales are targeted by both the Río Plátano and Bosawas management plans. Establishing the link between encroachment patterns and reserve rules depends on demonstrating not only that the boundaries are respected and that mestizos are not "invading," but also that indigenous residents are not selling land to mestizos.

In addition to the semi-structured interviews, I use the results from the "Miguel questionnaire" (as explained in chapter 1) to compare individuals' attitudes in Río Plátano and Bosawas with respect to whether they believed their communities can prevent mestizo encroachment and with respect to opinions on indigenous land sales to mestizos. I administered the "Miguel questionnaire" to a purposefully selected sample of households that was based on geographic location of the house and gender.

In the following analyses I examine the physical presence of mestizos in the cultural zone of Río Plátano and the Bosawas indigenous territories, and I compare land use inside the indigenous cultural zone/territories and outside in the mestizo-dominated buffer zones. If the boundaries matter, I expect to see a difference in land-use patterns on each side of the border. Furthermore, I expect that the findings from the semi-structured

interviews and “Miguel questionnaire” will further substantiate that differences in encroachment are, in fact, associated with property-rights policies.

7 FINDINGS ON MESTIZO EXPANSION

The combined analyses of mestizo encroachment in each reserve find that mestizos continue to settle in the cultural zone of Río Plátano. In contrast, in Bosawas, mestizo encroachment has virtually halted in the two indigenous territories. Fieldwork in each reserve, analyses of remotely sensed images of the contested borders, and interviews with residents, forest officials, and non-government personnel working in the reserves demonstrate that in Río Plátano, the designation of the cultural zone and its associated exclusionary rules by AFE-COHDEFOR are not serving to stop new mestizo settlements. In Bosawas, however, the boundary rules created by the indigenous residents are serving to control encroachment and reinforce indigenous property rights over their lands.

7.1 Mestizo Encroachment in Río Plátano

7.1.1 Evidence of Mestizos in Cultural Zone

Figure 3.3 shows mestizo settlements to the west of the Plátano River in the cultural zone. The green circles are mestizo sites. The black circle is Banaka, the principal Miskito study site, and one of the few communities in the region that remains predominately Miskito. The outskirts of Banaka are populated with mestizo settlements. The image shows ten mestizo settlements; however, it is important to recognize that these settlements do not necessarily include all mestizos living in the zone and that the western border of the cultural zone is predominately mestizo.

In interviews I conducted with mestizos living in Río Plátano, I found that many had moved to the reserve since 1997, some as recently as three months previous to my visit (2005). While some were hesitant to state when they moved to the region because they were aware that they were forbidden to live in the cultural zone, others did not understand

the status of the lands they lived on and stated that they had moved to the region because they found “unoccupied” land that they could farm. The mestizo households I encountered ranged from poor families who came to the region because they did not have anywhere else to farm to wealthy ranchers who hired others to maintain their lands as they generally lived elsewhere. Some families cleared land so that wealthier cattle ranchers would rent pasture from them. In several communities, I found Miskito families managing lands for absentee mestizo landowners.

Table 3.4 shows the number of houses in each settlement, the predominant ethnicity, and, when known, approximate arrival dates. In total, I located ten colonist communities in the western region of the cultural zone. I was able to visit six of these communities. One community that is unique is site no. 9. This community is predominately Miskito. However, these Miskitos are referred to by the Banaka natives as “Miskito colonists” because they have reportedly sold their original land in the western edge of the reserve and moved inland. Miskito residents of site no. 9 said that they had moved farther into the cultural zone because their original communities were now dominated by mestizos. However, several noted that they can no longer live among the other Miskito (such as those in Banaka) because they have adopted many mestizo land-use practices such as large homesteads that include permanent pasture lands and houses that are separated from one another.

The fieldwork and maps show that mestizos have not stopped encroaching on the cultural zone since it was formally designated for the indigenous residents and mestizo settlements were prohibited in 1997. Based on the approximate population and settlement data, the number of mestizo houses and mestizo settlements far outweigh the number of Miskito houses and settlements in the western side of the cultural zone.ⁱⁱⁱ

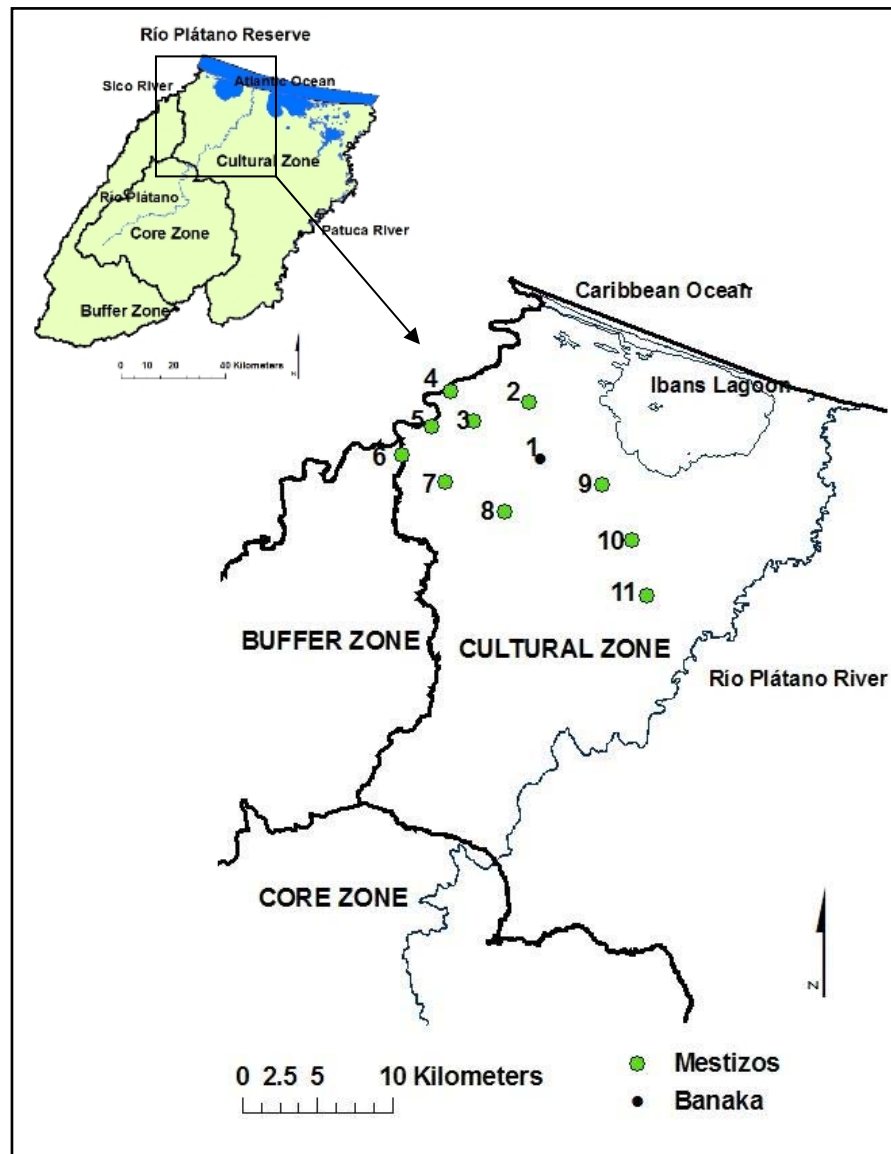


Figure 3.3. Mestizo Sites in Cultural Zone West of the Plátano River

Table 3.4. Demographics in Western Side of Cultural Zone

Site #	# of Houses	Demographics ^{iv}
1	50	Predominately Miskito.
2	6	Mestizo absentee landowners who arrived after 1997 and hire Miskitos.
3	17	Mestizo--most settled since 1997.
4	6	Mestizo.
5	133	Approximately 1/2 population is mestizo.
6	36	Mestizo
7	9	Mestizo
8	11	Mestizo--approximately 1/2 came before 1997 and 1/2 since.
9	30	Mostly "Miskito colonists"; some mestizos as well.
10	5	Mestizo--all arrived since 1997.
11	NA	Mestizo. Growing mestizo community.

7.1.2 Land-Cover Change in Cultural Zone

Figures 3.4a and 3.4b present a graphic illustration of the land-cover change from 1995 to 2001 in relationship to the mestizo settlements. The figures show land-cover change in the region west of the Plátano River. The red areas represent crop and pasture lands; yellow represents fallow. The white areas are predominately broadleaf tropical forests, but the cultural zone includes other ecosystems. All of the land cover in the zone is represented in Table 3.5.

In Figures 3.4a and 3.4b, the black lines outline where the cultural zone ends and the mestizo buffer zone begins. Note, the zone boundaries are shown on Río Plátano management maps; they are not, however, physically demarcated within the reserve. As shown in Figure 3.3, the Miskito community Banaka is located in the yellow area in the center of each map. The surrounding areas are predominately mestizo.

Table 3.5 shows the GIS land-cover estimates I calculated based on the classified images provided by AFE-COHDEFOR. The estimates presented in the table are for the region west of the Plátano River in the cultural zone. The table does not present land-cover calculations for the buffer zone.

Table 3.5. Land Cover 1995–2001 in Western Side of Cultural Zone

Land Cover—Land Use	1995 Cover (ha)	2001 Cover (ha)	1995–2001 Change (ha)	Percent Change
Crops/Pasture	352	1,585	1233	350%
Fallow	3730	4,768	1038	28%
Coniferous forest	1268	1,305	37	3%
Broadleaf forest	52,087	49,729	-2358	-5%
Other^a	1,911	1,983	72	3%
Not classified	58	0	NA	NA
Total^b	59,419	59,370	49	-0.08%
^a Other includes mangroves, teak plantations, grasslands, and sand.				
^b The same polygon is used in 1995 and 2001. Total area varies slightly due to slight differences in classification of each image. Both images were classified by AFE-COHDEFOR.				

Land-cover data source: AFE-COHDEFOR; land-cover change calculations by T. Hayes.

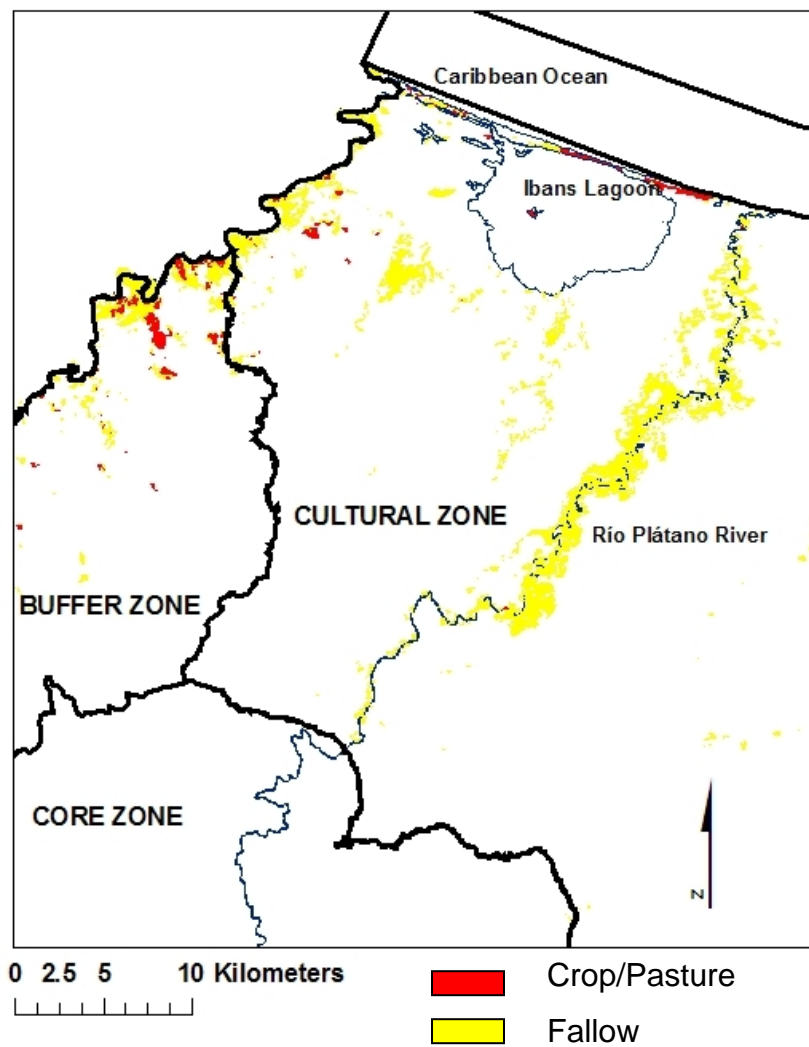


Figure 3.4a. Land Cover in Río Plátano, 1995

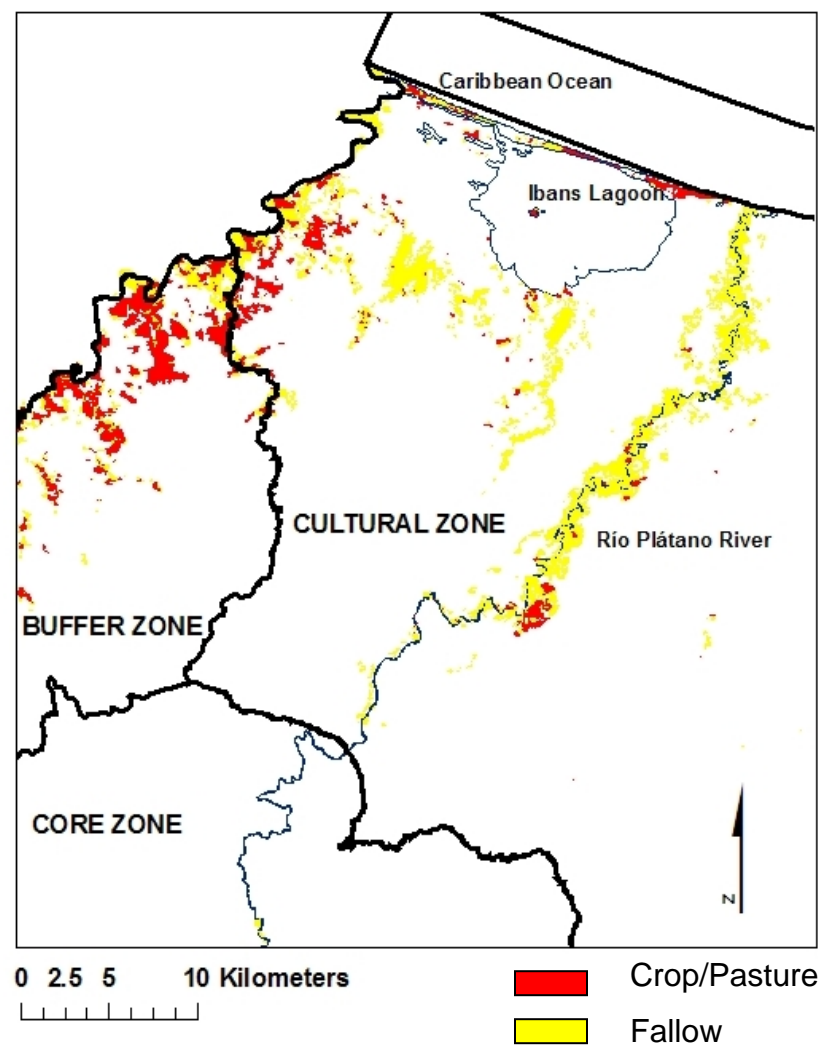


Figure 3.4b. Land Cover in Río Plátano, 2001

The land-cover change from 1995 to 2001 in the western edge of the cultural zone is particularly striking when it is compared with land-cover change in the community of Banaka. The comparison of land-use change in Banaka shows the distinction between mestizo and Miskito land-use practices. Table 3.6 shows the amount of increase from 1995 to 2001 in crop/pasture and fallow lands within the community of Banaka. Banaka boundaries are not formally recognized and were defined by community residents and recorded on GPS units during field visits.

Table 3.6. Land-Cover Change in Banaka, 1995–2001

Land Cover	1995 Cover (ha)	2001 Cover (ha)	1995–2001 Change (ha)
Crops/Pasture	0	12	12
Fallow	437	663	226

Land-cover data source: AFE-COHDEFOR.

The GIS calculations of land cover show that in Banaka, the total amount of land under crop, pasture, and fallow increased by 50%. In the entire western region, the area under crop, pasture, and fallow increased by 378%. In contrast to the rest of the western region of the cultural zone where the greatest land-use increase was in crop and pasture lands, the majority of the land-use increase in Banaka was in fallow lands.

The land cover in the community of Banaka is representative of the Miskito land-use practices. Miskito do not clear large areas of land for farm or pasture, but rather clear plots of approximately 0.5 ha within the broader forest. Therefore, in satellite images it is likely that many of their plots will be identified as fallow lands, or not identified at all since they are small and mixed in with the forest. In contrast, the land-cover patterns outside Banaka, along the western border of the cultural zone, are not representative of traditional Miskito land-use practices. Larger patches of farm and pasture lands show that these lands are now under permanent cultivation of crop or pasture, land-cover patterns that are more representative of mestizo agricultural practices.

7.1.3 *Is the Border Working?*

Figure 3.5 shows agricultural expansion into the cultural zone of Río Plátano from 1995 to 2001 and further demonstrates the ineffectiveness of the cultural zone “paper boundary.”^v In order to examine whether the cultural zone boundary is working to prevent mestizo encroachment, I compare land cover in a 2-km corridor (buffer) on each side of the boundary line between the cultural zone and the mestizo buffer zone. In total, the corridor is 4 km wide. Table 3.7 compares land-cover change between 1995 and 2001 in the 2-km corridor inside the mestizo buffer zone and the 2-km corridor inside the indigenous cultural zone.

The images and land-cover change show that the cultural zone boundary and scope rules are not serving to stop mestizo agricultural expansion. The increase in the amount of land under crop, pasture, and fallow was, in fact, greater within the corridor inside the cultural zone than within the corridor inside the mestizo buffer zone. In the cultural zone corridor along the border, the amount of land under crop or pasture in 1995 was 9 ha (less than 0.1 km²). Crop and pasture land along the border *inside* the cultural zone had increased from virtually none to 486 ha—almost 5 km²—by 2001. Crop and pasture land inside the mestizo buffer zone increased from 102 ha in 1995 to 422 ha in 2001. Interviews with Miskito and mestizo residents and park officials confirm that the mestizos continue to cross over from the buffer zone into the cultural zone to farm, ranch, and settle.

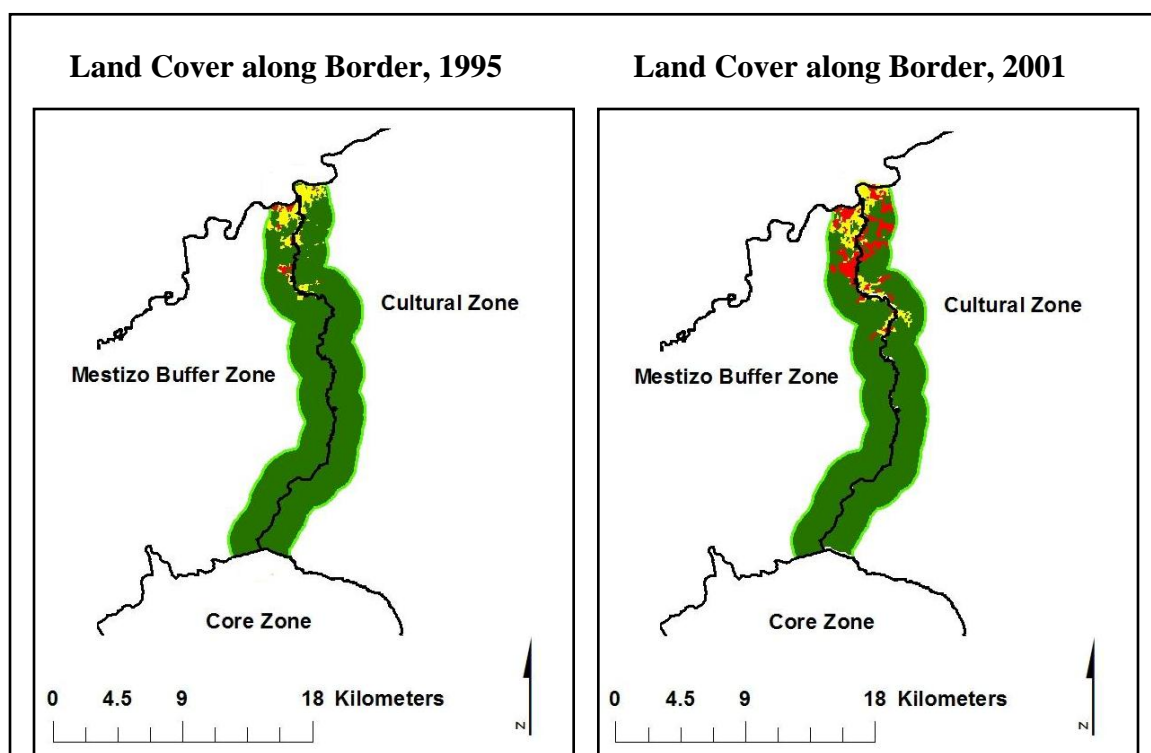


Figure 3.5. Comparison of Land-Cover Change along the Cultural Zone Border

The two images above show land cover within a 2-km corridor inside the cultural zone and within a 2-km corridor outside of the cultural zone (in the mestizo buffer zone). The bright green lines outline a corridor that I created around the official boundary that divides the mestizo buffer zone from the indigenous cultural zone. Note that this boundary is only identified on paper and not on the ground. The dark green areas represent broadleaf forests, the red represents crop and pasture lands, and the yellow represents fallow. The land-cover change shows that the mestizos are not respecting the boundary of the cultural zone. Since 1995, mestizos have continued to cross the border from the buffer zone into the cultural zone. The specific amounts of land under crops/pasture, fallow, and forest is shown in the table below.

Table 3.7. Land-Cover Change 1995–2001 along the Cultural Zone Border

LAND COVER	2-km Corridor inside Cultural Zone				2-km Corridor inside Buffer Zone			
	1995 (ha)	2001 (ha)	Change (ha)	Percent Change	1995 (ha)	2001 (ha)	Change (ha)	Percent Change
Broadleaf forest	5,966	5,447	-519	-9%	5,567	5,174	-393	-7%
Fallow	293	393	99	34%	311	389	78	25%
Crops/Pasture	9	486	476	5106%	102	422	320	315%
Total area	6,279	6325			5,989	5,985		

Land-cover data source: AFE-COHDEFOR.

7.2 Mestizo Encroachment in Bosawas

In Bosawas, indigenous forest guards and residents state that since the property-rights accords were agreed on in 1997, the mestizos have stopped encroaching on their lands. Remotely sensed images of forest cover in and outside the indigenous territories confirm resident statements and show that mestizos are not expanding into the Miskito and Mayangna territories.

Stocks et al. (in press) find that the territorial boundaries are restraining agricultural expansion by mestizo farmers and ranchers. In their analysis of land-cover change in Bosawas, Stocks et al. used satellite data on forest cover from 1987, 1995/1996, and 2001/2002 to compare forest-cover change within and outside the six indigenous territories that form the core of Bosawas. They found that forest connectivity is statistically greater in the indigenous portion of Bosawas than in the mestizo buffer and that the rate of deforestation per capita over the 15-year period is significantly less inside the territories than in the mestizo-dominated portions of Bosawas.

These findings are consistent with my findings presented below on mestizo settlements within MITK and MSB and with my analysis of population density and land-use patterns in 2003 inside MITK and MSB and in the buffer zone.

7.2.1 Evidence of Mestizos in the Territories

Figure 3.6 shows the boundaries of MITK and MSB and the location of mestizo settlements inside the two territories. The community of Lacos (shown by the green dot in Figure 3.6) is the only mestizo community inside of the Mayangna territory MSB. Residents of Lacos first settled in the region in the early 1990s before the property-rights accords were created in 1997. Today, twelve families live inside the MSB borders in Lacos. According to the accords, the residents of Lacos are permitted to reside within MSB so long as they comply with the Mayangna land-use rules prescribed in their territorial land-use plan. During my visit in August 2005 there was some concern that

relatives of the current mestizo residents had recently moved to Lacos. At the time of my visit, the vice president of the mestizo political organization APDECOMBO visited Lacos to find out if new mestizos had, in fact, moved into the community. Other than the residents of Lacos, there are no other mestizos inside MSB.

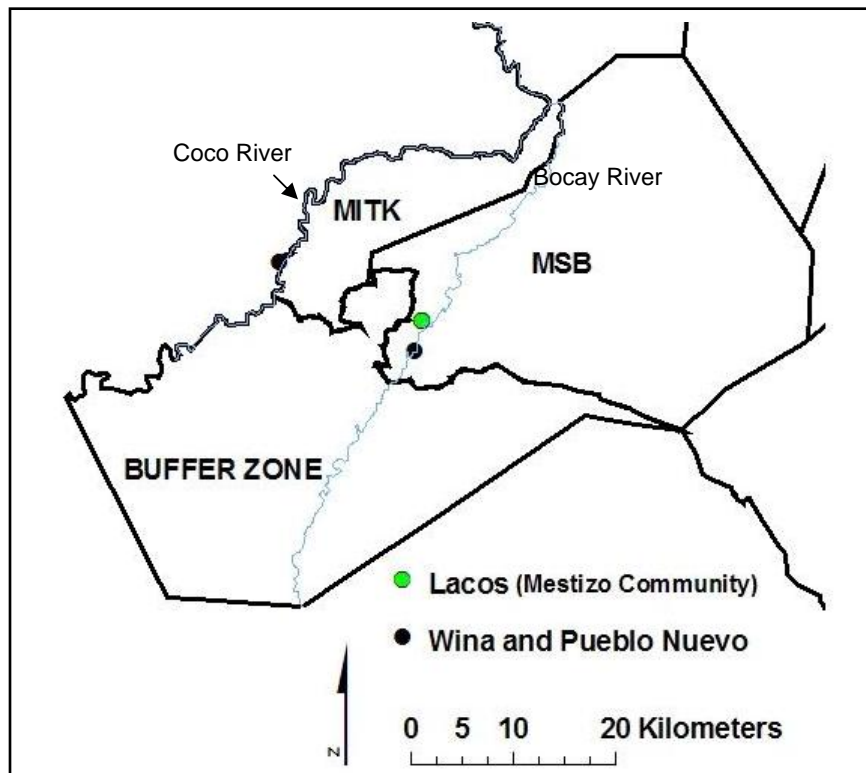


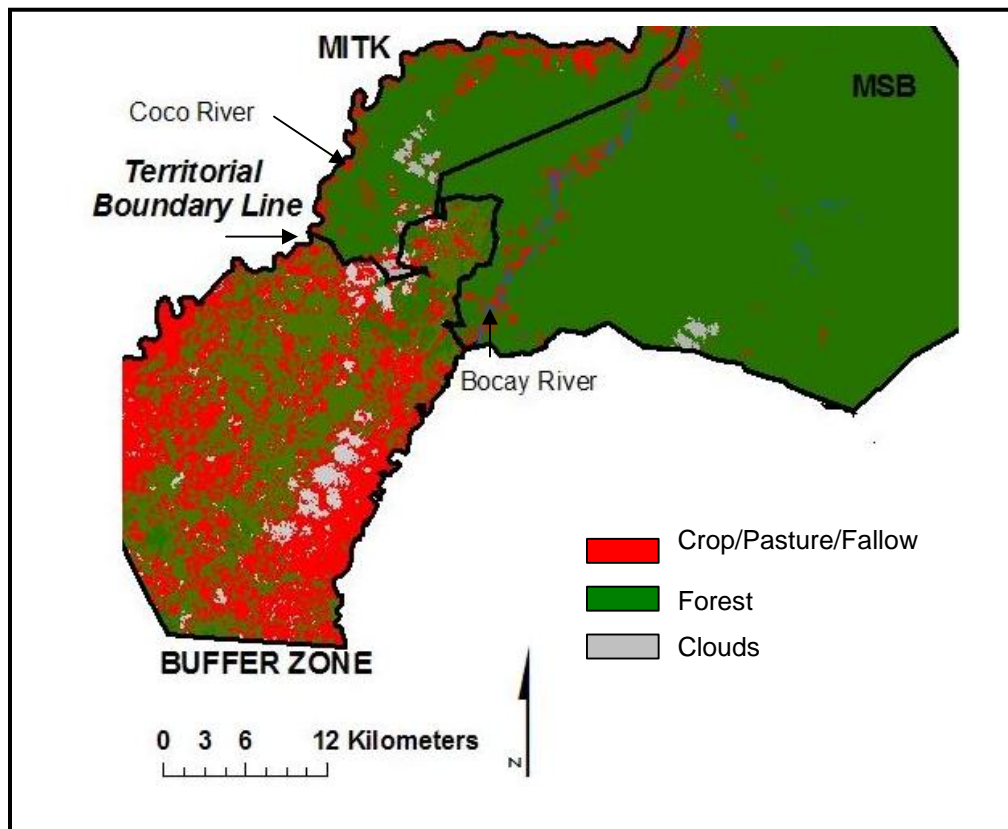
Figure 3.6. Mestizo Sites in Bosawas Territories

According to MITK residents, there are only two mestizo families that remain inside MITK. Both settled in the territory before the 1997 accords and both are permitted to stay in the territory so long as they comply with the Miskito land-use plan.

7.2.2 Are the Boundaries Working?

Evidence that the territorial boundaries are working is further substantiated by comparing land cover and population densities in the territories to land cover and population density

in the mestizo buffer zone to the south. Figure 3.7 and Table 3.8 show land-use patterns and population pressures in the southern region of MITK, MSB, and the mestizo territory.



Land-cover data source: MARENA

Figure 3.7. Land Cover in Territories and Mestizo Buffer, Bosawas, 2003

Table 3.8. Area, Population, and Percent Land Cover in the Bosawas Territories

	Area (ha)	Population (2005 est.)	Density (persons/ha)	Forest (%)	Crops, Pasture, Fallow (%)	Other ^a (%)
MITK Miskito Territory (half)^b	21,097	1,552	0.07	80.90	14.7	4.40
MSB Mayangna Territory^c	102,400	2,360	0.02	97.03	2.34	.63
Mestizo Territory	56,927	12,525	0.22	48.70	45.90	5.50

^a Includes clouds and rivers

^b Land cover includes only the southern half of MITK (21,097 ha)

^c 4,178 ha not classified for MSB and not included in analysis.

A remarkable distinction between the indigenous territories and the buffer zone is the higher population density within the mestizo buffer zone and the distinct land-use patterns between the indigenous and mestizo lands. For example, the southern half of MITK encompasses 21,097 ha and has a population density of 0.07 persons/ha. This means that 86.67 ha of agricultural land are potentially available to each household. The Mayangna population density in MSB is even less at 0.02 persons per ha.

In contrast, all land in the mestizo territory is occupied (Stocks, 1998). The mestizo territory encompasses approximately 56,927 ha and has 0.22 persons/ha. In interviews, mestizos noted that they generally need 50 ha of land per family for farming, ranching, and obtaining forest products. In the mestizo territory, roughly half that amount of land is available per household. Residents claim that new families continue to try to find land in the region, but that no land is available unless someone agrees to sell. However, despite population pressures in the region, the mestizos do not appear to be moving into MITK or MSB.

The land-use patterns in 2003 show distinct differences in the amount of land under agriculture, pasture, and forest inside the territories compared to outside the territories. In 2003, 97% of MSB remained covered in forest and less than 3% of the territory was in crop, pasture, or fallow. Similarly, 81% of the southern half of the Miskito territory was covered with forest and approximately 14% was covered by crops, fallow, or pasture.^{vi} In contrast, only half of the mestizo territory was forest covered and the other half was in crops, pasture, or fallow.^{vii} The clear distinction in land-use patterns demonstrates that although the mestizos face greater land-use pressures due to population density and need for land, they do not appear to be crossing over to the indigenous territories in search of land.

7.3 Resident Attitudes toward Encroachment and Land Sales

The critical role that property rights have in exacerbating the problem of encroachment in Río Plátano and facilitating its resolution in Bosawas is further demonstrated by a comparison of individuals' attitudes with respect to their communities' ability to stop mestizo migration and their attitudes toward land sales to mestizo colonists. In

interviews, Miskito of the cultural zone in Río Plátano consistently complained about mestizo encroachment into the region. As one Miskito leader stated “Los ladinos son una virus mas peor que la SIDA” [mestizos are a virus worse than AIDS], a statement reflecting the severity of the problem (interview with Miskito leader, Belen, Honduras, March 2002). In contrast to Río Plátano where residents had numerous stories about the ill done to them by mestizos, the indigenous residents in Bosawas appeared to feel fairly secure in their territorial holdings. In semi-structured oral interviews, most responded that they felt that the community was able to prevent mestizos from settling on their lands.

7.3.1 Ability to Prevent Mestizo Encroachment

Table 3.9 shows the different attitudes that the indigenous residents in Río Plátano have about their ability to control mestizo expansion in contrast to indigenous attitudes expressed in Bosawas. In the table, “Río Plátano” includes responses to the “Miguel questionnaire” I administered to residents in Banaka and Wampusirpe. “Bosawas” includes the questionnaire responses in Pueblo Nuevo and Wina.

Table 3.9. Ability to Prevent Mestizo Encroachment

	Yes Prevent	Cannot Prevent	Total # Interviews
Río Plátano	33	45	78
Bosawas	14	4	18

Continuity Correction Value = 6.012, $p = 0.014$

The findings show that the relationship between reserve and resident opinion of the ability to control encroachment is statistically significant ($p = 0.014$). An indigenous resident of Río Plátano is more likely to believe that their community cannot control encroachment than an indigenous resident from Bosawas. In Bosawas, the majority of those interviewed said that the community can prevent encroachment. Bosawas residents who disagreed with the ability to prevent mestizo encroachment were primarily Mayangna residents in Wina who expressed concern about the continued presence of mestizos in Lacos.

7.3.2 *Prohibition of Land Sales*

One of the principal means by which mestizos gain access to indigenous lands is through land purchases from indigenous residents. Table 3.10 compares the responses in Río Plátano and Bosawas to the “Miguel questionnaire,” which asked residents whether they would sell land to anyone (including a mestizo).

Table 3.10. Indigenous Land Sales to Mestizos

	Sell to Anyone	Sell Only to Native / Never Sell	Total # Interviews
Río Plátano	26	51	77
Bosawas	2	16	18

Continuity Value = 2.594, $p = 0.107$

The responses show that the indigenous residents living in Río Plátano (Banaka and Wampusirpe) are more likely to sell land than those living in the indigenous territories in Bosawas (Pueblo Nuevo and Wina). The association between reserve type and willingness to sell land is on the borderline of statistical significance ($p = 0.107$). Interviews in Río Plátano and Bosawas with respect to land sales found that residents in Río Plátano are more likely to consider selling land to mestizos and, furthermore, are more likely to have actually sold land.

For example, in Wampusirpe, eight new mestizo families had settled in the community in the past year. They settled after buying land from Miskito residents. Similarly, leaders in Banaka estimated that approximately ten families had sold land to mestizos in recent years. Several Banaka residents commented that the Miskito of Banaka started to sell land because they had seen other people do it who had gone unpunished. When money is tight, sometimes land is the only source of income. Some criticized the land sales, but noted that there was nothing they could do to stop their neighbors from selling. Others thought that it was fine to sell land when in need of money.

In contrast, in Bosawas, land sales were strongly frowned upon by indigenous residents in the Mayangna and Miskito territories in Bosawas. It is interesting to note that the one respondent in Pueblo Nuevo, MITK, who said that he would sell land, was quickly reprimanded by the others listening in to the conversation. In interviews, most

residents stated that they would never sell land and that indigenous people to the south of their territories had sold land and now they were left with nothing. In the Miskito territory, there was a report of one attempted land sale by a Miskito to a mestizo that purportedly occurred several years ago. The Miskito territorial organization, ADEPCIMISUJIN, learned about the sale and forfeited the transaction. According to mestizo residents in the buffer zone, the mestizo buyer was never permitted to occupy the land and lost his money. It was not clear if the Miskito received any sort of sanction (in addition to shaming).

8 DISCUSSION: DOES TENURE MATTER?

The findings from the field and the land-cover image clearly show that mestizo encroachment has not stopped in Río Plátano whereas it is largely under control in Bosawas. The findings also suggest that the specific rule configurations can, in large part, be contributed to the different encroachment patterns. The results support my hypothesis that property rights matter and that a forest reserve under indigenous management is better able to stop mestizo encroachment than a publicly managed forest reserve. The findings suggest that, specifically, it is the collective-choice rights that matter and the rules that are crafted by the right-holders. In Bosawas, rules that were created by the residents are serving to control agricultural expansion, whereas rules defined by AFE-COHDEFOR are doing little to control mestizo encroachment in Río Plátano.

One rule that has been critical to the success of Bosawas was the physical demarcation and monitoring of the territorial boundaries. In interviews, Miskito residents in the Río Plátano complained that there were no boundary markers to signal to mestizo settlers that they were on indigenous lands and that mestizo migrants frequently settle in more remote forests not often visited by the residents. The land-cover analysis of the border between the mestizo buffer zone and the indigenous cultural zone demonstrated that the designation of the cultural zone on paper has done little to restrict mestizo migration on the ground. In fact, in order to prevent mestizo occupation, individual Miskito residents have begun to cut boundary lines around forest lands to show

ownership. Residents remark that Miskitos generally do not claim ownership over forests; however, it is the only way to protect the forests from mestizo occupation.

In Bosawas, the physical demarcation of the indigenous territorial boundaries has served to thwart agricultural expansion by clearly demonstrating ownership over farm *and forest* lands. The land-cover analysis that compared inside the indigenous territories to outside the territories showed clear differences between the two regions. Indigenous and mestizo residents frequently mentioned the *carril*, the strip of land cut to define the boundaries of MITK and MSB, as a critical enforcement mechanism. Territorial forest guards stated that conflict with mestizos and land invasions significantly declined after the demarcation in 1997, and the vice president of the mestizo association APDECOMBO stated that if the demarcation process had not occurred, the mestizos would have kept moving into indigenous lands. Now, however, the mestizos consider the land to be owned by the Miskito and Mayangna.

Furthermore, in Bosawas, the boundaries are monitored by a corps of forest guards. Unlike AFE-COHDEFOR in Río Plátano, which failed to apply consistent monitoring and enforcement mechanisms, the residents of Bosawas used their collective-choice rights to create and apply a position rule that designated a group of indigenous forest guards responsible for monitoring the territories. The forest guards are a select group that receives payment and technical support from the Nicaraguan NGO Centro Humboldt. Their activities are also supported by an informal enforcement system that relies on meetings between the indigenous and mestizo leaders to resolve conflicts and enforce the property-rights agreements.

Mestizos in Bosawas are very aware of the territorial boundary line and recognize that if they cross the border, either through “invasions” or sales, they will most likely be caught. In Bosawas, both indigenous and mestizo residents noted that if a mestizo is illegally settling in the indigenous territory, it is likely that the forest guards will find out and that the indigenous and mestizo political associations will be called. This was the case in Lacos, where the mestizo leader was investigating reports of recent settlements. Although the sanctioning mechanisms are largely informal, thus far they have been successful in resolving disagreements and controlling encroachment.

9 CONCLUSION

The results from Bosawas and Río Plátano demonstrate that acknowledging indigenous ancestral rights to forest lands may be more effective in some settings than management and enforcement approaches based on public command and control. Several lessons come from the experiences in Río Plátano and Bosawas. First, the definition and application of boundary and scope rules are crucial in supporting common-property regimes and promoting forest conservation. The physical demarcation of common-property rights served to protect forest and farm lands from potential squatters.

Second, in Bosawas, the creation of a corps of indigenous forest guards and enforcement and conflict resolution mechanisms that depend on actors living in the region meant that many of the property-rights rules are rules-in-use and not merely rules on paper. In contrast to the rules developed by government agencies for Río Plátano, the land-use rules constructed by the Bosawas residents are generally recognized and respected by local residents and by potential in-migrants. The Bosawas process suggests that it matters not only what the rules are, but who holds the right to make the rules, invoke them, and enforce them. Property rights matter.

Finally, the success of Bosawas suggests that it is not necessarily legal designation of paper rights, but the *process* of establishing the rights and their respective rules that matters. In order to understand how and why the common-property-rights system is working in Bosawas (and perhaps replicate some of those key ingredients), we need a deeper understanding of (1) the effect that mestizo encroachment has on traditional indigenous property rights and land-use institutions, and (2) how a property-rights process can support traditional common-property arrangements so they are robust in the face of mestizo encroachment.

The following chapters address questions of institutional robustness and longevity. In chapter 4, I examine how indigenous residents respond to mestizo encroachment when they are not supported by a common-property-rights process, and I use data from three Miskito communities in the Río Plátano to test if and how mestizo encroachment disturbs Miskito land-use institutions. In chapter 5, I return to the property-rights processes that occurred in Bosawas to identify the key components that served to bolster the indigenous property rights and governance capacity in the two indigenous territories. Finally, in

chapter 6, I consider some of the long-term prospects for the indigenous territories and their management institutions.

Endnotes for Chapter 3

ⁱ Interviews with Miskito leader, Belen, April 23, 2005; MOPAWI director, Tegucigalpa, July 11, 2003; group of Miskito leaders, Brus Laguna, July, 23, 2003; ADEPCOMEBO leaders, Jinotega, August 30 and September 12, 2005.

ⁱⁱ Note in the land-cover analysis of the 2003 Bosawas image that 4,178 ha in MSB are not classified. This is presumably due to cloud cover. The non-classified area is located in the northern region of MSB territory and does not impact the analysis of mestizo encroachment.

ⁱⁱⁱ This assessment does not include the Miskito communities on the strip of land along the Caribbean coast.

^{iv} Sources: (1) population per 2006 census conducted by community group, demographics confirmed by site visit; (2) population and demographics per personal count on site visit in 2005; (3) population per 2001 census and confirmed by 2006 site visit; (4) population and demographics per 2001 census; (5) population per 1997 Río Plátano census and demographics confirmed by 2005 site visit and talks with community leaders; (6) population and demographics per 2001 census; (7) population and demographics per 2001 census; (8) population per community mayor in 2005 site visit and demographics according to a long-term mestizo resident (2005); (9) population and demographics per community leader and 2005 site visit; (10) population and demographics per site visit in 2005; (11) population unknown, reported by residents, community leaders, and AFE-COHDEFOR officials to be a growing mestizo site.

^v Mestizos are also crossing into the cultural zone from the east (outside of the reserve) to the west. The eastern region outside of the reserve is predominately mestizo and is a region that was opened up for colonization in 1995. Unfortunately, I was not able to obtain classified images for the area outside of the reserve.

^{vi} Note that there appears to be a patch of pasture/crop/fallow land in the southeastern corner of MITK. It is under cloud cover. MITK forest guards report that the pasture lands are from the earlier work of a mestizo who previously lived in the territory. The dates were unclear, but the mestizo was asked to leave (and reportedly no longer lives in MITK).

^{vii} The 2003 image classified by MARENA does not distinguish pasture land from fallow land. However, fieldwork in both areas found that few of the Miskitos interviewed had pasture while almost all of the mestizos did.

CHAPTER 4
THE ROBUSTNESS OF TRADITIONAL LAND-USE INSTITUTIONS:
MISKITO RESPONSES TO DEMOGRAPHIC AND MARKET CHANGE IN RÍO PLÁTANO

1 INTRODUCTION

The mestizo settlements and agricultural expansion occurring in the western region of the cultural zone of Río Plátano demonstrate that the reserve management plan and regulations have not stopped mestizo colonization of indigenous lands or halted the subsequent deforestation. Despite official regulations that prohibit the entry of non-natives and forbid the destruction of forested lands, mestizo migration persists.

The indigenous residents of Río Plátano insist that only by receiving eminent domain over their homelands will they be able to stop the mestizo migration. Many reserve officials and policy makers, however, balk at the thought of granting the indigenous residents ownership and management rights over Río Plátano lands. Akin to the opinions of several prominent environmentalists regarding the resiliency of indigenous institutions (Redford, 1991; Terborgh, 1999, 2000), many Río Plátano reserve officials insist that the indigenous residents are incapable of managing Río Plátano lands and that their land-use traditions falter when confronted with market pressures and demographic changes introduced by the mestizo colonists.ⁱ

In fact, we know relatively little about how indigenous institutions change in response to exogenous pressures, and what this means for resource management (Berkes and Folke, 2000; Richards, 1997). Richards notes that in Latin America, as in other regions, how common-property institutions respond to increasing economic, commercial, and demographic pressures is a vital question (1997, p. 95). As new markets expand into previously remote forested regions, we need to understand how traditional peoples respond to shocks such as major demographic shifts, outside invasion, or technological change and the role that broader policy prescriptions have in promoting sustainable resource management (Agrawal, 2001; Berkes, 2001; Ensminger and Knight, 1997; Ostrom, 1990; Redford and Stearman, 1993; Richards, 1997).

The institutional dynamics in frontier forests remain largely ill-defined. In their research on tenure policies and conflict in the Brazilian frontier, Alston and colleagues (1997, pp. 146–147) state that we understand very little about the institutional changes occurring within the frontier and that these changes ultimately underlie the necessary modifications to the formal property-rights policies. In order to improve forest management, particularly frontier forest policy, we need a more nuanced analysis of the robustness of traditional resource management institutions and how traditional resource users adapt to change.

In Río Plátano, mestizo colonization increases the value of land by increasing demands on the resources and introducing an external market for forest and farm land. The mestizos also introduce land-use preferences and land-use institutions that differ from, and at times conflict with, Miskito customs. Some policy makers and Miskito residents worry that the Miskito institutions will collapse in the face of mestizo encroachment and that the Miskito will adopt mestizo land-use practices. Many Miskito residents also wonder what will happen to their identity as an ethnic group if they lose their land and become integrated with mestizos.

How are the Miskito addressing mestizo encroachment? The purpose of this chapter is to explore, in the context of Río Plátano, if and how Miskito property rights and the associated land-use institutions are changing in response to mestizo migration to the region. Specifically, I examine how the introductions of an external market for land and institutions that support private-property rights disturb the Miskito common-property regime. I analyze Miskito decision making and the evolution of their traditional property-rights systems in three communities with varying degrees of outside encroachment.

I realize that the effects of mestizo migration on indigenous institutions tap into an array of anthropological works that examine the social, economic, political, environmental, and philosophical changes that occur when indigenous populations begin to participate in a market economy (see Richards, 1997, for review of literature related to Latin America). This study is limited in scope in that I only consider how Miskito property-rights institutions are changing in response to mestizo land-use pressures. The institutional analysis examines only those institutions that relate to the access, withdrawal, management, exclusion, and alienation rights to *land* within the cultural zone

of Río Plátano. As far as the property-rights dynamics tap into indigenous organizations and values, I discuss the organizational structure and values present in different institutional arrangements. I do not, however, pretend to provide an overarching analysis of Miskito culture and cultural change occurring in the region.

Furthermore, I recognize that a crucial component in this analysis is the broader policy environment in which the resource users live and make land-use decisions. A central thesis of this dissertation is that the broader policy environment, specifically property-rights policies may either bolster or weaken indigenous institutions in the face of mestizo encroachment. This chapter is the first step in the analysis of if and how indigenous land-use institutions change (or are “stressed”) in response to mestizo migration, and the influence of property-rights policies on indigenous institutional change. In this chapter, I examine how indigenous institutions change in a policy environment that does not recognize their communal rights over their homelands and gives minimal recognition to indigenous governing organizations. I focus on changes in the traditional land-use institutions. I consider the broader policy environment only in that I recognize that the Miskito land-use decisions occur in a context of insecure tenure rights. In the following chapter, I take the analysis one step further as I reconsider the formal policy context and analyze how the policy processes in Río Plátano and Bosawas influenced the ability of indigenous residents to bolster their land-use institutions in response to mestizo encroachment.

2 THEORIES OF INSTITUTIONAL CHANGE AND THE EVOLUTION OF PROPERTY RIGHTS

Institutions, specifically property-rights institutions, are a good starting place to examine Miskito response to mestizo encroachment. In his work on cultural adaptation, Keesing (1975) notes the importance of examining institutions as a source of adaptation and cultural change. He states, “Cultures do not respond to pressures. Rather, individual human beings cope as best they can, formulate rules, follow and break them; and by their statistical patterns of cumulative decision, they set a course of cultural drift” (Keesing,

1975). A primary concern in common-pool resource management is how traditional management institutions will change or drift.

2.1 Institutional Change

Some scholars suggest that traditional resource systems are fragile (or non-existent) and predict that without government regulations, demographic and market pressures will cause traditional systems to break down and create an institutional vacuum where resources are overexploited as individuals fend for themselves (Hardin, 1968; Redford, 1991; Redford and Stearman, 1993; Terborgh, 1999, 2000). Redford, Stearman, and Terborgh (Redford, 1991; Redford and Stearman, 1993; Terborgh, 1999), in particular, emphasize that indigenous residents will adopt market institutions and market values when presented with the means to exploit their resource systems.

In contrast, other scholars contend that institutions are sticky and resistant to change (Ensminger and Knight, 1997; Gluckman, 1968; North, 1990). Knight maintains that once an institution is established, change comes slowly and often at considerable cost. He predicts that actors will continue to respect existing institutions unless external events alter the distributional benefits provided by them and the respective participants can resolve the formidable collective-action problems inherent in institutional change (Knight, 1992, p.127). Furthermore, some maintain that, even after drastic conditions force the institution to change, “institutions are so tough that they often survive into, or revive in, the new conditions that eventuate” (Gluckman, 1968, p. 223).

It may be that an institutional system neither entirely collapses nor does it remain completely unchanged. Recently scholars (Anderies et al., 2004; Berkes, 2001, Berkes et al., 2003) have been struggling with how to assess institutional change with respect to the overall structure and function of a social-ecological system. One means of analyzing the direction of institutional change is to consider how each institution affects the overall maintenance and structure of the social system. Berkes (2001) contends that just as ecological systems can be characterized by their resilience or ability to withstand disturbances to the natural systems, social systems also can be characterized by their resilience. Berkes states that the resilience of a social system refers to the ability of the

system to absorb disturbances while still retaining its central functions, and the ability of a social system to build the capacity to self-organize, learn, and adapt (2001, p. 294).

Similarly, in their analysis of social-ecological systems, Anderies et al. (2004) consider how institutional arrangements affect the robustness of social-ecological systems to internal and external disturbances. The authors define robustness as “the maintenance of some desired system characteristics despite fluctuations in the behavior of its component part or its environment” (citing Carlson and Doyle 2002). Anderies et al. (2004) explicitly examine how social and ecological systems change in conjunction with one another and contend that the collapse of an entire system would require that both the social and ecological systems collapse.

The concepts of resilience and robustness contribute an important dynamic aspect to the analysis of institutions and the relationship that actors have in response to changes in their environments. Rather than considering institutions as stagnant entities, the ideas of social resilience and social-ecological robustness build flexibility into institutions and considers if and how they are able to adapt to address competing demands and exogenous shocks while continuing to satisfy their core functions.

2.2 Land-Use Institutions and the Evolution of Property Rights

With respect to the evolution of property rights and the Miskito common-property-rights system, the principal issue is whether property rights necessarily become more privatized when the resource becomes scarcer or more economically valuable. In “Toward a Theory of Property Rights,” Demsetz (1967) traces how private-property rights emerged among the Montage Indians of Quebec in response to the fur trade. As more people had an interest in hunting and the fur became more valuable, the Montage Indians developed more complete property rights over their hunting lands.

Demsetz argued that when more people begin to use a resource and the resource increases in value, private-property rights would emerge. Others however, challenge the assumption that common-property systems necessarily evolve into private-property regimes (Ensminger and Rutten, 1991; Ostrom, 1990, 2005; Richards, 1997). Some research on the evolution of property rights finds that when the resource is abundant and

difficult to monitor, a relatively open property-rights arrangement frequently exists and that when demand for the resource increases, the property rights regimes become more clearly defined, or complete (Demsetz, 1967; Ensminger & Rutten, 1991; Gibson et al., 2002; Taylor and Singleton, 1993).

In their analysis of property-rights arrangements, Taylor and Singleton (1993, pp. 199–205) predict that when a group of users is fairly homogenous, share similar preferences, and have many different types of interactions (as are the Miskito people of Río Plátano), there will not be much institutional development due to the prevalence of a shared belief system and the minimal monitoring and enforcement needs. However, as the group becomes more heterogeneous, with less frequent interactions, and preferences that vary widely, the authors predict that the resource users will have a greater need to create more formal institutions and may find it hard to establish, monitor, and enforce these rules without some sort of third-party intervention.

In the context of frontier forest governance, the loosely developed property-rights system of the indigenous people may no longer be sufficiently binding when residents are faced with mestizo migrants who have their own land-use institutions that are more connected to mainland market systems. In response to mestizo colonization, some indigenous groups may try to create more formal institutions, or more complete property-rights regimes to strengthen their land claims over frontier forests.

A clear distinction, however, needs to be made between *more complete* property rights and *private-property* rights; more complete rights do not necessarily imply individual private-property rights. For example, in Bosawas, the creation of a physically demarcated boundary line and rules that prohibited mestizo entry more completely defined the indigenous residents' common-property rights, but these institutional changes did not create a private-property system.

Jean Ensminger and colleagues (Ensminger, 1997; Ensminger and Rutten, 1991) emphasize the social and economic functions of property rights and contend that ideologies can have a strong impact on the type of property-rights arrangement that emerges. Ensminger and Rutten (1991) note that property rights are political institutions that shape the relations between people, the values that will be prioritized and satisfied, and the distribution of costs and benefits across society. They argue that the perceived

value of the resource and ideologies with respect to how the resource should be distributed also influence the definition (and presumably evolution) of rights and their respective rules.

3 RESEARCH DESIGN AND SITE CONTEXT

Institutional dynamics in Río Plátano provide a superb fieldwork arena in which to examine practical applications of the theories of institutional change in response to an external disturbance. This chapter examines change in the property-rights institutions in the cultural zone of Río Plátano and, more specifically, in three Miskito communities, and their respective satellite settlements.

The independent variable in this study is mestizo encroachment and the dependent variable is land-use institutions, specifically changes in land-use institutions. In examining institutional change, I am interested in changes made by Miskito leaders at the collective-choice level and changes in the daily decisions made by Miskito residents.

As discussed in chapter 2, the Miskito of Río Plátano are organized into a series of indigenous federations that lie within the larger umbrella indigenous federation MASTA. The creation of MASTA and its respective federations is in itself an institutional change within the traditional Miskito common-property system. As will be discussed, the Miskito historically have made land-use decisions primarily at the household level (Dodds, 1994).

The organizational structure of MASTA generally follows the hierarchy portrayed in Figure 4.1. MASTA consists of seven federations that operate at a regional level (generally corresponding with the municipal divisions). The umbrella organization MASTA and each of its respective regional federations have an elected cabinet. Each regional federation may (or may not) have one or more land vigilance committees. The land vigilance committees implement the regional federation's decisions with respect to land-use rules by monitoring land use in the Miskito communities.

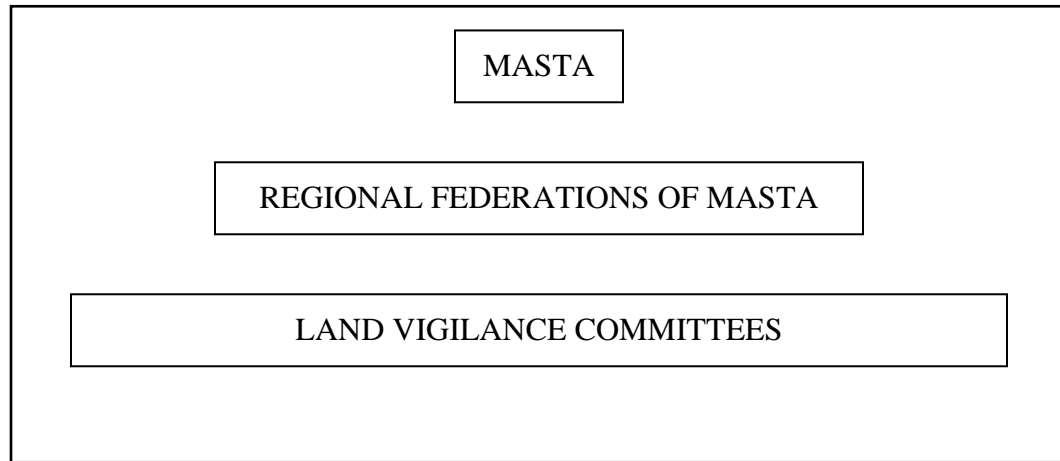


Figure 4.1. Hierarchical Structure of the Indigenous Federations of MASTA

If we consider how each subset of MASTA makes decisions within the IAD framework, the umbrella federation of MASTA is trying to make constitutional decisions by asserting Miskito autonomy over their homelands in the Mosquitia. The regional federations make collective-choice decisions about how to create rules to monitor mestizo encroachment and Miskito land sales. It is also the responsibility of each regional MASTA federation to create one or more land vigilance committees. The purpose of the land vigilance committee is to actively monitor the day-to-day activities within the Miskito communities. In this study, I focus on (1) the institutional changes occurring at the collective-choice level with respect to rule-making and organizational activities of the regional MASTA federations and (2) the day-to-day land-use decisions made by individuals within the respective Miskito communities.

3.1 Institutional Change within Three Miskito Communities

Are the organizational and institutional changes occurring within MASTA in accordance with the decisions individuals are making within their respective communities? Do decisions made by the Miskito leaders truly represent the attitudes and actions of the broader set of Miskito residents?

In order to compare whether the decisions made by Miskito leaders are reflective of decisions made by individual Miskito residents, I focus on activities in three Miskito

communities: Ahuas, Wampusirpe, and Banaka. Each community is associated with a regional federation of MASTA. Table 4.1 shows the regional MASTA federation and its respective community. BAMIASTA is the regional MASTA federation for the municipality of Ahuas and the communities within the municipality. BAKINASTA represents residents of the Wampusirpe region, and RAYAKA represents the coastal communities along the Caribbean and also extends westward to include Banaka and surrounding communities.

Table 4.1. MASTA Federations and their Respective Communities

MASTA	
Regional Federation	Community
BAMIASTA	Ahuas
BAKINASTA	Wampusirpe
RAYAKA	Banaka

Figure 4.2 shows the principal Miskito study communities. The sites were chosen to examine the impact of outside encroachment on resident land-use practices and institutions. The regions share similar geographies and levels of market integration, but each region has a different history of mestizo encroachment. As shown in Figure 4.2, colonists have been moving into Río Plátano from the west and, more recently, from the south. Colonists have migrated to Banaka since the late 1980s. Another influx of colonists began to migrate into the Wampusirpe region in late 2003. As of April 2006, Ahuas had not experienced mestizo colonization.

In all study communities, the residents are primarily subsistence agriculturalists. In addition to agriculture, some men harvest timber for small-scale commercial sale, primarily within the department of Gracias a Dios. In some communities, young men work part of the year as divers for the lobster boats along the Caribbean coast. As the regions are only accessible by boat or small plane and are not connected to commercial markets, diving is the principal source of income available to residents. The following sections discuss some of the principal characteristics of the study sites. I begin with Ahuas, the site that has not experienced mestizo encroachment.

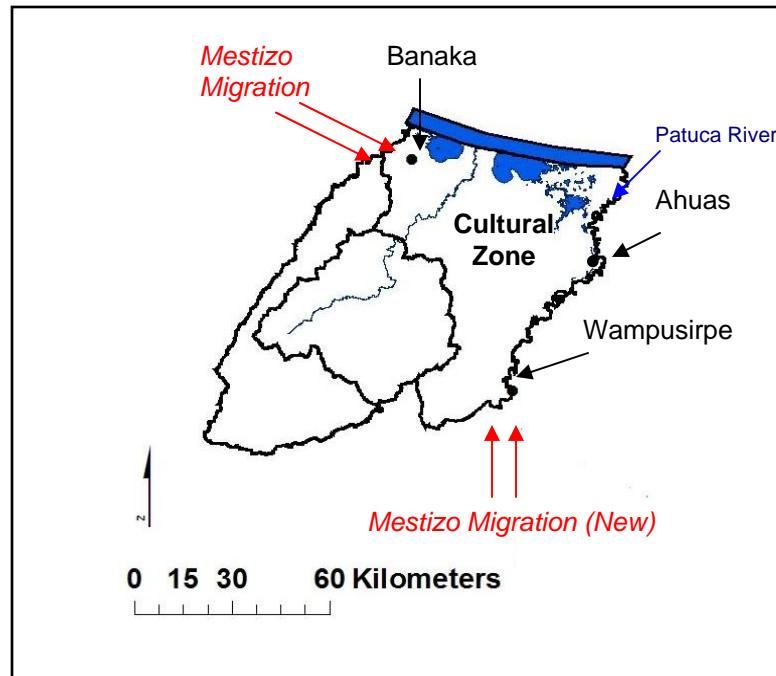


Figure 4.2. Río Plátano Sites in Relation to Mestizo Migration

3.2 Ahuas

The study site Ahuas, hereafter referred to as “Ahuas,” is located on the eastern edge of Río Plátano reserve in the department of Gracias a Dios. Although the Miskito communities in Ahuas are not within the reserve’s boundaries, the residents rely on lands inside Río Plátano for agriculture and forest products. Ahuas consists of three communities: Ahuas (the municipal seat), Paptalaya, and Wawina. The settlements are on the eastern side of the Patuca River on the edge of the savanna Llanos de Ahuas. Residents claim that the grasslands on this side of the river are not appropriate for agriculture. Instead, they prefer to farm on the western side of the Patuca River, in the reserve.

All residents in these communities share the same agricultural and forest zone. The agriculture-forest zone is in Río Plátano and is bordered on the east by the Patuca River and on the west by the grasslands of the Llano de Brus Laguna. The region covers roughly 236 km². The land cover is a mosaic of swidden agricultural systems along the

rivers edges and broadleaf rain forests deeper inland that residents claim have never been farmed.

According to the 2001 census, total population for the region is 6,039. There are approximately 235 houses in the municipal seat of Ahuas (PBRP, 1997/98). Approximately 90% of all residents of Ahuas were born in the community where they presently reside, and 97% of the population is Miskito (INE, 2001).

With respect to outside encroachment, Ahuas has remained relatively sheltered from encroachment pressures. As colonists move in from the west and the south, they have found lands in other regions before reaching Ahuas. However, this may soon change. Residents are aware that outsiders are encroaching on Miskito lands in other parts of the department of Gracias a Dios and within Río Plátano Biosphere Reserve. Although many express concern that colonists might reach Ahuas, they do not perceive outside encroachment to be an immediate threat.

3.3 Wampusirpe

Wampusirpe is located upriver from Ahuas on the Patuca River. Similar to Ahuas, the settlements are to the east of the Patuca, but the residents farm and use forest products on the western side of the river, in Río Plátano. The study site includes three principal communities in the Wampusirpe region, hereafter referred to as “Wampusirpe”: Wampusirpe (the municipal seat), Bodega, and Raya. The area that the residents use within the reserve is approximately 246 km².

According to census data provided by the community health center, in 2005 there were 1,873 people and approximately 260 houses in the three communities. The region had been predominately Miskito with only a few mestizo merchants living in the settlements. When I visited the region in August 2003, residents reported that mestizo colonists had not yet moved into the area. However, since 2004, at least eight new colonist families have settled in Wampusirpe, and in discussions with some of the recently arrived settlers, they indicated many of their relatives would soon move to the region.

3.4 Banaka

The region around Banaka has the longest history of encroachment, and today, Banaka lies directly in the path of the ever expanding agricultural frontier. The study site of Banaka, hereafter referred to as “Banaka”, includes the principal village of Banaka and five satellite settlements in the surrounding foothills. Banaka lies in the northern region of the cultural zone off of the western edge of the Lagoon of Ibans. The principal village of Banaka is on a plain along Banaka Creek that flows down from the surrounding mountains. Below the plain is marshland out to the lagoon. The study area encompasses roughly 155 km².

The principal village Banaka began as an agricultural center for residents in communities along the north coast off the Lagoon of Ibans. Originally, the Miskito residents retained permanent homes in communities along the coast and farmed in Banaka. Over the past twenty years many settled permanently in Banaka and the settlement has become a village in itself with its own churches, school, and a nascent health center. In 1996, Banaka was officially declared a community. According to a community leader, in January 2006 there were 269 people living in 50 houses in the immediate community of Banaka. The majority of the residents in the village of Banaka are Miskito.

The mestizo residents populate the hillsides above the central plain of Banaka. In this study, four of the five satellite communities are predominately mestizo. In total, there are approximately 65 houses in these communities, and the majority of the residents have settled in the region since 1998.

3.5 Limitations of the Research Design

I structured the research in Río Plátano to analyze whether mestizo colonization produces changes in both the collective-choice land-use decisions and the decisions made by the individual actors at the operational level. Banaka and Wampusirpe are both experiencing colonization pressures as mestizos migrate to those regions, and Ahuas is not. Nevertheless, there are two limitations in this design. First is mestizo influence in Ahuas.

Ideally, Ahuas would be a pure “control,” isolated from all mestizo influences and following customary Miskito land-use practices. However, this is not the case in Ahuas, or to my knowledge, anywhere in Río Plátano. As compared to Banaka and Wampusirpe there is *less* mestizo influence in Ahuas. Nevertheless, there are a few mestizo men in Ahuas. The men came with the Honduran military in the 1950s, married Miskito women, and stayed. Although they are recognized by the Miskito as mestizos, they are not considered colonists and they have generally adopted Miskito land-use customs. At the time of my visit there was only one new mestizo family living in Ahuas. The head of the household was a traveling merchant that decided to move his family to Ahuas in 2002. Ahuas residents stated that mestizos have not begun to colonize their region, nevertheless, they are aware of mestizo pressures elsewhere, particularly in Wampusirpe.

The second limitation is the introduction of the chainsaw in all communities. Residents state that some Miskito people began using chainsaws to cut trees and clear land in the mid-1990s. The introduction of the chainsaw may confound some of the institutional results. The chainsaw enables individuals to clear more land and harvest more trees. Therefore, in all communities, not only are mestizos producing greater scarcity of forested lands, so too are the Miskito destroying forests with chainsaws. In order to take into account the difference between institutions aimed at controlling mestizos and institutions aimed at controlling the chainsaw, I asked interviewees to specify why they preferred a particular land-use institution (Was it to prevent mestizo encroachment or a Miskito neighbor from cutting forested land, or possibly some other reason?). In interviews, chainsaw use was more of a concern in Ahuas than in Wampusirpe or Banaka.

4 METHODS

The data that I gathered and the subsequent analyses I present in this chapter draw heavily on definitions developed by Ostrom and colleagues (Crawford and Ostrom, 1995; Ostrom, 2005) to identify institutional change. I use the concepts of institutional robustness and resilience (Anderies et al., 2004; Berkes, 2001; Berkes et al., 2003) to understand the impacts and directions of these changes. In the following, I highlight some

of the key concepts I use to define and categorize institutional change, and the data-gathering methods.

4.1 Explanation of Concepts Used in Analyses

4.1.1 Identifying Institutional Change

The analysis of land-use dynamics in Río Plátano depends on the ability to identify institutional change. According to Ostrom (1990, p. 140), “a change in any rule affecting the set of participants, the set of strategies available to the participants, the control they have over outcomes, the information they have, or the payoffs is an institutional change.” She also suggests that one theory can be used to describe both the creation of, and change in, institutions because the absence of a rule is a rule itself (if nothing is forbidden then everything is permitted).

In Río Plátano, I focus on changes in the participants, their permitted activities, and the payoffs or sanctions. I identify the changes by looking at the different clusters of rules that specify a particular property right. Recall that Schlager and Ostrom (1992) define five different rights that make up the complete bundle of property rights (access, withdrawal, management, exclusion, and alienation). In chapter 3, I looked at how right-holders in each reserve further defined these rights through the creation of specific rule clusters—boundary, scope, choice, pay-off, and position rules.

The analysis of institutions presented in this chapter differs from that in chapter 3 in that I distinguish between different types of institutional statements. In chapter 3, all institutions were rules (either in-use or in-form). In order to gain a more nuanced understanding of the institutional dynamics occurring in the Miskito communities, in this chapter I distinguish between rules, norms, and strategies.

Following the work by Crawford and Ostrom (1995), in this study, a rule is differentiated from a norm by the level of collective decision making required and a formal sanctioning process. A rule requires some degree of collective action and collective-level decision making where participants consciously craft what an individual must, may, or may not do, and expressly stipulate what will happen if an individual does

not comply with the ordinance. In contrast, a norm is more informal. A norm is often a tacit understanding of customs that guide an individual's behavior by stating what an individual should or should not do. A norm is not consciously crafted and does not have a formal mechanism for monitoring and sanctioning non-compliance. However, norms are supported by informal monitoring and sanctions such as community gossip, shunning, and other communal incentives. A strategy is the most informal institutional statement. It specifies what is customary, but it is not enforced by either formal or informal sanctioning. It could be considered to be followed because others have generally found that the institution "works," but it is not necessarily the only acceptable behavior or decision.

For example, in the Miskito communities I consider migratory farming to be a land-use strategy not a land-use norm. The land-use strategy supports the Miskito management rights by creating a shared understanding that residents farm small plots spread out in the forest. Most residents comply with the strategy; however, farmers who choose to maintain farms in one area are not criticized or shunned. It is simply understood that they have made a land-use decision that differs from what is considered by many as customary. In contrast, I consider the prohibition of Miskito land sales to be a traditional land-use norm that defines Miskito alienation rights. Historically, no formal sanctioning mechanism has been prescribed for those who sell land. Nevertheless, those Miskito who do sell land are frequently subjected to community criticism and negative gossip.

The distinction between a norm and a rule is particularly telling. When something that was once a norm, such as the prohibition of land sales, becomes a rule, it suggests that tacit understanding between community members is no longer sufficient and that the particular resource now holds enough value that it warrants the costs associated with collective action to define a rule and its respective sanctions. Similarly, a norm shifting to a strategy may mean that the values and attitudes that once supported the norm are no longer prevalent in the community and that the institution is now merely a custom to be practiced if one so desires.

4.1.2 Assessing the Robustness of the Miskito Common-Property System

What do changes in the land-use institutions mean with respect to the overall stability of the Miskito common-property system? Chapter 3 showed how different institutional arrangements impact agricultural expansion and forest cover. In this analysis, I focus primarily on how individual institutional changes with respect to land use impact the structure and function of the overall common-property institutional system. I am explicitly interested in changes that can be considered to contribute to the maintenance or collapse of the common-property system.

In the context of Río Plátano, where the private-property institutions promoted by the mestizos conflict with the common-property institutions of the Miskito residents, the theories of institutional change suggest four outcomes in response to the mestizo disturbance: (1) institutional collapse; (2) institutional change toward private property; (3) no institutional change; or (4) institutional change that sustains robust common-property rights. In my analysis of institutional change, I categorize changes that contribute to a “robust” institutional system or to institutional “collapse.” I have decided to use the word “robust” to refer to changes that enable the mestizo common-property system to maintain its core structure and function. According to Berkes (2001, p. 313), resilience (robustness) is the measure of: (1) the amount of change the system can undergo and still retain its function and structure; (2) self-organization capabilities; and (3) the ability to learn and adapt. Thus, I categorize organizational and institutional changes that support the structure and function of Miskito common-property customs, even in the face of mestizo encroachment, to be part of a robust common-property system.

Figure 4.3 illustrates how I envision Miskito responses to mestizo migration with respect to their overall impact on the robustness of their traditional common-property system. There are two changes that I consider signal institutional collapse: the creation of an institutional vacuum and Miskito adoption of private-property rights. The ultimate in institutional collapse would be an institutional vacuum. This scenario would be something like Hardin’s (1968) hypothesized tragedy of the commons. In this situation, there are no institutions and everything is permitted, nothing is forbidden. Although the

Mosquitia is frequently referred to as a lawless region, I cannot envision a complete institutional meltdown and absolute tenure insecurity. In this scenario, no one would plant or have cattle, for there would be no way of keeping one's neighbors from one's harvests or one's livestock.

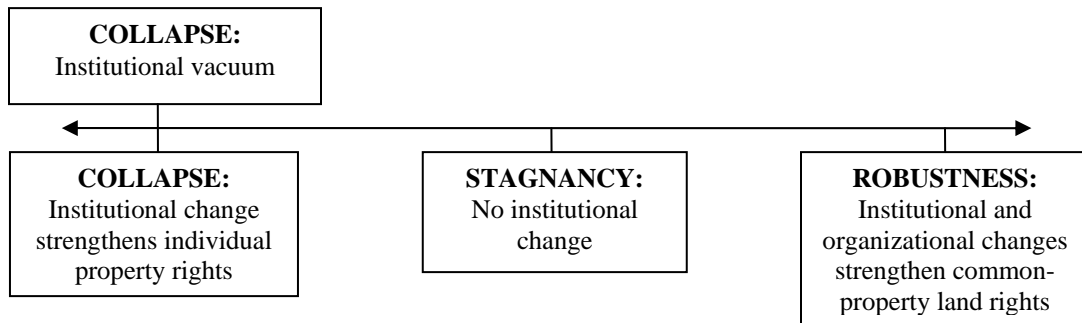


Figure 4.3. Spectrum of Changes in Miskito Common-Property Institutions in Response to Mestizo Migration

I consider it more likely that rather than complete collapse, the Miskito begin to adopt mestizo institutions. Despite rumors that the mestizos are ruthless, they are not without institutions; their land-use norms and rules simply differ from those of the Miskito. These differences will be discussed in greater detail, but broadly speaking, the mestizo institutions serve to establish and defend private-property rights. For example, whereas the Miskito does not restrict access to his/her cultivated fields, the mestizo puts a fence around his/her crops and prohibits trespassing. It may be that some Miskito also begin fencing their lands. In this case, I would code this institutional change as moving toward institutional collapse. It is not, however, an institutional vacuum.

I recognize that some land-use institutions may not change or will remain unaffected by mestizo migration. In this analysis, I am principally concerned with institutional developments that either serve to sustain the function and structure of the common-property system or serve to promote the function and structure of private-property rights.

4.2 Data-Gathering Methods

4.2.1 *Determining the Structure and Function of the Traditional Miskito Common-Property-Rights System*

The first section of the analysis provides the context for understanding the structure and function of traditional Miskito land-use institutions and the overarching common-property customs. Data on customary Miskito property rights and land-use institutions were gathered through semi-structured interviews with Miskito leaders and elders in Ahuas, Wampusirpe, and Banaka. In interviews I asked respondents, historically speaking, how they decided on the distribution of land and forest products. I paid particular attention to how residents defined access rights to the land, management institutions, and institutions regulating the ability to loan, bequest, and sell land. I also noted the types of benefits the respondents said they derived from different natural resources and how the property-rights system served to sustain those benefits. In addition, I asked elders whether property-rights institutions or land-use practices had changed in their lifetimes, and if so, why and how they had changed.

The customary land rights defined by the residents were compared to land-use studies in the region conducted by Dodds (1994) and Tillman (2004). The customary rights described by Río Plátano Miskito residents were similar to other accounts of Amerindian land-use systems in Nicaragua and other parts of Honduras (Godoy et al., 1997; House, 1997; Nietschmann, 1973; Stocks, 1996).

The description of the disturbance (mestizo land-use practices and institutions) is based on structured and semi-structured interviews I conducted with long-standing mestizo residents as well as with those who had moved into the cultural zone within the past ten years. The description is also based on the mestizo responses to the “Miguel questionnaire” with respect to preferred land-use practices (see appendices A and B). I compared the mestizo responses to research by Carr (2004) on mestizo colonization in eastern Guatemala and Stocks’ (1998) work on mestizo land-use patterns in Bosawas, Nicaragua.

4.2.2 Assessing Institutional Change, Preferences, and Practices

(1) Institutional Changes and Decisions Made by MASTA

At the collective-choice (and to some degree the constitutional-choice) levels, I examine changes in the land-use and property-rights institutions by looking at rule development on the part of MASTA and its respective regional federations. I collected data through semi-structured interviews with leaders from the MASTA federations in Río Plátano. I also attended a Biosphere Project meeting where the president of MASTA discussed MASTA's position with respect to property rights in the cultural zone of Río Plátano reserve. Semi-structured interviews were held with Miskito leaders and community groups within the study sites. These interviews aimed at understanding not only rule creation, but also rule application. In addition to the semi-structured interviews with community leaders, I asked individual residents about their attitudes toward rules at the collective-choice level.

In analyzing the results, I categorize three possible outcomes: rules to support private-property rights, rules to support common-property rights, or no rules. If the Miskito property-rights system is robust, I expect that in response to mestizo encroachment, the regional federations of MASTA will have created rules to support the Miskito people's communal rights to the Mosquitia. For example, if MASTA demands private-property rights, this would be considered to detract from the robustness of the Miskito customary property-rights. A third option is no change—no rule creation. If MASTA has done nothing with respect to property-rights and mestizo encroachment, I consider their inactivity to detract from the robustness of the Miskito common-property system.

(2) Land-Use Preferences and Practices of the Miskito People

I chose four different variables to examine property-rights preferences and land-use institutions in each community. The four variables include: (1) land tenure preferences, (2) property-rights preferences specifically over forest lands, (3) use of fences, and (4) attitudes toward land sales. I chose each of these variables because they represent key differences in the Miskito and mestizo property-rights arrangements. For each variable I consider if preferences are in accordance with Miskito common-property customs or

mestizo private-property institutions, and whether the different experiences with mestizo encroachment are associated with different institutional preferences and practices.

In order to gather information on how individual residents are responding to mestizo encroachment, I conducted semi-structured interviews, walked through the forests and fields in each study site, and worked with residents in their agricultural fields to observe present land-use practices. I also administered the “Miguel questionnaire” to a purposefully selected sample of residents in each study site (see appendices A and B).

In each community, I sampled at least 10% of the houses, and in many, I interviewed residents in 25–50% of the houses. In order to get a representative sample of residents, I divided each community into geographic regions and sampled the Miskito households and residents based on the geographic location of the house and gender. I chose to sample based on house location in order to ensure that not only the wealthiest or the closest to the community center were sampled. In each house, either a male or female head of household was asked to speak for household(s) in the house.

If Miskito common-property rights are robust, I expect that institutional outcomes will be independent of encroachment and that in each study site:

1. Miskito residents will prefer common-property tenure rights over individual tenure rights.
2. Miskito residents will prefer shared ownership and access rights (for all the Miskito people) to the forest lands.
3. Miskito residents will not use fences.
4. Miskito residents will not sell land.

5 CUSTOMARY MISKITO PROPERTY-RIGHTS INSTITUTIONS AND THE MESTIZO DISTURBANCE

I begin the analysis of institutional change with a description of the customary Miskito property-rights system, and an overview of how the mestizo property-rights institutions disturb the Miskito system. This is followed by an analysis of the findings of how MASTA and its respective federations are responding to mestizo migration and how the individual Miskito residents are addressing mestizo migration and the introduction of a

land market and private-property institutions. I conclude with a discussion of whether the changes can be considered part of a robust common-property system.

5.1 Miskito Property Rights and Land-Use Institutions

In his work on forestry institutions in Mexico, Klooster (2000) highlights the important role that institutions serve in forming community identity (p. 14). Similarly, my own work in the Río Plátano and work by other researchers (Dodds, 1994; Herlihy, 2001) found that Miskito land-use institutions serve to maintain key values and practices that identify what makes a person Miskito. Residents express Miskito land uses not in terms of rules and laws, but rather by what is customary and what differentiates a Miskito from another ethnic group, such as the mestizos.

The Miskito property rights are founded on a set of commonly understood land-use norms. Customarily, Miskito land-use decisions are made at the household level, and few, if any, decisions are decided by the community at the collective-choice level. Historically, the Miskito did not have traditional tribal councils that crafted land-use rules and property-rights institutions (Dodds, 1994). Rather, property rights evolved over time into tacit norms and land-use strategies. No one monitored the forests and there was no collectively decided-upon enforcement mechanism. I categorize all customary institutions as either strategies or norms and do not consider any of them to be collectively decided-upon rules. Table 4.2 presents a broad categorization of the principal property rights that many Miskito consider to be their customary practices.

Broadly speaking, the Miskito property-rights institutions can be characterized as a common-property-rights regime by which all Miskito residents share access and withdrawal rights to the lands of the Mosquitia. The Miskito of Río Plátano have not created scope rules or physically demarcated their lands, however, elders and leaders claim that their ancestral rights include the entire department of Gracias a Dios. As one of the first groups to occupy the land, they believe that they, and the other natives in the region, are the rightful owners of the Mosquitia. The customary property-rights institutions did not include any boundary rules to forbid non-natives from settling in the region. As one Miskito leader stated, they never created any rules prohibiting outsiders or

clearly demarcated their lands because many assumed that the lands naturally belonged to the Miskito peoples.

Table 4.2. Miskito Customary Property Rights

Institutional Statement	Configuration of Property Right
	<u>Access</u>
NORM	All natives (loosely defined) may access all lands.
	<u>Withdrawal</u>
NORM	All natives (loosely defined) may withdraw forest products.
	<u>Exclusion</u>
NORM	First to farm may exclude others from withdrawing from plot.
NORM	No one may exclude Miskito from forested lands.
	<u>Management</u>
NORM	First to farm retain management rights to plot.
NORM	Miskito farm small plots of less than 1 ha.
STRATEGY	Miskito do not clear forest for pasture.
	<u>Alienation</u>
NORM	First to farm retains right to bequeath and loan previously cultivated land.
NORM	Miskito do not sell land.

The most prominent feature of the Miskito property-rights arrangement is their shared access and withdrawal rights to the land and its resources. A common perception, one frequently expressed in interviews, is that God created the land for the Miskito to use for their livelihood needs. In interviews, Miskito residents frequently emphasized that their property-rights system gives the Miskito people access to all the Mosquitia lands and that it goes against their customs to restrict access to the land. In particular, elders and Miskito leaders noted that the Miskito are accustomed to sharing forests with one another so that all can benefit from the forest resources. Many noted that certain trees or forest products are only available in certain regions and that all Miskito must have access and withdrawal rights to these regions. Similarly, many residents refuted the notion of government sovereignty over the land. Several stated that the government did not make the trees or the land. An individual may lay claim to his work, but no government or individual has the right to restrict Miskito access to otherwise unoccupied lands.

Cultivated land is distinguished from virgin forest land as the former has more complete property rights attached to it. However, any forest that has not been previously cultivated is available to be claimed. Agricultural lands are claimed using the first-in-time rule (Ostrom, 2005). Both men and women may own agricultural lands. The first person to clear a piece of forest and cultivate the land retains permanent use rights to the land. The land remains in the family and ensures that future generations will have land to farm. The original cultivator has withdrawal, management, and restricted-alienation rights.

It is up to the owner to monitor and enforce his or her property rights to cultivated land. The boundaries are not usually physically demarcated, and once the plot returns to fallow it can be difficult for an outside eye to recognize the specific boundaries defining ownership. Permanent crops such as fruit trees or cacao are frequently planted as a sign of ownership, and elders have a remarkable ability to recall who cut what tree and planted where. If someone violates another's property rights he or she may be sanctioned by the property owner. Sanctions include community gossip, vandalism, or the threat of black magic. For example, if someone plants on another's land, the plot owner may destroy the perpetrator's crops. In some instances, an elder may be called to resolve boundary disputes. In some communities, the position of a community mediator has been created by the municipality, however many residents state that conflicts are often settled informally. Residents assert that disagreements generally get worked out because a Miskito does not want trouble with his neighbor.

Land and forests are not managed for substantive commercial profits through cattle, agriculture, or forestry. People do not cut pasture or fence their lands, and cattle are customarily kept in the village living spaces. Given the relatively low population densities and Miskito preference for farming small plots (less than 100 yd by 100 yd) along the rivers, there is minimal competition over forest lands and the forests have been left largely intact (Dodds, 1994).

With respect to alienation rights, the Miskito residents emphasize that, traditionally, land is not sold. In conversations, Miskito elders noted that unlike the mestizos, Miskito do not sell land. Although many will loan land to a neighbor in need, the loan is only temporary. All cultivated land is to be held in the family for future generations.

5.2 The Disturbance: Colonist Land-Use Institutions

The mestizo colonists disturb the Miskito land-use system in three important ways. First, the mestizos are a heterogeneous group that do not necessarily share Miskito values toward the land and are not incorporated into the complex web of interactions within Miskito society. Furthermore, the central functions of the mestizo property-rights system differ from those of the Miskito. Instead of operating under a common-property system that serves to meet subsistence needs and provide a certain degree of social equity, the mestizos depend on private-property rights to secure not only subsistence benefits, but also the economic profits that can be derived from the land and its resource base, namely from crops, cattle, and timber. The mestizo land-use institutions do not protect shared access rights to the forests and shared benefits from the forest products. In accordance with research findings of Taylor and Singleton (1993), the loosely developed property-rights system of the Miskito people may no longer be sufficiently binding when residents are faced with mestizo migrants who have their own land-use institutions that are more connected to mainland market systems.

Second, the mestizos increase the demand for land resources and contribute to resource scarcity. Mestizos tend to farm in the foothills and claim (and clear) areas of forested land that the Miskito residents have historically shared in common. This means that all of the forest resources that were located in that forest are no longer available to the Miskito people.

Third, the mestizos introduce an external source of money into the region via the land market. Mestizos create economic incentives to owning land and forest by offering money for pastures and forested lands.ⁱⁱ Although mestizos are commonly accused of invading forest lands, many buy at least some of their landholdings from Miskito residents. The offer of money for land presents a new economic value for land other than purely subsistence benefits. Table 4.3 shows the institutional structure that supports the mestizo colonists' property-rights system.

Mestizo farmers and ranchers place utmost importance on the establishment of individual land rights. The colonists perceive all lands to be open for appropriation unless they are otherwise physically demarcated. Upon arriving in the frontier, mestizos

immediately demarcate their landholdings with markings on trees and clearings in order to establish ownership rights. The first person to demarcate a piece of land is then considered to hold all property rights to the land, including the right to sell. Unlike the fluid boundaries and overlapping rights found in the Miskito property-rights arrangements, the mestizo property-rights institutions clearly demarcate access and withdrawal rights, and facilitate the buying and selling of land.

Table 4.3. Colonist Property Rights

Institutional Statement	Configuration of Property Right
	<u>Access</u>
NORM	All Hondurans may access all unclaimed lands.
	<u>Withdrawal</u>
NORM	All Hondurans may withdraw products from unclaimed lands.
	<u>Exclusion</u>
NORM	First to physically demarcate land may exclude all others from land.
NORM	All unclaimed land may be appropriated.
	<u>Management</u>
STRATEGY	Manage large permanent plots for crop, pasture, and forest products.
	<u>Alienation</u>
NORM	First to physically demarcate has right to sell, bequeath, rent, or loan land.

Mestizo lands are monitored and enforced by the respective owners. Fences are commonly used to demonstrate ownership and deter trespassers. It is understood among colonists that no one else may enter or use another person's land without his/her permission. If someone is found entering another's land he or she will be asked to leave and the threat of violence (usually the use of a firearm) is an accepted means of enforcement.

In addition to their property-rights institutions, the mestizo land-use strategies also tend to prioritize the wealth-generating benefits of the Mosquitia lands over the benefits that can be derived from subsistence living and forest conservation. Mestizo settlers often claim relatively large expanses of land (50–60 ha) in which they keep roughly half in forest and the rest for crops and pasture (Carr, 2004; Stocks, 1998). And, unlike the indigenous residents that tend to farm along the riversides and keep large areas of forest

intact for communal use, mestizo land-use strategies often produce fragmented forests. This is not to say that the mestizos do not value the environmental benefits that forests provide. Many mestizos recognize that forests are vital for watershed protection and some settlers discourage clearing land in the watersheds. However, all other forests are viewed as potentially cultivable.

6 THE RESULTS: EVOLUTION OF MISKITO PROPERTY RIGHTS IN RÍO PLÁTANO

The institutional findings are divided between collective-choice decisions that are being made by Miskito leaders and the operational-level activities and attitudes of the residents in the Miskito communities. Findings show that while at the collective-choice level the Miskito are developing rules to strengthen their common-property rights to the Mosquitia, individual actions and attitudes at the operational level are less cohesive. Individuals support the creation of an autonomous territory for the Miskito people, but they have little faith in the ability of their communities to prevent mestizo encroachment. Many individuals prefer to adopt land-use institutions that are recognized by the mestizos and serve to protect each person's individual rights to their agricultural and forest lands.

6.1 Institutional Dynamics at the Collective-Choice Level

The Miskito political organization MASTA demands formal legal recognition of their common-property rights over the Mosquitia, including the ability to exclude, manage, and determine alienation rights over their homelands. The MASTA members consistently call on the International Labor Organization Indigenous Rights Treaty 169 signed by Honduras in 1989 and insist that the Honduran government recognize their autonomous rights over the Honduran Mosquitia. However, thus far, their claims have fallen on deaf ears.

Nevertheless, in response to continued mestizo migration and in an effort to assert their dominion over their homelands, the regional federations of MASTA have defined, and are trying to establish, a set of de facto land-use rules with respect to access and use

rights to their communal lands in the Mosquitia. The regional federations have collectively established two rules to prohibit mestizo occupation of their lands:ⁱⁱⁱ

1. Exclusion: No mestizo settlers are permitted to settle in the cultural zone of Río Plátano.
2. Alienation: Miskito are prohibited from selling land to mestizos.

In order to enforce these rules, each MASTA federation is responsible for creating a land vigilance committee to monitor mestizo encroachment and Miskito land sales. Any illicit activities are to be reported to the MASTA federation which, in turn, is expected to coordinate with AFE-COHDEFOR and/or municipal governments to further investigate and enforce the rules. In practice, however, the rules are only sporadically applied in the Miskito communities.

Findings on the regional MASTA activities in the three study sites are that the regional federations do not create a committee to monitor mestizos until the mestizos have actually entered. BAMIASTA, the regional federation of MASTA for Ahuas, has not created any type of land vigilance committee and is not actively organizing residents to consider how they might address the problem of mestizo encroachment. BAMIASTA leaders say that they are concerned with the possibility that mestizos might invade their communal lands, but to date, that has not happened.

In contrast, in Wampusirpe and Banaka, the communities' respective regional federations BAKINASTA and RAYAKA have individually organized land vigilance committees to monitor encroachment activities. In both cases, however, these committees were organized after mestizos began moving into their respective regions. Furthermore, the land vigilance committees' activities vary in effectiveness and consistency over time.

Wampusirpe's land vigilance committee is the most recent. The committee formed circa 2003 in response to an increase in colonist activities in the region. Committee members state that the group has been relatively successful in getting colonists to leave forested lands that they had appropriated. Committee members recounted one occasion in the past year when the group encountered several mestizo settlers demarcating land in Río Plátano. The land vigilance committee called on its federation, BAKINASTA, and AFE-COHDEFOR personnel to tell the settlers to leave (and they did). However, group

members stated that thus far they have been less successful in prohibiting land sales to mestizos.

Of the three study sites, Banaka has the longest history of encroachment and the longest history of attempts to control mestizo migration. In the early 1990s, the regional organization that is now RAYAKA organized residents of the Miskito communities in the western region of the cultural zone into land vigilance committees to monitor their lands from mestizo encroachment. Banaka residents report that monitoring and enforcement activities of their land vigilance committee thrived in the early 1990s. While all vigilance activities were voluntary, the Honduran NGO MOPAWI supported the organizational development of the committee. Although the land vigilance committees did not hold any official rights to sanction the colonists, when group members encountered colonists they asked the settlers to leave and if the colonists refused, they called on neighboring land vigilance committees, and at times the employees of AFE-COHDEFOR, to expel the colonists. Banaka residents reported that until the mid-1990s, the group was relatively successful.

In 1995, however, the Honduran government encouraged thousands of farmers to colonize a region along the northwestern edge of Río Plátano, close to the western border of the cultural zone. According to residents, many of these farmers pressed farther into the cultural zone and into the foothills surrounding Banaka. In interviews, the original members of the Banaka land vigilance committee reported that, at that time, they felt they needed greater support in order to control the onslaught of colonists. Ultimately, RAYAKA demanded that the government either give the indigenous peoples their own territory to manage or provide greater government support to control the colonization process.^{iv} Banaka residents said they felt discouraged by the lack of support on the part of the Honduran government. In the late 1990s, AFE-COHDEFOR began to assert its jurisdictional rights over Río Plátano lands through the creation of the Río Plátano management plan. At this time, RAYAKA underwent administrative difficulties and the Banaka land vigilance committee dissolved.

In June 2004, MOPAWI and RAYAKA began to try to reinvigorate the Banaka land vigilance committee and encourage members to monitor and enforce the rules to prohibit land sales as well as regulate their own agricultural expansion. However, community

residents and several members of the new committee are pessimistic about the actual application of said rules. Banaka residents' state that the community is divided over land sales and that many families have since sold land to colonists. The land vigilance committee members also complain that their work is voluntary and that they still lack a means to sanction colonists or community members who illegally sell land.

6.2 Deterioration of Community Confidence in Collective-Choice Capabilities

The results of the land vigilance committee activities in Wampusirpe and Banaka demonstrate that land-use rules made at the collective-choice level have had mixed results. At times, the rules prohibiting mestizo settlements have been enforced and have apparently served to thwart mestizo encroachment. The findings also suggest that the longer colonists have been in the region, the less likely residents will believe that they can effectively control mestizo migration. This is reflected not only in reports by the respective land vigilance committees, but also in residents' attitudes about whether the community can control mestizo encroachment.

Figure 4.4 shows the results from the "Miguel questionnaire" statement with respect to whether the community can prevent mestizo encroachment. Some residents responded that the community can sometimes prevent mestizo encroachment or that the community can but are not preventing encroachment. I coded all such responses to signify that the community cannot prevent mestizo colonization. Furthermore, some residents did not know whether the community could or should control encroachment. Table 4.4 shows the cross-tabulation results and demonstrates the relationship between history of encroachment and perceptions of whether the community can prevent mestizo encroachment. In the table and cross-tabulation analysis, I chose to exclude the five "don't know" cases in Ahuas.

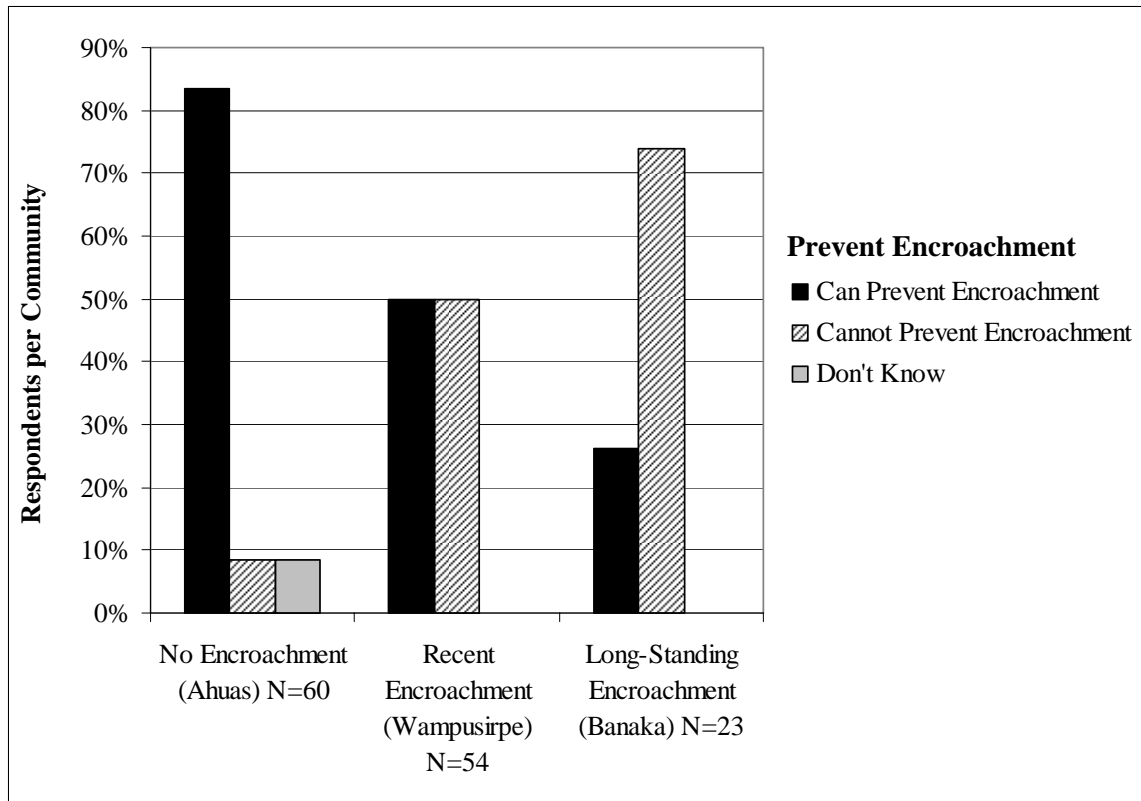


Figure 4.4. Comparison of Attitudes on Ability to Control Encroachment by Community Encroachment History

Table 4.4. Cross-Tabulation Results of Ability to Prevent Mestizo Encroachment

		Can Prevent Mestizos	Cannot Prevent Mestizos	Total
No Encroachment (Ahuas)	Count	50	5	55
	Expected count	34.58	20.42	55
Recent Encroachment (Wampusirpe)	Count	27	27	54
	Expected count	33.95	20.04	54
Long-Standing Encroachment (Banaka)	Count	6	17	23
	Expected count	14.46	8.54	23

Likelihood ratio 39.362, $p = 0.000$

The results suggest that the longer a community is exposed to mestizo encroachment, the less likely it is that community residents will believe that the community can prevent mestizo colonization of the region. The likelihood ratio value from the chi-square test of independence shows that there is a statistically significant relationship between a

community's experience with encroachment and residents' attitudes with respect to their ability to prevent mestizo settlements. Ahuas residents, who have yet to experience mestizo migration, are most confident in their ability to control mestizo settlements. However, several residents in Ahuas were not sure whether they, in fact, needed to keep out mestizos. It is also important to note that many Ahuas residents responded to the question as more of a hypothetical situation of whether they wanted mestizos in the region. Ahuas residents frequently stated in response that no, they did not want mestizo residents and that yes, they *would* prevent them from moving to the region.

In contrast, Wampusirpe residents who began experiencing mestizo migration within the last five years are divided over whether they are able to prevent mestizos from settling in their communities. In Wampusirpe, several residents stated that the community can prevent mestizo encroachment, but they are choosing not to. These residents expressed frustration over recent land sales by Miskito residents to mestizo settlers and noted that although he or she does not want mestizos living in the region, there is nothing to prevent a neighbor from selling land.

Finally, Banaka residents, with the longest history of encroachment, were the most likely to state that the community is incapable of preventing mestizo migration. In Banaka, 14 of the 23 respondents stated that they could not prevent mestizo migration to the region.

6.3 Individual Attitudes and Land-Use Practices: Defense of Miskito Common-Property Rights or Adoption of Mestizo Land Uses?

Mestizos continue to migrate to Banaka and Wampusirpe. How are the Miskito residents responding to this migration? Do they continue to support the collective-choice rules created by MASTA and its respective federations? Or, are they turning to other institutional mechanisms to protect their lands? Do their institutional choices vary depending on their experiences with mestizo encroachment?

The analyses of individual land-use preferences demonstrate that within the Miskito communities, the Miskito residents are not unified with respect to (1) their property-rights preferences or (2) deference to the prohibition of land sales to outsiders. Findings

show that this dissonance between the collective goals expressed by the Miskito leaders and individual Miskito land-use preferences becomes more pronounced the longer that a community is exposed to mestizo colonists. The following highlights the results from questions with respect to tenure preferences and the defense of land rights, institutions to protect forested land, fences, and attitudes toward land sales.

6.3.1 Property-Rights Preferences

The semi-structured interviews with reserve residents found that the majority of Miskito residents agree with MASTA that the Mosquitia should belong collectively to the Miskito people. In informal individual and group interviews, the majority of residents rejected any tenure arrangement that would restrict their rights over all of the Mosquitia lands and expressed support for MASTA's demand for an autonomous indigenous territory. This support did not vary by community.

However, when residents were asked explicitly about the type of tenure right they would prefer to hold, the responses varied and did not necessarily cohere with MASTA's demand for a communal title to the Miskito lands. Figure 4.5 and Table 4.5 compare the land-title preferences of residents in the three study sites of varying levels of encroachment.

Approximately half (75/138) of the total respondents in the three communities stated that they wanted communal titles to the lands, and the responses, once again, varied by community. In Ahuas, where residents have not experienced encroachment, residents were less likely than in the other two sites to have a firm grasp of different titling options. In interviews, approximately 40% of those in Ahuas did not understand the concept of land titles. Furthermore, the Ahuas residents did not express title preferences with respect to their ability to protect their lands from outsiders, but rather with respect to maintaining rights to their agricultural plots and the forest lands within the reserve.

In contrast, in Wampusirpe, where mestizo colonists recently began to settle, communal title had the strongest support with 76% of the households interviewed stating that they wanted a communal title. In interviews, many were concerned about mestizo invasions, illegal land sales, and the division of communal lands. Many stated that they

preferred common property because those rights corresponded with Miskito traditional land-use systems that do not have clearly defined boundaries and where everyone is entitled to use the land. Several commented that communal titles also serve to demonstrate Miskito ownership over the lands and prevent land sales to outsiders.

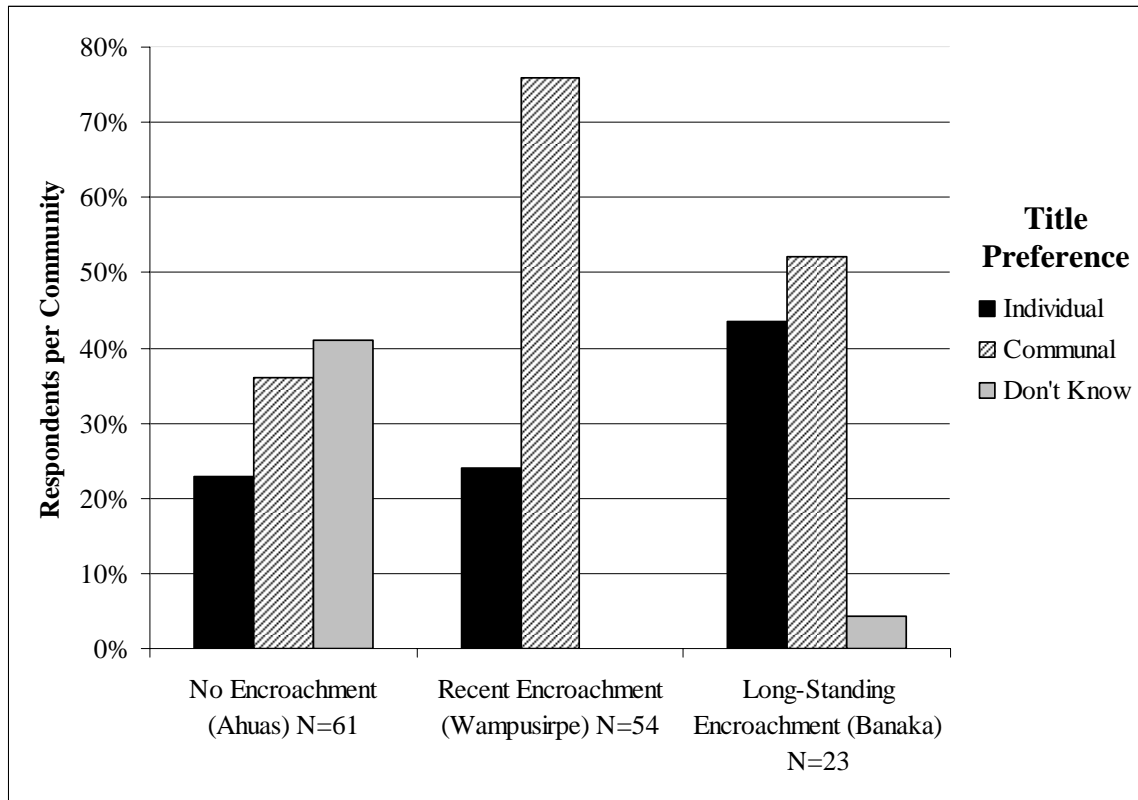


Figure 4.5. Comparison of Land-Title Preferences by Community Encroachment History

Table 4.5. Land-Titling Preferences

	Individual	Communal	Don't Know	Total
No Encroachment (Ahuas)	14	22	25	61
Recent Encroachment (Wampusirpe)	13	41	0	54
Long-Standing Encroachment (Banaka)	10	12	1	23

Finally, in Banaka, where colonists have been settling in the region for over a decade, almost half of the respondents, 10 out of 23 households, stated that they wanted individual titles to their lands. Banaka residents frequently stated that with individual titles one could secure one's own land and work.

6.3.2 Privatization of Forest Reserves

As stated, the Miskito generally share access to the forests and withdrawal of forest products. Families do not own forest land, and the community residents at times travel to forests lying near neighboring communities to look for specific timber or other forest products. In contrast, among mestizo colonists, clearing a strip of land around a forest area is a commonly accepted practice that denotes ownership.

In response to a questionnaire statement about use rights to the Mosquitia forests, 131 out of the 138 total respondents interviewed in the three study sites stated that the forests are only for the Miskito or native peoples. Less than 5% believed that the forests are for all Hondurans. But, once again, in their decisions at the operational level, many Miskito are straying from the customary shared access rights to the forest and adopting the mestizo institutions that demonstrate individual property rights to forest resources.

The "Miguel questionnaire" asked residents whether they agreed with having a private family forest that was physically demarcated. According to the scenario, the forest would be only for that particular family and the owner could prohibit other Miskito from using the forest resources within the family's private reserve. Figure 4.6 graphically illustrates the results, and Table 4.6 presents the cross-tabulation and chi-square test findings. The results show that encroachment and the preference for a privatized individual forest are positively associated. The number of respondents in Banaka and Wampusirpe who said that they agreed with (and in some cases had) private forests is greater than what would be expected if encroachment and forest preference were independent. In contrast, in Ahuas, those in favor of private forests are far less than the expected count.

In all communities, the privatization of forest lands is becoming more acceptable; however, it is more likely that a resident in Banaka prefers privatized forest lands than a

resident in Ahuas or Wampusirpe. In Banaka, 21 of the 23 households interviewed stated that they had their own forest that was physically demarcated and specifically designated for their own family's use. In contrast, in Wampusirpe just under half of the residents interviewed stated that they had or wanted a private forest for their families. And in Ahuas, only 18 of the 60 respondents supported owning a private forest.

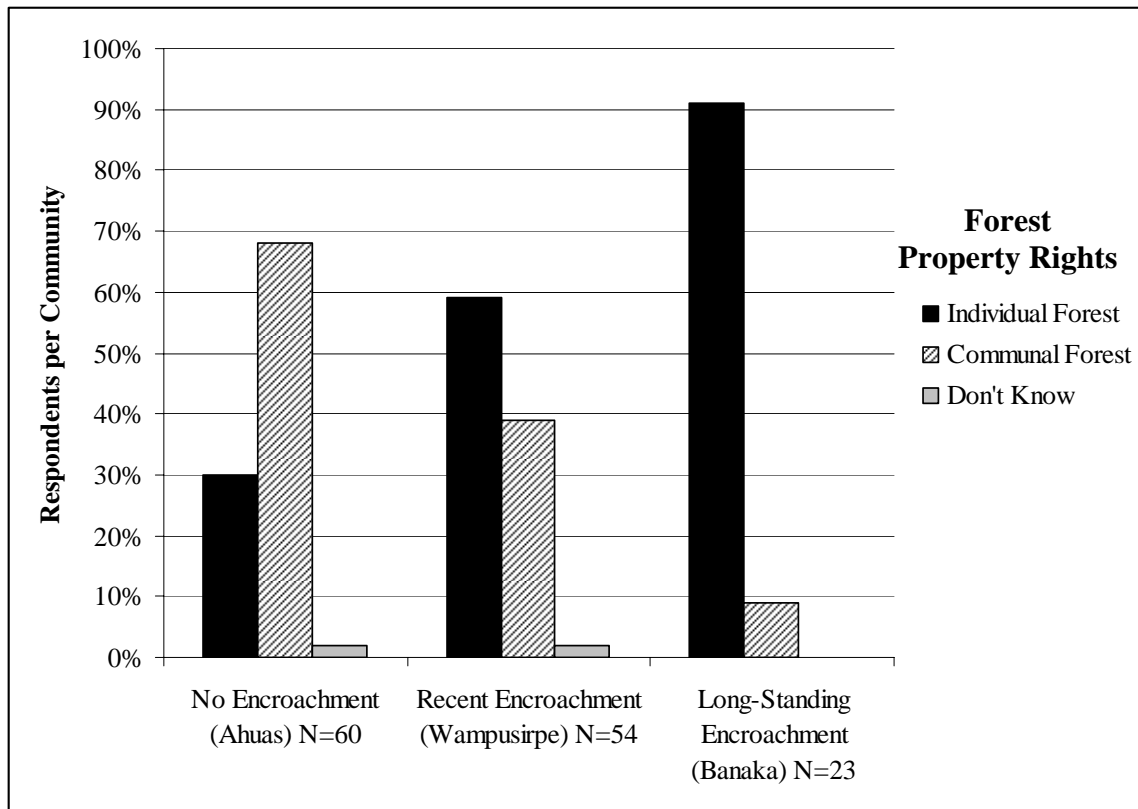


Figure 4.6. Comparison of Forest-Ownership Preferences by Community Encroachment History

Table 4.6. Cross-Tabulation of Encroachment and Forest Preference

		Individual Forest	Communal Forest	Total
No Encroachment (Ahuas)	Count	18	41	59
	Expected count	31.03	27.97	59
Recent Encroachment (Wampusirpe)	Count	32	21	53
	Expected count	27.87	25.13	53
Long-Standing Encroachment (Banaka)	Count	21	2	23
	Expected count	12.10	10.90	23

Likelihood ratio = 29.439, $p = 0.000$

Those respondents in favor of individual forests frequently stated that any land that is not clearly occupied may be taken by another. Whereas residents in Ahuas expressed concern over timber harvesting, Wampusirpe and Banaka residents who supported private forests said that by physically demarcating a forest they could ensure that no mestizo would invade and that a Miskito neighbor would not sell the land. In Banaka, several residents recounted earlier times when they had gone up into the hillsides to cut mahogany for boats and found mestizo settlers restricting their access to the residents' prime forest lands. Banaka respondents stated that they have created their own forest reserves so that their families and their children will have places to hunt and gather timber products.

In all communities, those respondents who did not prefer individual forests were adamant that it violated Miskito traditions to restrict access to forested land. Many emphasized that different forest products grow in different regions and that all Miskito deserve equal access to these products.

6.3.3 *Propagation of Fences*

Another trend toward more restrictive property rights regimes is through the use of fences. Fences may appear fairly innocuous, yet many Miskito residents note that traditionally the Miskito do not fence their lands because anyone may access all lands. Fences are a visible demonstration of property rights and a mechanism for enforcing boundary rules. In interviews, many Miskito residents complained that the mestizos restrict Miskito access by fencing their lands (and actively monitoring their property). However, more Miskito families are beginning to fence their lands.

Table 4.7 shows a statistically significant relationship between encroachment and the use of fences. As with the other institutions that support greater privatization of the land and its resources, fencing is most popular in Banaka, where 20 of the 22 respondents agreed with fencing one's land. This response may be due, in part, to the geographic layout of Banaka and the fact that the agricultural plots are planted closer to the communal living areas than they are in Wampusirpe or Ahuas. Many Banaka residents, however, have also begun to adopt the mestizo practice of permanent pasture lands. In

addition to keeping their cows out of the crop lands, some residents noted that part of the reason to fence is to define ownership over one's land.

Table 4.7. Cross-Tabulation of Encroachment and Use of Fences

		No fences	Yes fences	Total
No Encroachment (Ahuas)	Count	30	25	55
	Expected count	24.54	30.46	55
Recent Encroachment (Wampusirpe)	Count	26	27	53
	Expected count	23.65	29.35	53
Long-Standing Encroachment (Banaka)	Count	2	20	22
	Expected count	9.81	12.18	22

Likelihood ratio 6.058, $p = 0.000$

Fencing land and maintaining permanent plots is not as prominent in Wampusirpe and Ahuas. In Wampusirpe and Ahuas, opinions are evenly split over whether to fence agricultural lands. In both regions, residents expressed concern that fencing would restrict resident access to community lands, and community leaders and elders, in particular, worried that fencing would allow a few wealthy residents to claim all of the prime land. Nevertheless, many also noted that with the acquisition of cattle, fencing is becoming more important in order to protect crop lands.

6.3.4 Alienation Rights: Land as a Market Commodity

Given the chance to gain immediate access to money from land sales, have the Miskito become integrated into the mestizo land market? In questionnaire responses, the majority of the residents (125/140 total respondents) stated that land sales to non-natives causes problems for the entire community. Many Miskito stated that, in their opinion, mestizos generally do not make good neighbors. The attitude of general distrust of mestizos did not vary much by community.

Nevertheless, land sales to mestizos persist. Community leaders and land vigilance committee members frequently commented that one of the greatest difficulties in

controlling mestizo encroachment is in convincing their own community members not to sell land to the colonists.

Table 4.8. Comparison of Willingness to Sell across Communities

	Sell to Anyone	Sell Only to Native	Never Sell	Total
No Encroachment (Ahuas)	20	24	14	58
Recent Encroachment (Wampusirpe)	17	17	20	54
Long-Standing Encroachment (Banaka)	9	8	6	23

When asked whether they would sell land to (1) anyone, (2) only to natives, or (3) never sell their land, in all regions, approximately one-third of the respondents in each site stated that they would sell land to anyone. Table 4.8 shows a comparison of the willingness to sell across communities. The willingness to sell land clearly facilitates encroachment and defies MASTA land-use rules. There is not a statistically significant relationship between willingness to sell and encroachment. However, Banaka and Wampusirpe residents are more likely to have actually sold land to a mestizo than residents in Ahaus. A community leader and former forest guard in Banaka reported that approximately 25% of the community landholders had sold land to mestizos over the past ten years. Similarly, almost half the residents in the one community in the Wampusirpe region reportedly sold land to mestizos in the past year.

The prohibition of land sales to mestizos forms the crux of the Miskito common-property system. The continual problem of Miskito land sales to mestizos demonstrates the difficulties the Miskito face in uniting their communities in the protection of Miskito common-property rights. Attitudes and activities in three communities in the Wampusirpe region characterize the division and tension among residents due to land sales. The graph and table below illustrate the willingness to sell land to outsiders in each of these communities. In terms of stopping mestizo migration, the crucial decision is whether a Miskito would sell to a mestizo (not to another Miskito). Therefore, I have

combined the “sell only to natives” and “never sell” categories, and focus on whether a resident would sell to anyone (including mestizos) or never sell to a mestizo.

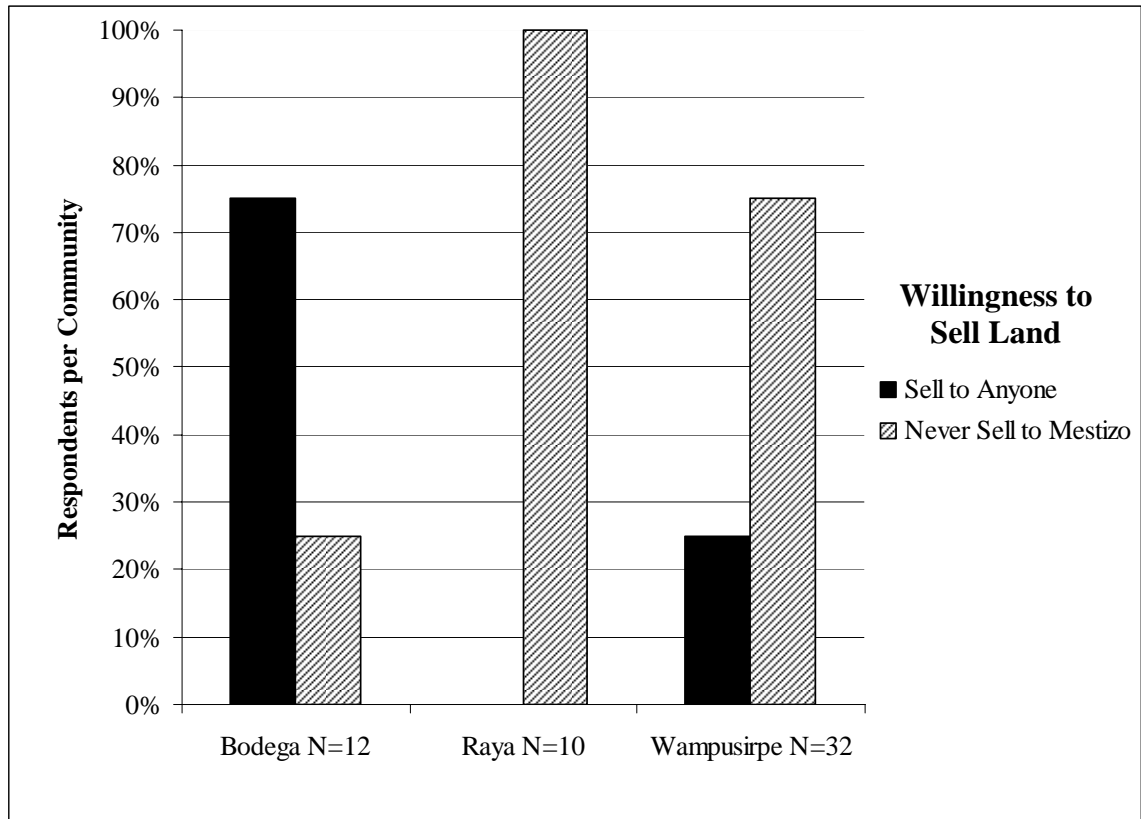


Figure 4.7. Conflict over Land Sales in Wampusirpe

Table 4.9. Willingness to Sell to Mestizo in Wampusirpe

	Sell to Anyone	Never Sell to Mestizo	# Households Interviewed	Total # Houses in Community
Bodega	9	3	12	15 Miskito (8 mestizo)
Raya	0	10	10	25
Wampusirpe	8	24	32	210

Likelihood ratio 17.788, p. = 0.000

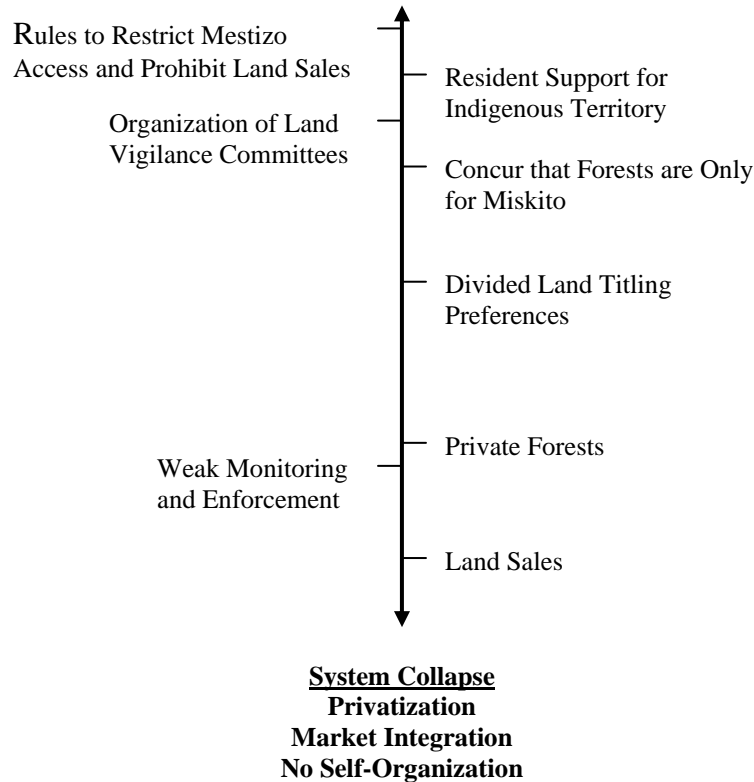
In Bodega, roughly half of the households sold their land between 2004 and 2005 to mestizos and eight new colonist families have since moved in. In this community, nine of the 12 households interviewed said they would sell land to anyone. In contrast, residents in the neighboring community, Raya, were adamant about prohibiting land sales. In Raya, residents expressed particular concern about the recent arrival of colonists and none of the households interviewed stated that they would sell land to anyone.

The conflict over land sales is largely due to the immediate need for money versus the long-term costs of lost lands and mestizo neighbors. Many of those who said they would sell land stated that they have no other source of income and that land sales are a quick way to make money, particularly when there is a familial crisis such as illness. They stated that they would sell land to mestizos because Miskito do not have money and that mestizos pay better prices. Other community members, however, were quick to criticize those who sell land. Many noted that the sales are only temporary solutions and that, ultimately, the family is left worse off because they have lost at least some of their agricultural lands. Some residents commented that they thought that those Miskito who sell land should have to leave the Mosquitia and wished that there were stronger punishments for land sales.

7 DISCUSSION

Can the Miskito property-rights arrangement and their respective institutional adaptations to mestizo migration be considered part of a robust common-property system? The findings from this study contradict the assumption made by some that indigenous institutions will necessarily collapse or completely succumb to market pressures. The findings, however, point to the frailties in the Miskito common-property system and highlight the conflict and tension that mestizo migration produces with respect to land use in the region. Figure 4.8 shows an overview of the institutional dynamics occurring at the collective-choice and operational decision-making levels in the three Miskito sites in Río Plátano.

Robust System
**Institutional and Organizational Changes
to Bolster Common-Property System in
Response to Mestizo Disturbance**



The figure above maps out the general institutional findings at the collective-choice and operational decision-making levels with respect to their contribution to the overall robustness of the Miskito property-rights system and the institutional changes in response to mestizo migration. Moving toward the top of the arrow are institutional and organizational changes that further substantiate the Miskito common-property rights in response to mestizo colonists. Toward the bottom of the arrow are institutional changes and activities that detract from the robustness of the common-property system, namely the adoption of private-property institutions and weak monitoring and enforcement mechanisms. On the left side of the arrow are the activities at the collective-choice level. On the right side of the arrow are the preferences and practices of individual Miskito residents.

Figure 4.8 Miskito Institutional Responses to Mestizo Migration

7.1 Overall Robustness of the Miskito Property-Rights System in Response to Mestizo Encroachment

The spectrum shown in Figure 4.8 focuses on institutional preferences and practices that support or thwart the Miskito common-property regime. The Miskito property-rights regime has neither collapsed nor remained completely robust in response to mestizo encroachment. Institutional developments in the Miskito property-rights system fall across the spectrum. Within the regional federations of MASTA, there is some self-organization and adaptation of rules to strengthen the Miskito system, but many of the collective-choice rules have not been fully applied or respected within the communities.

The finding from Río Plátano portray the struggle Miskito residents face in deciding how to balance individual interests such as land security and livelihood needs with the broader Miskito functions of their traditional property-rights system that promotes equitable access to land and forest resources and respect for Miskito ancestral rights and land-use practices. The creation of property-rights rules to restrict mestizo encroachment and prohibit land sales support the core functions of the common-property system by attempting to ensure continued communal access to Miskito homelands. The individuals living in the Miskito communities, however, are less united in their support for these new land-use rules, and some individual residents are adopting mestizo institutions such as private forest reserves and fences and express a willingness to participate in the mestizo land market. Still others, advocate for stronger legal support for Miskito communal rights to their lands and actively monitor their community's forests and farm lands for mestizo settlers.

7.2 Evolution of Property Rights as Encroachment Persists

The community-level studies suggest that a community's first response is to create institutions to maintain Miskito common-property customs in the face of mestizo encroachment. This initial self-organization and activity gradually fades, however, as the land vigilance committees fail to protect Miskito common-property rights and Miskito

residents begin to adopt mestizo institutions to protect their subsistence needs and provide for their families.

If we envision a graph with investment in institutions and activities to bolster Miskito common-property institutions and control outside encroachment along the y-axis and encroachment over time on the x-axis, it should appear that as encroachment continues, investment in activities to support the Miskito common-property system initially increases and then decreases as encroachment persists. The resulting graph might look something like an inverted U.

This inverted U is demonstrated in the comparison of activities and attitudes with respect to land use and encroachment in Ahuas, Wampusirpe, and Banaka. At time zero (no encroachment), the Miskito common-property institutions are functioning. But, the traditional institutions require minimal investment because, for the most part, they are understood and complied with by the Miskito population. They have not been challenged. Ahuas could be considered to be at time zero with respect to encroachment. Although Ahuas residents are optimistic about their ability to prevent mestizo migration, to date in Ahuas, there is no committee organized to monitor and enforce land-use rules, and residents have very little understanding about their formal tenure standing.

Following along the timeline of mestizo encroachment, when the common-property institutions are first challenged by mestizos, the Miskito organize land vigilance committees and create boundary rules, thereby contributing to the robustness of their property-rights system. Wampusirpe could be considered to be at this point of encroachment and at the height of the organizational and institutional actions to prevent outside encroachment. But, the success of these new organizations and institutions is, in part, hindered by decisions by Miskito residents, namely the decision to sell lands.

Land vigilance committee members in Wampusirpe can recall cases where they prevented colonists from moving in, but they also point to plenty of examples of new colonist settlements and incidents of Miskito land sales to mestizos. Although the majority of Wampusirpe residents were adamant about receiving communal tenure rights to protect their land and their customs from mestizo settlers, only half of the respondents believed they could control mestizo encroachment. The conflicting attitudes toward land sales in the different communities within Wampusirpe (Bodega, Raya, and Wampusirpe)

demonstrate the disagreement over sales, the tension brewing in the region, and the fragility of the efforts to defend Miskito common-property rights.

Finally, Banaka lies farther along the encroachment timeline. Investment in common-property institutions to thwart mestizo migration begins to decrease as mestizos continue to migrate into the region and as residents lose faith in the effectiveness of collective-choice activities in stopping encroachment. Miskito residents stop participating in the land vigilance committees and some adopt mestizo property-rights institutions to defend their lands.

If Banaka represents the future, the maintenance of the Miskito property-rights regime appears unpromising. Its land vigilance committee dissolved in the mid-1990s. The group has since revived, but members themselves are uncertain of their own abilities to control mestizo migration to the region and cite the difficulties of controlling their neighbor's land sales and the challenges of trying to enforce rules that have minimal judicial or community backing.

Residents of Banaka were the least likely to think that the community could control mestizo encroachment. Banaka residents are also the most likely to have adopted mestizo property-rights institutions to define their landholdings. Twenty-one of the 23 respondents approved of having private forest holdings and many of those said that they currently maintain private forests. Similarly, Banaka residents were the most likely to approve of the use of fences and the most likely of the three sites to prefer individual land titles. Furthermore, approximately 40% of the Banaka respondents stated that they would sell land if there were dire need, and many pointed out a neighbor that had in fact, recently sold land.

Banaka traditional land-use institutions appear to be in decline. Although they have some level of organization, their land vigilance committee is not particularly effective, and many residents are choosing to support private property instead of supporting common-property rights over their lands.

8 CONCLUSION

The Miskito of Río Plátano are struggling to maintain their customary property rights that support not only their subsistence needs, but also their identity as an ethnic community. Mestizo encroachment in Río Plátano has not produced an institutional vacuum. The activities of the Miskito leaders at the collective-choice level demonstrate that some Miskito are trying to make adaptations to sustain the Miskito land-use system and resist mestizo encroachment. However, they have been unable to control mestizo migration, and the longer a community and its respective vigilance committees struggle with the settlers, the weaker their traditional systems become. Residents slowly begin to adopt private-property institutions to protect their subsistence needs while sacrificing some of the communal benefits that the common-property system provides.

Many of the Miskito leaders complain that government ownership of reserve lands and the absence of clearly demarcated and established indigenous land rights thwart their ability to sustain their customary land practices. They call for the creation of an indigenous territory as a means of stopping outside encroachment, protecting the Miskito culture, and promoting environmental conservation.

The results presented in chapter 3 suggest that the territorial property rights established in Bosawas bolster indigenous customary land-use practices and prevent mestizo encroachment. The findings from Bosawas suggest that the decline of indigenous common-property institutions is not necessarily an inevitable or a desirable response to mestizo migration and that the broader policy environment may play a pivotal role in supporting or thwarting indigenous customary land-use practices. In the following chapter, I revisit the property-rights processes enacted in each reserve and examine how the respective property-rights processes influenced the ability of the indigenous residents to respond to mestizo migration and maintain robust common-property systems when confronted with colonization.

Endnotes for Chapter 4

ⁱ Interview with Biosphere Project official Tegucigalpa, March, 29, 2005; Biosphere Project meeting, Ahuas, April 1, 2005; informal conversations with Biosphere Project officials and GTZ officers 2005-2006.

ⁱⁱ Some mestizos are also connected to the timber market. However, these mestizo colonists, who are the focus of this study, are primarily engaged in agriculture and ranching activities.

ⁱⁱⁱ These rules echo those made by the Biosphere Project. However, attempts to apply the rules are completely separate from any Biosphere Project activities. In interviews, several residents were unfamiliar with the Biosphere Project and its respective rules. They did, however, know of MASTA's rules prohibiting mestizo settlements and land sales.

^{iv} Note, that at this time RAYAKA was operating under a different name (Comité de Vigilancia de Tierras, or CVT). However, to avoid confusion, with the community land vigilance committees, I am consistently referring to the regional federation of MASTA for Banaka as RAYAKA.

CHAPTER 5

EXPLORING THE POLICY CONTEXT OF ROBUST COMMON-PROPERTY SYSTEMS: A COMPARISON OF THE IMPACT OF POLICY PROCESSES ON RULE MAKING AND COMPLIANCE IN BOSAWAS AND RÍO PLÁTANO

1 INTRODUCTION

In the conservation arena, some conservationists, scholars, and indigenous activists have joined forces to push for policies that support environmental conservation and indigenous rights. Many point to the ecological and social benefits of common-property institutions to advocate for indigenous land rights and the devolution of resource management to indigenous populations (Grosvenor et al., 1992; Schwartzman and Zimmerman, 2005; Stevens, 1997; Stocks, 2003; Stocks et al., in press; Worah, 2002). The findings from Bosawas support their arguments. The indigenously managed territories of MITK and MSB have been more successful in defending their borders from mestizo encroachment and promoting land-use management plans than the publicly managed cultural zone of Río Plátano. The indigenous residents living in MITK and MSB are more likely to believe that they can control mestizo encroachment and conserve forest lands for future generations than their indigenous neighbors living in Río Plátano to the north or the Bosawas buffer zone to the south. The findings from Bosawas suggest that indigenous reserves may, in certain cases, be more effective at maintaining forest cover and sustaining indigenous land-use practices than government-managed forest reserves.

The purported benefits of indigenous resource management, however, should not mask the difficulties in creating and sustaining common-property governance arrangements. Resource management is almost always a struggle, for governments or indigenous peoples. Over the years, government and non-government policy makers and program officers have devised collaborative and community-based management arrangements with the goal of promoting environmental conservation through support for indigenous resource management. In recent years, these cases have come under heavy scrutiny, and the numerous examples of partnership failures have been critiqued by both

indigenous-rights advocates and protected-area traditionalists (Barrett et al., 2000; Brandon and Wells, 1992; Chapin, 2004; Larson et al., 1998).

Barrett and colleagues (2000) contend that one of the greatest challenges for tropical conservation is weak institutions at all societal levels (i.e., government institutions and local institutions). Although there is no doubt that indigenous and local people can make appropriate resource management rules (Gibson et al., 2005; Hayes, 2006), Barrett and colleagues caution that we should not naively assume that resource users always have the organizational and institutional capabilities to devise effective management arrangements. This is particularly true when the resource to be managed extends beyond the scope that traditional users have customarily managed, or when there are changes in the resource system or the community of appropriators. In some cases, communities may have the knowledge, breadth of organizational experience, and collective capacity to manage the resource systems, even when threatened by exogenous shocks. In other cases, they may not.

In any case, communal property rights do not guarantee successful rule making and management. In his review of mapping projects in support of indigenous property rights, Stocks (2003) argues that, although the demarcation of indigenous lands is an important component in establishing ownership over their land and resources, mapping is not enough. He states that, particularly in cases where indigenous customary practices are challenged by mestizo encroachment, the process must include technical, political and institutional support for indigenous governance organizations and their resource rights. Barrett and colleagues emphasize the need for more scholarship to identify when central governments or communities have the comparative advantage in promoting conservation and when some form of nested management would best meet conservation demands. Similarly, Worah (2002) notes that we lack scientific and methodological studies that document the factors that support successful community-based conservation.

One way to further our understanding of the factors that make community conservation successful is through careful analysis of how specific protected-area policies impact the resource users' abilities to make, monitor, and enforce rules. This chapter examines how external actors and the respective policy processes in Bosawas and Río

Plátano influenced the indigenous residents' abilities to sustain their customary land-use institutions in the face of mestizo encroachment.

The central thesis of this study is that mestizo encroachment disturbs traditional indigenous land-use institutions, and that property-rights processes and policies can serve a pivotal role in bolstering traditional land-use systems and thereby contribute to indigenous residents' abilities to prevent mestizo expansion and promote forest conservation. Thus far, I have shown that (1) mestizo encroachment does weaken traditional common-property arrangements, and that (2) tenure policies do make a difference in mestizo encroachment. The tenure policies, however, were the results of external actors that initiated protected-area resource management processes and thereby greatly influenced the resultant policy environment. In this chapter, I analyze *how* the external actors and the respective policy processes either supported or thwarted indigenous common-property institutions and thereby influenced the indigenous residents' abilities to control encroachment.

2 CHALLENGES TO COMMON-PROPERTY RULE MAKING: SUPPLY, CREDIBLE COMMITMENT, AND MUTUAL MONITORING

Scholarship on resource management, both in the laboratory and in the field, highlights some of the key components that have been found in successful common-property arrangements (Barrett et al., 2000; Cardenas et al., 2000; Gibson et al., 2000; Ostrom, 1990; Ostrom et al., 1994). In *Governing the Commons*, Ostrom identifies eight design principles that she found consistently characterized long-enduring common-pool resource arrangements (Ostrom, 1990, p. 90). In brief, the design principles include: (1) clearly defined boundaries; (2) congruence between appropriation and provision rules and local conditions; (3) user participation in collective-choice decisions; (4) monitoring; (5) graduated sanctions; (6) conflict-resolution mechanisms; (7) recognition of rights to organize; and, in the case of larger resource systems, (8) nested enterprises. Other scholars have found similar attributes in successful common-pool resource systems, and emphasize the importance of boundaries, participation in collective-choice rules, monitoring, and enforcement (Agrawal, 2001; Gibson et al., 2000; McKean, 1992).

The design principles serve as a guide to the institutional attributes we seek in resource management. Nevertheless, the question remains How do we (or the specific appropriators) get there? What factors promote rule making, mutual monitoring, and compliance on the part of common-pool resource users? Can public policies create an environment that bolsters self-governance and sustainable resource management?

Rule making is not easy. In her work on institutional change, Ostrom (1990, pp. 42–44) emphasizes the problems of supply, credible commitment, and mutual monitoring. The dilemma is a delicate catch-22 in that rule making entails significant costs to the participants who must organize, negotiate, create, and ultimately apply a rule. Unfortunately, these costs are often incurred in an environment of great uncertainty over whether the rules produced will be recognized or whether individuals will shirk on their commitments to the agreed arrangement. Individuals do not necessarily want to make rules and commit to monitoring those rules unless they are certain that they will be respected. Unfortunately, a rule will not be respected until it is made.

Knight (1992) suggests that actors will continue to respect existing institutions unless external events alter bargaining powers or the distribution of benefits under the current institutional system. He notes however, that new institutions will not emerge unless the actors are able to resolve the formidable problems of collective action and that central to this process of institution building is finding a way to ensure that the institution is recognized as the expected behavior for the community as a whole (Knight, 1992, pp. 126–127).

2.1 Costs of Collective Decision Making

Key to understanding how the broader policy environment influences rule making and compliance is through careful analysis of its impact on the transaction costs involved in institutional change and the incentives it provides to comply with agreed-upon commitments. In their analysis of the evolution of traditional property-rights systems in Africa, Ensminger and colleagues point to transaction costs, specifically the difficulties in gathering information about the users and developing mechanisms to monitor vast

expanses of land, as a determining factor of the types of property-rights regimes that evolved over time (Ensminger, 1997; Ensminger and Knight, 1997).

For example, Ensminger (1997) finds that for the traditional migratory Galole Orma herders in Kenya, it was particularly costly to craft institutions to monitor property rights to grazing lands. It was much easier to assign rights to watering holes and rely on access to the holes to manage the grazing lands. She reports, however, that as the Orma became more sedentary and associated with market centers, the value of the land near the markets increased and the costs involved in monitoring these lands decreased. In response to market and demographic pressures, the Orma have adopted more exclusive private-property arrangements. Ensminger notes that the newer private-property institutions have increased inequality in the Orma communities and eroded community characteristics that in the past, promoted communal cooperation.

2.2 The Influence of the Policy Environment on Collective Decision Making

The literature suggests that the broader policy environment can influence the costs and benefits that individuals perceive with respect to rule making and compliance and that this influence can be beneficial or detrimental to local governance arrangements (Cardenas et al., 2000; Ensminger, 1997; Ostrom et al., 1993). In the case of the Galole Orma, Ensminger argues that the current property-rights policies in Kenya weaken the abilities of the Orma to collectively organize and maintain some of the core social functions of their traditional property-rights institutions. She contends that property-rights policies should be reconfigured so they reduce the costs of collective action, support the attributes that contribute to community collaboration, and, in the case of land management, promote the maintenance of indigenous production and distributional norms (Ensminger, 1997, p. 192).

In her analysis of common-pool resource arrangements, Ostrom (1990, pp. 190–191) found that external political regimes served to either support or thwart collective decision making. She notes that greater attention needs to be paid to information and transaction costs and how the broader political environment influences levels of collective decision making on the part of resource appropriators.

2.3 The Influence of the Policy Environment on the Decision to Comply

The theories and findings on compliance also suggest that external intervention and the broader policy environment may also play a vital role in promoting compliance. The traditional theory of compliance uses the deterrence model that assumes that if the sanctions outweigh the benefits derived from illegal activities, individuals will comply. In contrast to conventional assumptions of compliance, however, recent literature suggests that external actors and formal policies do not necessarily induce compliance through the traditional means of third-party monitoring and sanctions. Rather, they promote compliance through the establishment of legitimate rule-making processes and sets of rules that resource users feel that they *ought* to comply with (Kuperan and Sutinen, 1998; Tyler, 1990). In a similar vein of thought, research on governance and natural resource management also suggests that, in some cases, community participation in rule making and monitoring may be more effective at obtaining credible commitments to conservation goals than the deterrence model (Berkes et al., 2003; Cardenas et al., 2000; Lebel et al., 2006).

The conventional protected-area paradigm follows the tenets of the deterrence model and presumes that only with heavy monitoring and costly sanctions will resource users comply with conservation regulations (Brockington, 2001; Bruner et al., 2001; Terborgh, 1999, 2000). If sanctions are stringent enough and the likelihood of getting caught is high, it seems reasonable to believe that most resource users will obey conservation rules. If for example, AFE-COHDEFOR were to demarcate and monitor Río Plátano reserve boundaries, it seems likely that encroachment would diminish. The catch in the deterrence model is, however, that some party must incur the costs of monitoring and sanctions. In Río Plátano, as in many protected areas, these costs may be politically and economically exorbitant, particularly when the rules are contested. This is particularly true in frontier forests where residents are resistant to government intervention and the institutional infrastructure to monitor rules and apply sanctions is lacking.

When residents do not believe that regulations are legitimate, they will often find ways to sabotage them. Conflict between park residents and park personnel is well

documented and a consistent theme (Igoe, 2004; IUCN, 2003; MacFarland et al., 1984; Brandon and Wells, 1992; Western, 1997). The conservation community estimates that an additional U.S. \$27 to \$30 billion dollars is needed annually to adequately manage protected areas (Molnar et al., 2004). This is particularly troubling for developing countries that often lack these funds. For example, the average budget per protected forest area in Europe is eight times that in Latin America (WWF 2004). In many cases, minimal funds and lack of political support translate into a deterrence model that consists of rules-in-form that are never, or only sporadically, applied.

Unfortunately, sporadic third-party monitoring may be more detrimental than no monitoring at all. An experiment conducted by Cardenas, Stranlund, and Willis (2000) shows that sporadic third-party management and enforcement may deter compliance. In the experiment, Cardenas and colleagues test the decisions made by Colombian farmers in two resource management scenarios that require collective action to sustain the resource. In the first scenario, there are no government regulations on resource use or third-party enforcement mechanisms, and the farmers are allowed to communicate (i.e., engage in collective-choice decisions). In the second scenario, farmers are placed under government regulations with sporadic third-party monitoring of those regulations and are not permitted to communicate. Cardenas et al. found that the third-party regulations “crowded out” individuals’ interests in how their actions impacted others and caused individuals to act with more self-interest. In contrast, communication promoted decisions that were more beneficial to the entire group.

Some scholarship in compliance studies (He, 2005; Kuperan and Sutinen, 1998; Tyler, 1990, 1994) complements the findings by Cardenas and colleagues and offers an alternative to costly sanctioning mechanisms. The studies demonstrate that perceived legitimacy of the decision-making process and regulations, and ideas of moral obligation, may determine the decision to comply, irrespective of the sanctions. He (2005) found that Chinese rural-to-urban migrants choose not to comply with licensing regulations in part because they do not respect the officials and perceive the laws to be styled on a Western model that is not applicable to their circumstances. They do not recognize the regulations as legitimate.

Similarly, Tyler (1990, 1994) links legitimacy to the decision-making process and emphasizes that from the citizen's perspective, a legitimate process matters more than the decision outcome. Tyler's work found that individuals often decide to comply because they believe that the rule was derived from a just process, not because they are worried about costly sanctions. Likewise, findings from studies of forest management show that when resource users engage in collective-choice decisions, they are more likely to comply with resource regulations (Banana and Gombya-Ssembajjwe, 2000; Batistella, 2001; Hayes and Ostrom, 2005). This further reinforces the importance of resource-user participation in the collective-choice decisions.

3 COSTS AND BENEFITS OF COLLECTIVE RULE MAKING, MONITORING, AND ENFORCEMENT IN THE MOSQUITIA

In frontier forests such as the Mosquitia, the development of common-property rules is a risky activity given the contentious attitudes toward land use in the region and the dearth of enforcement mechanisms. As in the case of the Galole Orma, some indigenous residents in the Mosquitia are turning to private-property arrangements in response to the disturbances created by mestizo encroachment. In doing so they risk losing some of the benefits derived from their common-property traditions such as greater equity in access to land and forest resources and community cohesion. Nevertheless, private-property arrangements have their benefits.

3.1 Costs and Benefits of Common Property vs. Private Property in the Mosquitia

Table 5.1 shows some of the benefits and costs that a Mosquitia resident might consider in deciding whether to support common-property traditions or adopt mestizo private-property practices. The benefits and costs are based on residents' testimonies in Río Plátano and Bosawas and presume minimal third-party monitoring and enforcement.ⁱ

Table 5.1. Benefits and Costs of Common Property versus Private Property

COMMON PROPERTY		PRIVATE PROPERTY	
Benefits			
Maintain ethnic unity		Rights do not depend on collective cooperation	
Political power and communal wealth		Generation of individual wealth	
Maintain forest access rights		Avoid conflict with neighbors	
Maintain migratory land-use customs			
Costs			
Time to Organize and Meet		Potential loss of language and ethnic identity	
Money to go to meetings		Communal lands and migratory agriculture	
Establish boundaries		Loss of rights to some forest resources	
Monitoring		Monitoring	
Enforcement		Enforcement	

In the context of the Mosquitia, rule making and enforcement are formidable challenges for indigenous residents who are not accustomed to making collective-choice land-use decisions at a communal or regional level. In order to change their customary common-property norms to more cogent common-property rights, the indigenous residents must self-organize and engage in collective-choice decisions to produce more stringent land-use rules. This can be costly, as participants must first identify and inform the other relevant parties, attend meetings, work through conflict-ridden debates, and continually monitor the agreed-upon rules. Partaking in collective-choice decision making is not only time consuming and costly, it can be risky. In frontier conditions where enforcement mechanisms are minimal, the odds are against a credible commitment to the land-use rules. Thus, even if the indigenous peoples are able overcome the challenges to create rules and monitor those rules, there is still a high probability that the rules will not be respected.

On the other hand, private-property institutions require less collective organization and are more likely to be recognized by mestizo settlers. Private-property claims over agricultural and forest lands provide the individual with greater livelihood security from both crops and forest products. The cost to the individual in physically defining and monitoring agricultural and forest claims is minimal when compared to the costs involved in organizing, defining, and monitoring communal land claims. Miskito residents have traditionally respected individual rights to crop lands, and the physical demarcation of

crop and forest lands creates a boundary rule that mestizos recognize and generally respect. Although the privatization of forest lands goes against traditional indigenous customs, the repercussions of community gossip or disapproval are relatively minimal when contrasted with the benefits of having greater security over access and withdrawal rights to specified forest lands. Furthermore, private-property arrangements create greater possibilities for generating individual wealth through land and timber markets.

3.2 Closer Examination of the Costs of Collective Action in the Mosquitia

The literature suggests that the Bosawas property-rights process may have been pivotal to the indigenous residents' success in stopping mestizo encroachment and crafting a land-use management plan for their territories. According to the literature, if the property-rights process lowers the costs involved in collective rule making, it is more likely that common-property rules will be created and monitored. Furthermore, if the process produces a set of rules that the users perceive as legitimate, it is more likely that resource users will comply with management regulations, even under relatively weak enforcement mechanisms.

The costs of collective action and, specifically, transaction costs, are often cited as crucial determinants in decision-making outcomes (North, 1990; Olson, 1965; Ostrom, 1990; Ostrom et al., 1994); however, it remains difficult to measure and assess transaction costs in the field. In this chapter, I draw on work by Ostrom, Schroeder, and Wynne (1993) to assess and compare the transaction costs involved in creating common-property rules in Bosawas and Río Plátano. In their review of international development projects, Ostrom and colleagues divide transaction costs into three categories: coordination, information, and strategic costs. Coordination costs include the time, capital, and personnel needed for negotiating, monitoring, and enforcing agreements among actors. Information costs include the cost of obtaining information and the possible errors in that information. Strategic costs are those produced by information asymmetries with respect to the activities of other actors that may enable some members to shirk responsibilities or receive unauthorized benefits from the agreements.

In the analysis of land-use decisions in Bosawas and Río Plátano, I focus specifically on coordination and strategic costs (although some information costs must be considered in the coordination of land-use agreements). In discussing coordination costs I examine both start-up transaction costs and maintenance transaction costs. It takes a certain amount of time and resources to craft an institutional system; however, the costs do not stop once an institutional system is created. Part of the difficulty in creating institutions involves sustaining investments in the system so it continues to operate over time.

In my discussion of strategic costs, I aim to examine how the specific property-rights process worked to ensure that all residents will comply with the land-use rules. In the context of the frontier, strategic costs can be particularly high because the regions are so remote and expansive, external monitoring and enforcement is sporadic at best, and informal enforcement mechanisms are often challenged by outside groups that do not necessarily recognize community land-use institutions and sanctions.

Table 5.2 categorizes the coordination, information, and strategic costs of crafting, monitoring and enforcing common-property rules in the Mosquitia. These costs include money, personnel, time and work losses, resources, and technology. Table 5.2 presents the transaction costs in a hypothetical situation without external intervention.

In addition to the transaction costs, I also consider how the policy environment impacts the costs of collective rule making in the Mosquitia by examining how specific policies and external actors promote or deter from compliance. Specific policies or processes that create conditions where an individual feels he or she might be sanctioned for non-compliance, or conditions where an individual feels obligated because of a moral duty to do “what’s right,” may reduce monitoring and enforcement costs and leave the system less vulnerable to strategic costs.

In my analysis, I consider how the different protected-area processes and policies influenced the costs and benefits associated with collective-choice decision making to sustain the indigenous common-property management regimes in the face of mestizo encroachment. Specifically, I examine how the policy processes enacted in each reserve impacted (1) the supply of rules to prevent mestizo encroachment and promote indigenous common-property rights and (2) compliance with those rules. Given the relative success in Bosawas in contrast to Río Plátano, I expect to find that in Bosawas,

the indigenous property-rights regimes are supported by a process that reduced the costs of collective decision making and contributed to the overall perceived legitimacy of the indigenous property rights. In contrast, I expect that in Río Plátano, the policy process did not reduce the costs of rule making and monitoring, and that the present rules are not perceived as legitimate.

Table 5.2. Transaction Costs in Common-Property Rule Making in the Mosquitia

Coordination	
Negotiation	<ul style="list-style-type: none"> • Arrange and attend meetings with mestizos, indigenous residents, and government personnel. • Negotiate agreement with mestizos, indigenous residents, and government personnel with respect to territorial rights and land-use rules. Note that this may involve a substantial amount of conflict and risk due to volatile attitudes with respect to land rights. • Create and maintain conflict resolution mechanisms to resolve disputes of application of agreements. • Attend government meetings to lobby for rights.
Monitoring	<ul style="list-style-type: none"> • Organize forest guards and actively monitor boundaries and land-use rules.
Enforcement	<ul style="list-style-type: none"> • Physically demarcate boundaries. • Organize meetings to decide sanctions • Apply sanctions.
Information	
	<ul style="list-style-type: none"> • Gather information to define location of territorial/community boundaries and census of people living within them. • Gather information on current land-use practices and monitor land-use changes.
Strategic Costs	
Shirking	<ul style="list-style-type: none"> • Lack of information on actors' activities may result in indigenous land sales, sale of forest products, mestizo invasions.
Corruption	<ul style="list-style-type: none"> • Lack of information on leaders' activities may result in personal gains for leaders from misuse of external assistance, land/resource sales.

4 STRUCTURE OF ANALYSIS AND DATA SOURCES

The analysis is divided into two sections. The first section is a comparison across the two reserves of indigenous and mestizo residents' attitudes toward the creation and maintenance of indigenous common-property rights and land-use rules. It is difficult to

measure and assess individual perceptions of transaction costs in the field. In order to portray decision making in Bosawas and Río Plátano, I use a series of vignettes based on conversations with reserve residents that highlight how the residents themselves perceive rule making and the decision to comply, given the broader policy environment they live in.

I present four vignettes of indigenous and mestizo residents from each reserve. The indigenous vignettes demonstrate commonly expressed attitudes toward the indigenous common-property institutions and governance organizations. The mestizo vignettes highlight mestizo attitudes toward the indigenous homelands and property rights as well as their opinions with respect to the land-use regulations they live under. The vignettes are not the specific testimony of any particular resident, but rather a collective summary of the most common interview responses and residents' comments with respect to property rights, encroachment, and organizational capacity in the cultural zone of Río Plátano and the indigenous territories in Bosawas. The vignettes are intended to demonstrate the common themes and differences in opinions among reserve residents. It is important to note, however, that the vignettes are a composite of responses and therefore do not represent the particular view of any one resident, nor do they represent the views of all residents.

The second section of the analysis is more of a discussion based on findings from the vignettes and interviews with government and non-government personnel involved in the reserves. I tease out specific factors in the policy process and link them to decisions made by reserve residents with respect to rule making, monitoring, and enforcement, specifically focusing on how the respective policy processes impacted the costs of negotiation and strategic costs. I also discuss how the overall processes promoted or deterred the creation of credible commitments between residents and the propensity to comply with those commitments. In a region where sanctions are rarely applied, I contend that land-use rules will not be respected unless they are considered legitimate.

I use two sources of data in the analysis: (1) data on residents' perspectives on rule-making and land-use decisions to create resident vignettes and (2) data on the implementation and application of the distinct property-rights and land-management policies. The vignettes are based on oral semi-structured interviews of indigenous residents living in the cultural zone of Río Plátano and in MITK and MSB in Bosawas.

The interviews were based on the IFRI protocols. The questions were adapted to focus on land-use practices (not specifically forest use). The purpose of the interviews was to gather information on rule making, monitoring, and land-use practices the residents engaged in. I asked residents whether they thought the community could prevent encroachment, whether they participated in the organizational activities of their respective communities and their overall attitudes toward the governance of their regions. I was particularly interested in why the resident chose to participate in a specific activity. For example, if a resident said he/she had once worked with the vigilance committee, I would probe why he/she began to work with the committee and why he/she stopped.

The Río Plátano indigenous vignette is based on interviews conducted in Banaka and Wampusirpe. These sites were chosen because they are both struggling with encroachment. In total, I interviewed approximately 44 Miskito households in Banaka and 54 Miskito households in Wampusirpe and held group interviews with members of the land vigilance committees in each community. The mestizo vignette is based on interviews I conducted with 23 mestizo households living in and around Banaka and Wampusirpe.

The Bosawas indigenous vignette is based on interviews I conducted with 11 Miskito households in Pueblo Nuevo, MITK, and 11 Mayangna households in Wina, MSB. I also held group interviews with elders and community leaders in each community. The mestizo vignette is based on interviews with 13 mestizo households living in the buffer zone of Bosawas and a group interview with members (approximately seven) of APDECOMEBO.

Data on the implementation and outcomes of the different policy processes are based on interviews with reserve residents, indigenous leaders, and the directors and employees of the key government and non-government organizations working in the reserves. In addition to interviews with the residents and territorial leaders, I conducted interviews and collected unpublished materials from the following organizations: the Río Plátano Biosphere Project, MOPAWI, the Managua and Tegucigalpa offices of TNC, Centro Humboldt, Saint Louis Zoo, Alistar, Center for Environmental Rights and the Promotion of Development, Nicaraguan Agrarian Institute, AFE-COHDEFOR, MARENA, and the

World Bank. I also spoke with lead consultants Peter Herlihy and Anthony Stocks about the policy processes enacted in each reserve in the mid-1990s

5 MOSQUITIA RESIDENTS WEIGH THE COSTS AND BENEFITS OF COMPLIANCE WITH INDIGENOUS COMMON-PROPERTY RIGHTS

The vignettes illustrate that MITK and MSB residents feel secure in their common-property rights and their ability to control mestizo encroachment and prohibit native land sales. In Bosawas, residents support common-property institutions and believe that the monitoring mechanisms work to ensure that indigenous and mestizo residents comply with territorial land-use rules. In contrast, in Río Plátano, residents base many of their decisions on tenure insecurity and the failed ability of the government or the communities to defend their lands from mestizos. As a result, decision making in Río Plátano is more oriented toward private-property institutions.

5.1 Weighing the Decision to Comply in Bosawas

(1) Vignette 1. Bosawas Indigenous Resident

Pablo says that when he first returned to his community after the Nicaraguan civil war, he couldn't believe the number of mestizos who had moved to the area. Shortly thereafter, some of the leaders from the Miskito and Mayangna communities began to organize and created ADEPCIMISUJIN to demand territorial rights over their lands and prohibit mestizo encroachment.

Pablo says that in the early 1990s, ADEPCIMISUJIN gained support from two NGOs, Centro Humboldt and TNC, to establish territorial rights over their lands. TNC worked with residents to map out and physically demarcate their territories. Pablo says that there was quite a bit of conflict between the Miskito and Mayangna and the mestizos when they first began to demarcate their lands. However, after a series of meetings facilitated by Centro Humboldt and TNC, the indigenous peoples and the mestizos signed a property-rights agreement in 1997. Pablo says that since 1997, mestizo encroachment has pretty much stopped. The mestizos don't cross the indigenous territorial boundary lines.

Pablo says that part of the agreement with TNC was that the Conservancy would help them defend their rights to the land and, in exchange, the Miskito and

Mayangna would conserve their forests. TNC worked with the communities to create a territorial land-use plan. He agrees with the land-use rules that they created, although he wouldn't mind being able to sell a few trees every once in a while so he could earn a bit of money. Nevertheless, the rules say that the residents cannot sell timber, and Pablo worries that if he tried to make a sale, he might get caught.

Pablo emphasizes that he would never sell land to anyone, not even a fellow indigenous resident. He says that all native residents should have land and if a native person doesn't have land, he or she must have sold it. Pablo did hear of one person who tried to sell land to a mestizo a couple of years ago. However, ADEPCIMISUJIN never let the mestizo occupy the land. He says that others outside the territory have sold their land and now they have none. Pablo says that the land is for his kids and that the community has plenty of land.

Pablo doesn't participate in many of the community meetings, but he was a forest guard for a couple of years. Pablo says that working as a forest guard is hard work, but it's also a source of income for his family. He believes that the boundaries and guards work to protect indigenous lands, but he would like to see some of the earlier mestizo settlers removed from the territories.

Pablo notes that before the territorial demarcation and the creation of their territorial land-use management plan, the Miskito of Jinotega never really considered themselves part of a territory. He said that before they organized, the communities all worked independently. Now they've established their own governing body and have rights to their land. He's proud of what ADEPCIMISUJIN has accomplished.

(2) Vignette 2. Bosawas Mestizo Resident

Jorge is a mestizo who lives in the buffer zone of Bosawas alongside the border of MITK and MSB. Jorge came to the area after the war. Jorge said that when he came there was barely anyone in the region; there were just a few indigenous settlements alongside the River Coco, but the forests were completely open. Jorge claims that the indigenous people don't like to farm in the hillsides, but that the mestizos are accustomed to hillside farming.

Jorge has about 50 ha of land, and at least half of it is in forest and the rest in crops or pasture. Jorge doesn't have many cattle, only four. He is trying to raise pigs, so he keeps much of his land planted in corn for the pigs. Jorge says that pigs are cheaper than cattle and you can make a quicker profit from them. Jorge does not have a title to his land, but would like one. He said that there is no land left and that the only way anyone can occupy land is if someone sells it. However, he also notes that if a family member were to come to him in need, he'd have to find a spot for the family member to farm.

Jorge states that the indigenous people have lots of land and forest that they haven't touched. However, that land is off limits to the mestizos. Jorge participated in the negotiations and demarcation process in 1997, and he explains that, at first, the mestizos protested the indigenous territory because the Miskito and Mayangna tried to claim land that was heavily occupied by mestizos. Jorge doesn't have a problem with the current boundaries because the majority of the mestizos live outside the territories and those who were included in the territorial boundaries were allowed to stay. Jorge repeats the story of the mestizo who tried to buy land from an indigenous resident and how ADEPCIMISUJIN never let the mestizo occupy the land and the mestizo lost all his money.

Jorge has heard rumors that some of the indigenous communities left outside the territories are trying to create a new territory that would include many mestizo settlements. Jorge says the mestizos will fight back if that happens. He says that the indigenous people are not like the mestizos. When the indigenous people decide to make boundaries around their lands they don't consult with their neighbors and often take mestizo lands. Jorge emphasizes that before a mestizo demarcates his land, he always checks with his neighbors first to make sure everyone agrees about the boundary lines.

Although not all of his neighbors participate in the mestizo association ADEPCOMEBO, Jorge says he supports the organization and its demands for land titles and greater support from government and NGOs for farming and conservation. He notes that the mestizos are always portrayed as the destroyers of the forest, but that this is not fair. He says that the mestizo people need technological help to learn how to farm better and use less land; all of the development money always goes to the indigenous peoples. Jorge says that it's fine that the indigenous peoples have their titles, but he also wants to know that he has security over his lands and help to develop them.

5.2 Weighing the Decision to Comply in Río Plátano

(3) Vignette 3. Río Plátano Indigenous Resident

Juan is a middle-aged Miskito farmer who lives in the western region of the cultural zone of Río Plátano reserve. In the early 1990s, Juan began noticing mestizo settlements in the region. He first came across a mestizo settlement when he was out in the forest looking for a tree to make a new boat. He found part of the forest fenced off and cleared with dogs barking at the house. Today, Juan says that his community is surrounded by mestizo settlements and more mestizo families arrive each year. On walks around the community, Juan points out forests and land that he can no longer access because mestizos have claimed the area. He objects to the amount of land that mestizos clear and emphasizes that the Miskito are naturally conservationists because they only farm small plots of land and do

not destroy large areas of forest. Juan says he worries where his children will farm in the future.

Juan says that in the early 1990s he participated in the land vigilance committee and helped monitor his community's lands for mestizo encroachment. Although they prevented mestizos from settling within the community, the committee was unable to prevent mestizos from colonizing the surrounding hills. Juan says that he eventually dropped out of the committee because it took a lot of time away from his fields and he didn't feel like they had any support from the government. Juan complains that the work was dangerous and that they had nothing other than their words to convince the mestizos not to settle in the region. Juan notes that not even the community residents know where the community boundaries lie and that without official documents or support, it was difficult to make the mestizos leave. Today, the committee still patrols every once in awhile and they tell community members not to sell their lands, but Juan doesn't think the community can stop mestizo encroachment.

Juan says that encroachment has worsened since 1997, when AFE-COHDEFOR took over management activities. He had hoped that with government support, the situation would improve, but land sales and mestizo settlements have only increased. Juan says that some Miskito have begun to sell their lands to mestizos, and while he doesn't approve, he understands that sometimes it's the only option. His own father sold land a couple of months ago. His mother was sick and they needed money to take her to the clinic. Juan's father only sold 1 ha of land, but the mestizo occupied twenty. Juan reported the mestizo invasions on his father's land to the land vigilance committee, but they did nothing.

Juan has heard that MASTA is trying to establish a territory for the native residents. He thinks that all lands of the Mosquitia should belong to the native peoples, but he doesn't completely trust MASTA. Although MASTA leaders talk a lot about defending their homelands, in his experience with his local land vigilance committee, he wished they had more support from MASTA. Juan has also heard rumors that some of the federation leaders have been negotiating with mestizos and have made illicit land sales to powerful mestizo settlers.

In order to protect his family's land, Juan has begun to keep his agricultural plots in one place and has fenced in some of his land. He also has cut a clearing around a piece of forest land to show that the forest is his. Juan says that you can't count on your neighbors not selling your land, or a mestizo not occupying the forests. He's noticed that the mestizos cut a strip of land around their forests and fence their farms and he figures that's a pretty good way to make sure he'll have forest and farm land in the future.

(4) Vignette 4. Río Plátano Mestizo

Jose is a mestizo who moved into Río Plátano reserve several months ago. He decided to move his family into Río Plátano because he had heard from relatives that there was plenty of land in the region whereas in his hometown, wealthy ranchers and farmers have occupied all the land. Jose says that the poor can't live among the rich.

Jose bought 20 ha of land from a Miskito man, and he points to the surrounding forested hillsides as evidence that there is still plenty of land available. Jose has heard something about living in a forest reserve, but he doesn't really know where the reserve starts. Some of his neighbors say that they're worried that they will be kicked off the land, but most say it's not a problem. The majority of his mestizo neighbors have lived in the area for about five years, and nothing has happened to them. Jose says the land is Honduran and any Honduran citizen should be able to use it.

Jose doesn't associate much with the Miskito. He says that they have a different way of living and that he thinks that mestizos and indigenous peoples should live apart. He's heard that some of the Miskito people are demanding an indigenous territory. Jose says that they can have their land, so long as they don't take land away from other Honduran citizens.

5.3 Summary of Propensity to Support Common-Property Rights in Bosawas and Río Plátano

The vignettes point to how individuals in Bosawas and Río Plátano make their land-use decisions and property-rights preferences by weighing their perceptions of whether individuals will comply with a particular land-use institution and the transaction costs involved in negotiating and monitoring against the social and individual benefits provided by a particular tenure arrangement or land-use practice. Indigenous residents in Bosawas are proud of their governing capabilities and express confidence in their ability to control mestizo encroachment. They are clear where their territorial boundaries are and do not worry that fellow neighbors will sell land to a mestizo or that a mestizo will invade. This is further supported by the mestizo residents' emphasis on respect for the indigenous territorial boundaries. Thus, while the indigenous residents do have monitoring mechanisms in place, the mestizo inclination toward compliance reduces the

costs of enforcement and also the sense of insecurity that the common-property rights might not be respected.

In contrast, indigenous residents in Río Plátano have expended resources in crafting and monitoring land-use rules, but they have been relatively unsuccessful in protecting their homelands. Miskito residents in Río Plátano fear that their neighbors will sell land to mestizos and/or that settlers will invade their traditional homelands. Many mestizos are either ignorant or derisive of the indigenous rights in the region. Mestizos continue to move to the region, and as a result, some indigenous residents are turning to mestizo property-rights practices that require less investment in coordination costs and provide greater tenure security.

6 IMPACT OF THE PROCESSES AND PARTICIPANTS ON INSTITUTIONAL SUPPLY, MONITORING, AND CREDIBLE COMMITMENTS IN THE MOSQUITIA

In Bosawas, the residents and leaders of MITK and MSB expressed great pride in their ability to defend their territory from mestizo settlers, their governing association and their recent acquisition of their territorial title. In each territory, the indigenous leaders emphasized that they self-organized before gaining outside assistance and, in large part, they credited themselves with the establishment of their territorial rights, the creation of monitoring mechanisms, and the defense and conservation of their forest lands. The indigenous peoples' ownership of their rules, rights, and governance associations points to a key ingredient in the success of Bosawas: residents believe that the land-use rules, forest guards, and territorial association are their own creation and that they are legitimate governing mechanisms. While the initiative and success of the Miskito people is significant, we cannot overlook the influence that the policy processes and, more specifically, the work of external government and non-government organizations, on the establishment of the common-property rules and compliance. The analysis below compares how the Bosawas and Río Plátano policy processes impacted coordination, information, and strategic costs and the overall propensity to comply with indigenous property-rights rules.

6.1 Bosawas: Impacts of the Non-Government Community on the Costs of Collective Action and the Supply of Common-Property Rules

In Bosawas, the community of NGOs played (and continues to play) a crucial role in reducing the costs of collective rule making and monitoring, thereby making the establishment and continued enforcement of indigenous common-property rules feasible. Specifically, processes enacted and supported by TNC and Centro Humboldt have bolstered the collective-choice and operational-level activities within the indigenous territories and fortified indigenous demands at the constitutional level.

6.1.1 Coordination Costs: Negotiation, Monitoring, and Enforcement

In Bosawas, TNC and Centro Humboldt covered the initial start-up costs required to negotiate the territorial boundaries and agree on property-rights and land-management rules. For example, TNC began the rule-making process by covering the costs of meetings and the activities required to map out and physically demarcate the territorial boundaries. This was no small endeavor. The initial property-rights process required a series of meetings with the indigenous and mestizo residents in order to agree on the boundaries and property rights. TNC consultants taught the residents how to use geographic positioning system units to map out the territorial boundary markers. In contrast to the process in Río Plátano, TNC provided Bosawas residents with cement markers and signs, and TNC organized teams to clear a strip of land along the contested borders. TNC also worked with the governing association ADEPCIMISUJIN and residents in each indigenous community to develop a land-management plan.

In order to further reinforce and monitor the boundaries, TNC worked with ADEPCIMISUJIN and the communities to create a group of forest guards. Each community selected two guards to work on the monthly patrols. The guards were originally paid a monthly stipend by TNC. Although the military is reportedly on hand to deal with major infractions, the enforcement of the boundaries is through negotiations with the indigenous association ADEPCIMISUJIN and the mestizo association ADEPCOMEBO. Enforcement of the territorial land management plans is primarily via

warnings from the forest guards and, if necessary, community meetings to address the problem.

One of the remarkable aspects of the Bosawas process, and one that differentiates it from the process in Río Plátano, is that support for coordination costs including negotiating, monitoring, and enforcement of the property-rights and land-management agreements did not stop after the plans were agreed upon on paper. Centro Humboldt played a pivotal role in the original negotiations by providing lawyers to facilitate the discussions, and it continues to maintain the institutional agreements it assisted by serving as a facilitator when conflicts emerge between the indigenous residents and the mestizos with respect to the application of the property-rights agreement. Furthermore, Centro Humboldt continues to cover monitoring and enforcement costs. The Bosawas forest guards are not voluntary. TNC originally paid the guards a small stipend; today, Centro Humboldt provides technical and financial support for the guards. Several forest guards commented that at times they have been without a source of funds. As one forest guard emphasized, when the guards are without pay, they do not work. Likewise, the Nicaraguan military does not come to enforce the boundaries unless the territorial associations pay for their transportation and daily expenditures are covered. It is not clear whether the military has actually been called in recent years; nevertheless, Centro Humboldt is there to cover those costs.

Finally, Centro Humboldt has been instrumental in pushing for greater legal recognition of the indigenous territorial associations and the residents' territorial rights. Centro Humboldt, in conjunction with funds from a Danish aid organization, covered the travel costs so that ADEPCIMISUJIN could attend government meetings to lobby for legal recognition of their common-property rights. Centro Humboldt also provided lawyers to help produce the necessary information required for a territorial title. In May 2005, the organization paid for the leaders from MITK and MSB to attend the government ceremony where they received their territorial titles.

6.1.2 Strategic Costs: Susceptibility to Shirking and Corruption

If residents refuse to recognize the property-rights rules or if leaders look for ways to obtain personal gains from their public service positions, the institutional system can quickly unravel, or never take hold. The Bosawas vignettes made no mention of shirking or corruption on the part of reserve residents or officials. In Bosawas, most residents did not express fear that their neighbors were secretly benefiting from illegal land sales, nor did they accuse public agencies of illicit activities in the region, although some mestizos did express disdain for MARENA.

The confidence that residents have that their neighbors are also complying with the property-rights agreements speaks well for the process and suggests that the rules are embedded in the region and that the residents recognize the rules as legitimate and feel compelled to respect them. Further analysis of the propensity to comply will be discussed in the following section.

With respect to the problems of corruption, public agencies have very little presence in the indigenous territories. Rather than invest in MARENA or other government agencies (such as the German development organizations did in Honduras), TNC decided to work directly with the indigenous association ADEPCIMISUJIN and the respective communities. By investing authority and resources in ADEPCIMISUJIN and directly in the communities, financial resources passed through fewer hands, and more residents were aware of the projects initiated in their regions. Similarly, I would argue that Centro Humboldt's close relationship with the territorial associations (the associations are housed in Centro Humboldt's office in Managua) has helped retain some oversight over how funds are spent.

The territorial associations are not, however, completely absent of corruption. Some Mayangna residents in MSB did complain that the benefits received from the NGO community were primarily spent in the territorial seat and in the territorial president's community. There were fewer reports of corruption in MITK. One concern with respect to corruption is that the territorial associations do not have a sustainable source of funding and therefore must look for other ways to support themselves and their work in their territories. Although external organizations provide some support, the support is not

always enough nor is it consistent. In search of funds, indigenous leaders are known to prey (at times unscrupulously) on individual researchers and research organizations for extra money.

6.2 Río Plátano: Impacts of the Biosphere Project on the Costs of Collective Action and the Supply of Common-Property Rules

The Río Plátano vignettes emphasize the debilitating costs involved in negotiating and, particularly, monitoring and enforcing the indigenous property-rights rules. Miskito land vigilance committee members repeatedly complained that they did not have any physical boundaries to monitor and that the costs of monitoring and enforcement were prohibitive given that compliance remained problematic.

6.2.1 Coordination Costs: Negotiation, Monitoring, and Enforcement

In the beginning, the Río Plátano Biosphere Project covered some of the negotiation and information costs incurred in community rule making by organizing and paying for community meetings. The meetings were facilitated by consultants for the Biosphere Project and engaged residents in discussions about problems in the reserve and their land-use customs and preferences. In the meetings the residents created regional land-use maps and norms and organized community-level and zonal-level committees to monitor the norms.

After the initial phase of community meetings, however, external support decreased. Unlike the Bosawas process that continued to strengthen the territories' and communities' capacities to govern their resources, the Biosphere Project did not recognize the community conservation committees. In the first few years of the collaborative management program, the Biosphere Project provided the zonal committees with some funding for infrastructure projects, but none of the committees received technical or financial support to monitor and enforce the land-use rules. Support for monitoring and enforcement, either resident or third-party, is virtually non-existent inside the cultural zone of Río Plátano.

In 2004, the NGO MOPAWI began to work with the residents of Banaka to reinvigorate their land vigilance committee, but MOPAWI's financial and technical support is minimal. An extension agent periodically visits the community to meet with the committee members and discuss how they will monitor their lands. At the time of my visit, MOPAWI was trying to get boots and basic equipment for the members. Nonetheless, many vigilance committee members feel that they are ineffective in preventing land sales and mestizo encroachment. The president of the new vigilance committee expressed little confidence in the committee's ability to control mestizo encroachment, and the committee members listed a string of problems in monitoring. Similar to complaints expressed in the Río Plátano indigenous vignette, many stated that they were unpaid and ill-equipped and that they could not afford to lose days in their fields to conduct monitoring expeditions. Others complained that without physical boundary markers and communal land titles, it was difficult to patrol the boundaries and hard to tell the mestizos they were invading indigenous lands.

As a further example of the weak enforcement mechanisms, on a visit I made to a mestizo farmer's ranch, one of my guides told the mestizo farmer that he had been reported to AFE-COHDEFOR for clearing old-growth forests. The mestizo farmer merely laughed and said that they wouldn't do anything. When I returned to the community ten months later, AFE-COHDEFOR had never visited the mestizo farmer.

One land vigilance committee member said that he didn't think the committee could protect the communal forests. He (like many others) had demarcated his own forest lands, and breaking from Miskito tradition, he had built his house away from the others, but close to his crops so that he could watch over them. He said he'd fight to the death to protect *his* lands.

6.2.2 Strategic Costs: Susceptibility to Shirking and Corruption

Reports of corruption in Río Plátano include illegal timber sales on the part of AFE-COHDEFOR, illicit land sales to mestizo migrants by mayors and indigenous leaders, suspicions that community leaders gain personal benefits from public projects. Newspaper reports, consultant reports, and Mosquitia residents frequently accuse AFE-

COHDEFOR of illicit timber sales (Del Gatto, 2002; Fiallos, 2003). Del Gatto, a lead researcher on Honduran forest policy, documented illegal timber harvesting in the region, and found that powerful timber barons force AFE-COHDEFOR personnel to falsify logging records and doctor permits in order to extract timber (cited in Fiallos, 2003). Similarly, some residents and NGO staff accuse municipal mayors of selling lands to mestizos as a source of income for their municipalities.ⁱⁱ In one community in the cultural zone, resident gossip was that the land vigilance committee president sold land to mestizos and kept committee resources (specifically baseball hats) for himself and his family.

It is unrealistic to expect a property-rights or protected-area process to resolve all of the complex issues associated with corruption. Nevertheless, the Biosphere Project has done nothing to address the causes of corruption or to hamper it. While not excusable, the corruption is understandable if one considers the underlying incentives to cheat the system: AFE-COHDEFOR engineers are poorly paid, the municipal governments must survive off a virtually non-existent tax base, and people in community leadership positions receive no monetary remuneration for their work.

Nevertheless, by placing management responsibilities in the hands of AFE-COHDEFOR, an organization with a renowned reputation for corruption and poor management, the Biosphere Project only further exacerbated the problem. Residents do not trust AFE-COHDEFOR to apply the laws fairly and equitably, nor do they believe that AFE-COHDEFOR has legitimate rule-making and enforcement rights over the Mosquitia. Reports of wrongdoings by AFE-COHDEFOR only further exacerbate the insecurities that residents perceive with respect to their rights to their lands and forest resources.

Furthermore, in failing to support or invest authority in the indigenous and municipal organizations, the Biosphere Project did not implement enforcement mechanisms that are present in the reserve. Given AFE-COHDEFOR's general absence in the reserve and the community's distrust of the agency, Río Plátano residents have limited recourse for reporting and controlling illicit activities.

7 THE PIVOTAL ROLE OF THE PROPERTY-RIGHTS PROCESSES IN INDUCING COMPLIANCE: PERCEIVED LEGITIMACY OF THE RIGHTS AND RULES

7.1 Perceived Legitimacy and Compliance in Bosawas

In Bosawas, the definition and demarcation of the territorial boundaries and monitoring obviously facilitated rule making and provided key mechanisms to monitor and control outside encroachment. In the remote forests of Bosawas where the mestizos are well-armed ex-combatants and third-party monitoring and enforcement is rare, the traditional deterrence model fails to explain why indigenous and mestizo residents are following the rules. Some might argue that the physical demarcation alone sufficed to stop mestizo migration. However, given the violent reaction of the mestizos to the original demarcation process, a process from which they were originally excluded, the findings from Bosawas suggest that participation in the rule-making process was vital to mestizo compliance. For the past 10 years, both indigenous and mestizos have complied with a de facto property regime they created in 1997. Why?

The compliance literature suggests that sanctions, perceived legitimacy of the rules, and moral duty all influence an individual's decision to follow the rules. Richard Tyler's work on compliance emphasizes the importance of perceived legitimacy of the decision-making process. As illustrated in the Bosawas indigenous vignette, the indigenous residents in Bosawas frequently responded that they respect the forest conservation policies and would never sell land because during the demarcation process they agreed to respect their ancestral homelands and follow a set of rules to protect those lands. Similarly, Bosawas mestizos frequently commented that they respect the indigenous territories because they signed "the law" that decided who would have rights to which lands. As one group of mestizo men commented, the Miskito have tons of land. However, their forest is off limits to the mestizos because they agreed that the other side of territorial boundaries is *otro pais* (another world). This respect for the property rights agreements bolsters relatively weak enforcement mechanisms and promotes social pressure to comply.

Several factors in the Bosawas process contributed to the creation of a set of property rights that were viewed as legitimate in the eyes of both the indigenous and mestizo residents of Bosawas. First, TNC appealed to the indigenous residents by placing indigenous land rights and their constitutional decision-making rights at the forefront of the process. Indigenous residents in the Mosquitia demand recognition of their ancestral rights to the land and a principal concern is tenure security. In defining the territorial titles in Bosawas, the Miskito and Mayangna rejected any reference to collaborative management with MARENA. They argued that the government does not have any rights to their land and they wanted the security of permanent ownership rights. In contrast to the process in Río Plátano, the Bosawas process acknowledged these demands.

The Bosawas property-rights and land-management processes initiated by TNC established a credible commitment to the indigenous people that TNC would support their territorial demands, and in turn, the indigenous residents committed themselves to the land-use rules. As shown in the Bosawas indigenous vignette, the indigenous residents feel responsible for monitoring their lands and complying with the land-use rules. This commitment was fortified by the participation on the part of the indigenous residents and their governing association in the creation of the land-management plan. Unlike the Biosphere Project in Río Plátano, TNC did not create its own conservation committees. Instead, it worked with community coordinators and ADEPCIMISUJIN to strengthen their roles as legitimate governing bodies.

In many respects, the decision by the Bosawas mestizos to comply with the indigenous property rights is astounding. As stated, there are few enforcement mechanisms that the indigenous residents can apply to ensure mestizo compliance. Nevertheless, the mestizos are not invading the indigenous lands. The Bosawas mestizo vignette highlighted the importance of including mestizo participation in defining the territorial boundaries. Mestizos stated that they respect property rights (communal or individual) so long as all agree to the boundaries. Thus, the inclusion of the mestizos in the constitutional-choice decision that established indigenous ownership of their territorial lands and mestizo participation in the collective-choice decisions of exactly where the boundaries would be drawn and who would have access and withdrawal rights to the land was a pivotal juncture in the process and greatly increased their propensity to

comply. The indigenous residents originally demarcated a territory much larger than their current limits. However, the mestizos protested (violently) and ultimately the mestizos defined where the territorial boundaries would run along the southern edges of MITK and MSB.

In addition to contributing to the legitimacy of the rules, the NGO community has also provided a legitimate process for resolving conflicts. The mestizo activities are formally monitored by the corps of indigenous forest guards. Nevertheless, the mestizos also recognize that the boundary rules are further substantiated by Centro Humboldt. If conflicts between the mestizos and indigenous peoples cannot be resolved, Centro Humboldt is on hand to mediate and resolve the land disputes. It is important to recognize that the mestizos are organized and are desperately trying to gain official recognition of their political association APDECOMEBO. If APDECOMEBO is unable to regulate mestizo activities in the region, it is difficult for them to claim governance authority. The desire to be recognized as an official political association is an added incentive for APDECOMEBO to monitor and enforce the commitments that they made with their indigenous neighbors.

7.2 Perceived Legitimacy and Compliance in Río Plátano

In contrast to the process in Bosawas, the property-rights and land-management processes in Río Plátano did not recognize indigenous demands for rights to their homelands, nor did it include the residents or their respective nascent governance institutions in creating and maintaining a governance system for the reserve. Although the project began with the best intentions of supporting local resource management, its assistance was short-lived and it did not even maintain the land-use rules it had created. The Biosphere Project's disregard for the indigenous land vigilance committees and MASTA's federations, in conjunction with sporadic monitoring and enforcement by AFE-COHDEFOR may have in fact, detracted from customary land-use institutions and impaired local rule-making abilities.

Unlike the Bosawas process that established right-holders and rules that were perceived to be legitimate by indigenous residents and the mestizos, the Río Plátano

process left a void in place of a legitimate and effective governing body for the region. The failure was twofold in that neither AFE-COHDEFOR nor the indigenous federations have been able to establish governing authority in the region. Residents in Río Plátano repeatedly stated that AFE-COHDEFOR had no rights to govern the region. Miskito leaders and land vigilance committee members stated that when AFE-COHDEFOR took over under the new management plan, the local vigilance committee members began to slack off because they thought AFE-COHDEFOR would work to prevent mestizos from encroaching. Unfortunately, many Miskito residents believe that the situation with respect to mestizo colonization has gotten worse under AFE-COHDEFOR. Although there may be numerous factors contributing to the mestizo migration to the region, including the colonization project initiated in 1995 but later squelched, in the Miskito mind, the failure is due to AFE-COHDEFOR.

A byproduct of the interference from the Biosphere Project and AFE-COHDEFOR may be that the external rules squelched local institutions. In interviews, MOPAWI staff and Miskito leaders criticized the Biosphere Project for failing to work with MASTA and support the residents' land vigilance committees. They accused the Biosphere Project of destroying community initiatives by setting up their own conservation committees and making empty promises of assistance for monitoring and enforcement from AFE-COHDEFOR. While many residents express support for MASTA, others perceive MASTA and its respective land vigilance committees to be relatively weak and often incapable of achieving or enforcing any of their demands. As shown in chapter 4, as a result, many Miskito residents choose not to comply with or trust in the federation's land-use rules.

Today, the Biosphere Project continues to sideline Miskito organizations. Although the Project has at times included MASTA leaders in its program plans, Project staff and directors express frustration in trying to work with indigenous federations and communities. They complain that they are argumentative, unorganized, and difficult to work with. However, Miskito leaders state that given their previous experiences with the Biosphere Project and their unfulfilled promises, the leaders and residents distrust the Project and many believe that the only way they can survive is by fighting against Project initiatives. In recent discussions about land tenure reform in Río Plátano, the Miskito

people rejected any reference to usufruct rights in the reform. They maintained that they hold eminent domain over their lands and will not sign any agreement that does not recognize their entitlements to the land and its resources.

8 CONCLUSION: GOVERNANCE OF INDIGENOUS RESERVES

The Bosawas process and its respective NGO community have contributed to a robust indigenous common-property system by covering many of the costs involved in collective rule making and monitoring and contributing to the perceived legitimacy of indigenous land rights in the region. This system has provided indigenous residents with a sense of tenure security and the obligation to comply with land-use rules that prevent land sales and regulate forest use. It has also served to stop mestizo colonization of the indigenous territories. The results demonstrate how external actors can support and strengthen the adaptive management capabilities of indigenous institutions.

Several fundamental lessons come from Bosawas and Río Plátano, the first of which is that indigenous land-use institutions may remain robust and adequately address mestizo encroachment given a supportive policy environment. Indigenous common-property systems do not necessarily collapse or become privatized in response to increased land-use pressures and land values produced by mestizo migration. A supportive policy environment includes one in which the actors and institutions engaged in the region recognize indigenous common-property rights to their lands and work to establish their constitutional decision-making rights over their homelands in the region.

Second, indigenous residents' abilities to demand constitutional rights and craft collective-choice rules in support of their common-property traditions may require financial and technical support to organize and negotiate new rules and establish the legitimacy of their demands for ownership rights to their lands. The need for support, however, does not stop after the initial negotiations. In remote frontier forests, many of the institutional changes are not minor alterations; rather they involve diverse communities of resource users who are struggling to develop enduring and effective governance arrangements. External support may in fact do more harm than good, if it is short-term or inconsistent.

The dependency on external support also points to the fragility of traditional governance systems and raises questions with respect to NGO commitment and governance responsibilities in the region. It is questionable whether the indigenous territorial associations and monitoring mechanisms would survive if the NGO community were to drop its support. As noted, the indigenous forest guards in Bosawas will not work without pay. At the moment, the guards' pay depends on funding from Centro Humboldt, which in turn is dependent on their ability to solicit funds and obtain grants from donors.

It is not unreasonable to expect that governing bodies need some form of monetary and technical support. What is concerning is that this support depends on an NGO community that has no official ties to the region. The results show the need for continued support of indigenous associations and their respective institutions. In the Mosquitia, a critical concern for the future is if and how this support will be generated on a sustainable basis.

Finally, the results from Bosawas suggest that perceived legitimacy of the process and the rules may be a key incentive to comply. Interviews with the Bosawas mestizos and the current agricultural activities in Río Plátano illustrate the need to include all relevant parties in decisions with respect to who has the constitutional rights over the region and the definition of the collective-choice rules to manage the Mosquitia. TNC initiated a legitimate process by working with the indigenous residents in Bosawas, and, ultimately, government agencies, the Nicaraguan legislature, and the mestizos recognized the indigenous residents' rights to their lands. In contrast to Río Plátano, where the indigenous residents rights to govern their homelands are not recognized by AFE-COHDEFOR or the Honduran government, TNC started with the assumption that the indigenous residents have decision-making rights with respect to the management and use of their lands. The Miskito and Mayangna's rights were further validated by Centro Humboldt's continued support for the territorial associations and insistence that they are the principal governing body in the region. This has given the indigenous territorial associations greater recognition with government and international agencies working in the reserve, and it has contributed to the residents' perceptions that their governing bodies are, in fact, effective and legitimate.

In the Mosquitia, and other frontier regions, where third-party rule making and enforcement is financially costly, and often politically questionable, resident rule making appears to be a viable option for frontier forest governance. Given a supportive political environment, the indigenous land-use institutions in Bosawas remain robust, even when confronted with mestizo migration. In contrast to Río Plátano, where the forest systems and social systems are threatened by mestizo encroachment, in Bosawas the forests and the indigenous property-rights systems appear to be relatively secure.

Endnotes for Chapter 5

ⁱ The table of benefits and costs is based on interviews with Miskito and Mayangna residents in Bosawas and Miskito residents in the cultural zone of Río Plátano. The interviews asked questions about property-rights preferences and the benefits associated with different property-rights institutions. The costs and benefits are not intended to be all-inclusive, but rather are intended to provide an overview of the factors that influence individual decisions with respect to whether to invest time to support and to respect common-property traditions or adopt mestizo private-property-institutions. For more information on the number of residents interviewed, please see section 4, Structure of Analysis and Data Sources.

ⁱⁱ Interview, World Bank staff, Tegucigalpa, March 24, 2006; interview, land vigilance committee member, April 29, 2006.

CHAPTER 6
INDIGENOUS PROPERTY RIGHTS AND CONSERVATION:
A MEANS TO SUSTAINED FOREST MANAGEMENT OR A BAND-AID SOLUTION?ⁱ

1 INTRODUCTION

The comparison of mestizo expansion into Bosawas and Río Plátano reserves demonstrates that the Miskito and Mayangna of Bosawas are better able to control mestizo encroachment than is AFE-COHDEFOR in Río Plátano. The findings suggest that, in some cases, forest reserves may be better protected if indigenous residents establish common-property rights over the forest land than if public agencies govern the reserves.

Nevertheless, the ability of the indigenous residents to prevent mestizo encroachment does not necessarily equate with their ability to manage their forests over the long term. Some conservationists worry that if in recognizing indigenous property rights, the conservation community is simply trading the rapid threat of outside encroachment for a slower, but inevitable threat of indigenous resource exploitation. Many fear that recognition of indigenous property rights is only a band-aid solution that is unable to sustain forest conservation (Chapman, 2003; Redford, 1991; Redford & Stearman, 1993; Terborgh, 1999, 2000; personal communication, St Louis Zoo, Managua, September 2005). They argue for continued use of the traditional protected-area paradigm that places forest land in the hands of the government and contend that only government jurisdiction over protected areas will ensure sustained environmental protection.

In Bosawas, the common-property institutions of the Miskito and Mayangna appear relatively resistant to mestizo land-use institutions and effective in controlling mestizo encroachment. Mestizo encroachment is, however, not the only source of agricultural expansion. The indigenous peoples also use forest lands for crops and pasture and contribute to deforestation in the region. In this chapter I examine some concerns about the fortitude of indigenous land-use institutions and forest conservation in Bosawas. Has the establishment of indigenous property rights meant that we simply traded the fast

threat of mestizo encroachment for the slower threat of indigenous agricultural expansion?

2 QUESTIONING CONSERVATIONISTS' CRITIQUES OF INDIGENOUS FOREST MANAGEMENT

In discussing the sustainability of indigenous forest reserves, Redford (1991, p. 47) argues that “to believe that when confronted with market pressures, higher population densities, and increased sedentism most indigenous peoples will maintain the integrity of their traditional methods is not only to argue against the available evidence, but worse, to fall into the ideological trap that produced the ecologically noble savage.” Likewise, it is naive to believe that governments and public managers will necessarily thwart the environmental costs of modernization and consistently defend forests and promote biodiversity conservation.

In this dissertation, findings from chapters 4 and 5 showed that when challenged by new market pressures and demographic change, the integrity of indigenous common-property institutions may falter, but that this is not necessarily so. The results of institutional change in three Miskito communities in Río Plátano showed that when confronted with mestizo encroachment and land markets, some indigenous residents chose to adopt mestizo land-use customs, and that the overall robustness of the traditional common-property system had deteriorated after being repeatedly challenged by mestizo encroachment. In chapter 5, however, I highlighted how the different policy environments in each reserve influenced the robustness of the indigenous common-property systems and the ability of indigenous residents to adapt their institutions to better control mestizo agricultural expansion. In contrast to the institutional decline occurring in Río Plátano, indigenous residents in Bosawas have made institutional changes that bolstered their common-property traditions in response to mestizo expansion.

I agree that it is dangerous to fall into the trap of the noble savage. Nevertheless, it is equally hazardous to presume that traditional peoples are naive and defenseless victims, easily overcome by changes in their environments. One of the difficulties I have with

conservationists' critiques of traditional resource management is that they frequently compare traditional systems to an idealized public management structure (Chapman, 2003; Putz et al., 2001; Terborgh, 1999, 2000). For example, in expressing his concerns over granting indigenous residents land rights in forest reserves, Terborgh (2000) contends that indigenous residents are not able to conserve forest resources when they are confronted with market pressures. He points to the dearth of wildlife on indigenous reservations in the United States, and contrasts that to the survival of biodiversity on public lands. He states that "first and foremost, it is our public-lands legislation that preserve biodiversity in the United States" (p. 1360), and he argues that the rest of the world should legislate more forests under public protection. The use of indigenous reservations in the United States as a measure of whether indigenous peoples can preserve biodiversity is highly questionable and blatantly ignores important historical and political conditions. But, what is particularly worrisome is Terborgh's (and others') insistence that public legislation of protection necessarily equates with on-the-ground conservation (Putz et al., 2001; Redford and Richter, 1999).

Forests that are legally designated as protected are not necessarily any better conserved than forests that are not legally protected (Hayes, 2006; Hayes and Ostrom, 2005). Communities and governments may both fail (or succeed) in forest management. The future of forest conservation does not depend on discovering whether a public-property, common-property, or private-property regime is *always* best for sustaining forest conservation. What is critical is discovering in which contexts which property-rights system is more suited to the particular ecological, social, political, and economic conditions. As this dissertation has shown, respect of forest regulations and the subsequent forest protection depend heavily on the context of the region, how the land-management rules are made, and if and how they are applied.

In considering whether indigenous residents with common-property rights are able to control mestizo encroachment, I did not compare the territorial management activities and encroachment outcomes to some idealized publicly managed protected area with guards consistently patrolling the borders and enforcing reserve restrictions. That would have been impractical; those conditions do not exist in the Mosquitia (nor in many protected areas around the world). The comparison of mestizo encroachment in Bosawas

to Río Plátano demonstrates how indigenous and public management compare given the political, ecological, and socioeconomic realities of the Mosquitia. The results suggest that, in the Mosquitia, indigenous residents who share common-property rights to their lands are better able to control mestizo agricultural expansion than is a public agency. A consequential concern is what are the future prospects for forest conservation in Bosawas?

3 RESEARCH DESIGN AND SITE DESCRIPTIONS

In this chapter, I examine the ability of the Miskito of MITK to regulate current agricultural expansion (both mestizo and Miskito), and I consider some of the prospects and challenges for future forest conservation in the territory. Just as it is impractical to compare the indigenous residents' ability to control outside encroachment to some hypothetical public management system, it would be unfair and unrealistic to compare their ability to manage the forests in Bosawas to some idealized management system of an omnipotent public agency. What is more reasonable is to examine how Bosawas residents are presently managing their forests and then try and envision (1) what the Bosawas indigenous territories might look like had they not established their territorial boundaries and instead remained under public management and (2) consider predictions for agricultural expansion given their present land-use practices as well as predictions of agricultural expansion given possible challenges to their land-use rules.

In this study, I focus on activities in the southwest corner of Bosawas, where the Miskito territory MITK borders the mestizo buffer zone that is under the jurisdiction of MARENA. In the final territorial demarcation of MITK, three Miskito communities were left out of the territory due to conflicts with mestizos living in the area. These communities remain within an area dominated by mestizos and are on public lands in the Bosawas buffer zone.

In order to understand how the territorial rights influenced current forest management and future management prospects, I focus on the land-use governance arrangements and resultant land-use practices of the Miskito living inside MITK and compare them to the

Miskito and mestizo people living in the Bosawas buffer zone just outside of MITK. Specifically, I compare land-use institutions and land cover in two communities, Pueblo Nuevo and Plis, and within the southern half of MITK territory.ⁱⁱ

The communities of Pueblo Nuevo and Plis share similar characteristics with respect to population, demographics, livelihoods, geographical location, and access to markets. The communities are located within a few kilometers of one another along the edge of the Coco River in a remote region of Bosawas that is accessible only by boat or by foot. Pueblo Nuevo is, however, located just inside the border of MITK. In contrast, Plis is located just outside MITK in the mestizo buffer. The study of Miskito communities on both sides of MITK's border enables me to consider what Pueblo Nuevo and, more broadly, MITK might look like had the Miskito not established their territorial rights.

The gray areas in Figure 6.1 show the geographic locations of the principal study sites (Pueblo Nuevo and Plis) along the Coco River and the boundary between MITK and the mestizo territory. Table 6.1 presents the relevant characteristics of each site. Please note that for the sake of the analysis, I have divided the MITK territory into north and south. This division is not recognized by the Miskito people, but rather demonstrates the area for which I have satellite imagery. Due to limitations in land-coverage data, my analyses of land cover and population densities in MITK refer only to the southern half of the territory (as shown in Figure 1).

The southern half of MITK covers 21,097 ha and had a population of 1,100 in 1995, according to a census taken by The Nature Conservancy (TNC) in that year. Using the TNC (1997b) census data and population growth rates provided by Stocks (1998), I estimate total population for the southern half of MITK in 2005 was 1,552 people (Stocks, 1998; TNC, 1997b).

Pueblo Nuevo is the southernmost community inside the boundaries of MITK. Pueblo Nuevo borders the mestizo-occupied territory, and was a region that experienced conflict in the 1990s as mestizos migrated to Miskito homelands. Pueblo Nuevo was founded by one family in the mid-1900s and today has approximately 20 families. Two mestizo families from before the demarcation process continue to live and farm in the region. Today, Pueblo Nuevo is governed locally by an elected community coordinator and the territorial governing body ADEPCIMISUJIN. Residents in the community participated in

the TNC territorial process in which the community created a land-use plan and demarcated lands for agricultural use, minimal forest use, and strict forest conservation. Today, two forest guards from the community participate in quarterly patrols of the territorial boundaries and help monitor Miskito resource use.

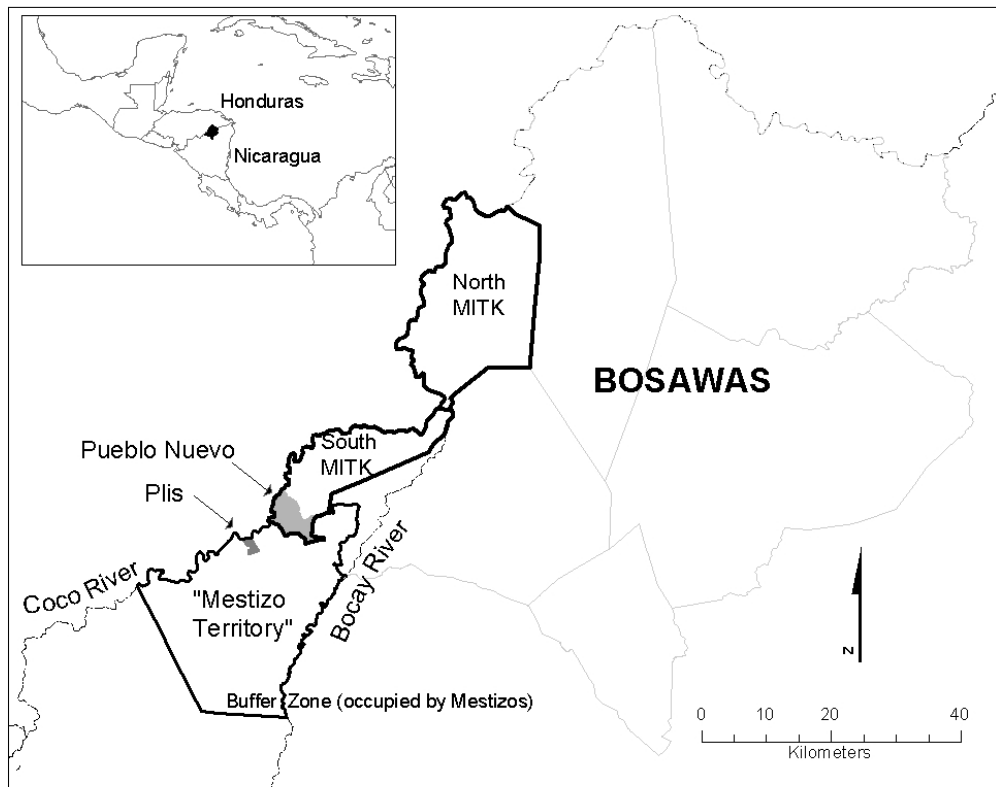


Figure 6.1. Study Sites

Table 6.1. Site Specifics

Community	Area (ha)	Population (est. 2005)	Density (pers/km²)	Available land^a (ha/household)	Land title	Ethnicity
Pueblo Nuevo	3,057	121	4	161.08	YES	Miskito
Miskito territory	21,097	1,552	7	86.67	YES	Miskito
Plis	244	125	51	12.45	NO	Miskito
'Mestizo territory' ^b	56,927	12,525	22	25.70	NO	mestizo

^a Eight percent of the area is assumed to be uncultivable and is not included in total area (per interviews and Wilkie et al., 1998). ⁱⁱⁱ Household data: Miskito 6.93 pers/household and mestizo 6.2 pers/household (Stocks, 1998).

^b Population estimates do not include two small Miskito communities.

Plis is one of three Miskito communities that were not included in the MITK. It is in the mestizo territory between Coco and Bocay rivers, where approximately 2,000 mestizo families live in 32 communities (personal communication, mestizo leader, Bosawas, 30 August 2005).

Plis was founded in the mid-1900s by one man and his family. Today Plis has 25 households that are governed by an elected community coordinator. It is not officially part of ADEPCIMISUJIN, as it currently lies outside of MITK, was not included in the demarcation process, and did not create a community land-use plan. Nevertheless, the residents did cut a boundary around the community in 2002–2003 in an effort to keep mestizos from encroaching on their lands. Land-use decisions about where to farm and locations of forest conservation areas are largely determined by the community founder.

4 DATA AND METHODS

I had three objectives in conducting this study: (1) to estimate what land cover and land-use pressures might be like had the community of Pueblo Nuevo not been included in the MITK boundary; (2) to determine if and how MITK residents are presently managing their forests; and (3) to consider possible long-term threats to forest conservation due to continued agricultural expansion (both Miskito and mestizo). If in the context of the Mosquitia, indigenous forest management is a viable management option, then I expect to find stronger management institutions and better forest conditions in Pueblo Nuevo than in Plis. Furthermore, I expect that residents of Pueblo Nuevo and MITK are in a position to better address future land-use challenges than are Miskito residents in Plis.

4.1 Data

In order to compare how the different communities are controlling agricultural expansion and maintaining forest cover, I use qualitative and quantitative methods to analyze data gathered on the current land-use institutions and governance arrangements, resident land-

use practices, population growth and densities, and land-cover patterns. Data on land-use institutions and land-use practices were gathered using ethnographic methods based on IFRI data protocols. IFRI is a validated framework that consists of a series of questions and fieldwork activities that enable scholars to examine the impacts of diverse types of ownership and governance of forests on protection and management activities and their consequences on forest conditions (CIPEC, 2004). In July 2004 and August–September 2005, I conducted in-depth individual and group interviews with a purposefully selected sample of community residents and interviewed territorial leaders, public officials, and non-government personnel. Interview questions gathered information on the de jure land-use rules and the de facto rules that govern Bosawas and respondents' attitudes toward agricultural expansion and forest conservation in the region.

4.1.1 Comparison of Land Cover

I examine the importance of territorial rights in Miskito community forest conservation by first comparing forest cover and land-use pressures in Pueblo Nuevo and Plis. The ability to control outside encroachment and current forest-cover status is based on my assessment of a 2003 Landsat image classified by MARENA in conjunction with fieldwork that established the community boundaries for Pueblo Nuevo and Plis. The MARENA land-cover image shows land under fallow, crops, or pasture, and land that is forest covered. The MARENA classification differentiates between the broadleaf tropical forest and *rало* forest. *Ralo* refers to a thinner forest, which may be due to human disturbance or naturally occurring variation in the terrain. A *rало* forest is defined as an ecosystem dominated by shrubs and trees in which the proportion of tree coverage is between 33.33% and 66.67%, the coverage of shrubs is no more than 33.33%, and the total coverage is always greater than 66.67% (INB, 2006). In their classification, MARENA did not distinguish between pasture and recently fallowed lands. However, in our interviews we found that while the majority of mestizos kept pasture lands, few Miskito maintained pasture.

Residents' opinions on their ability to control mestizo encroachment and present-day land-use pressures are from semi-structured, oral interviews conducted with community

leaders and residents and at community meetings in Pueblo Nuevo and Plis. In the interviews, I used the IFRI research protocols to guide the interview questions (CIPEC, 2004; Gibson, et al. 2000) and asked about current land-use practices, including amount of land used each year, fallow time, and productivity estimates. I also administered the “Miguel questionnaire” (as discussed in chapter 1) to a sample of residents in Pueblo Nuevo and Plis in order to compare how residents perceive their respective abilities to control mestizo expansion.

4.1.2 Management of MITK Forests

I examine if Miskito in MITK are complying with the management plan they created in the mid-1990s. As discussed in earlier chapters, when TNC began working with the indigenous residents of Bosawas, part of the project was to create territorial management plans. I assess Miskito forest management by comparing satellite imagery for 2003 forest cover to the principal land-use zones specified in their management plan: agriculture; minimal forest-product collection; and strict forest conservation. I use GIS to overlay a map created by TNC of the management boundaries with the 2003 land-cover image that I obtained from MARENA. I then assess for 2003, how much of the agricultural zone was occupied by crop or fallow lands and whether the Miskito residents have expanded their agricultural lands into the forest collection and forest conservation areas.

4.1.3 Future Threats to MITK Forests

I used data on land-use institutions, agricultural clearing and fallow estimates, and population growth to simulate three future land-use scenarios and predict their respective land-use outcomes based on two distinct models of land use and population growth. The models for the simulations are discussed below.

Data on the land-use institutions and the amount of land that households in each group hold in agriculture and fallow are based on interviews conducted in 2005 with Miskito and mestizo residents. According to resident responses, the average Miskito

household in the study uses 3.57 ha for crops and 0.25 ha for pastures (usually in communal holdings). The average mestizo household uses less land for crops (2.57 ha) and more land for pasture (6 ha). Thus, in total, mestizo land uses are roughly double those of the Miskito. Both mestizo and Miskito cultivate an agricultural plot for approximately two years before leaving the plot. The average fallow time is five years. These findings are similar to findings from other Miskito and mestizo land-use studies (Dodds, 1994; Stocks, 1998; TNC, 1997b).

Population density estimates were based on a simple calculation of the number of people predicted to live in the region in 2005 and the amount of available land in the study site or territory. In their simulation of agriculture-based deforestation, Wilkie and colleagues (1998, p. 141) assume that 10% of the total area is uncultivable because it is too swampy, hilly, or sandy. In interviews, residents stated that approximately 8% of the land is unsuitable for cultivation, primarily due to slope. Therefore, in my estimations of population density and the amount of land available for future use, I subtracted 8% from the total area under consideration.

Estimates of the level of outside encroachment and internal population growth are based on findings from a study conducted by TNC as cited in work by Hurtado de Mendoza (2001) of rates of mestizo migration to the region, resident interviews, and work by Stocks (1998). I estimate that after 1995, the mestizo annual growth rate in Bosawas (including in-migration and natural fertility) was 12.8% and that Miskito natural fertility growth rate remains at 3.5% (Hurtado de Mendoza, 2001; Stocks, 1998).

4.2 Simulations

From a conservation perspective, one of the principal concerns in recognizing indigenous people's rights to their lands is that they will eventually overexploit the resource system. In the context of agricultural expansion in Bosawas, the worry is that through population pressures and more extensive farming and ranching practices, the indigenous peoples will eventually destroy their forests. In interviews, I identified three scenarios that could influence agricultural expansion and threaten future forest conservation in the region. The

changes include increasing population pressures, more extensive land-use practices due to an increase in cattle, and the breakdown of the present boundary institutions.

I propose three scenarios to simulate different possible long-term management challenges for the Miskito communities in the region. In each scenario, I consider how long it will take to use up all of the forest lands in the agricultural zone, the forest-product gathering zone, and finally the conservation zone given the specified land-use conditions. The simulations assume that the agricultural zone would be used up first and that agricultural lands would progressively expand until the entire territory (including the conservation zone) is eventually in use.

The three scenarios presented in the analysis are:

1. Miskito Only
2. Miskito with Cattle (four or five heads of cattle per household)
3. Miskito and Mestizos (no boundary rules)

Scenario 1, “Miskito Only,” assumes that the Miskito of MITK continue to keep out mestizos and that they maintain their current land-use practices. The only change in this scenario is natural population growth. In the simulations, I consider how long it will take the Miskito to use up each land-management zone assuming that Miskito maintain the status quo in terms of their natural population growth and existing land-use practices.

In Scenario 2, the land-use practices change because the Miskito now own cattle. In interviews, very few Miskito households reported owning cattle; however, in discussing their ideal farms almost all said that they would like to have four to five heads of cattle. Scenario 2 examines land-use expansion if the Miskito were to obtain this goal.

Scenario 3 looks at what might happen if the Miskito were unable to defend their territorial borders. What would happen if the current monitoring and enforcement mechanisms failed to prevent mestizos from entering MITK and the territorial boundaries dissolved? In examining outside encroachment it is difficult to gauge the relative magnitude of mestizo migration and the stress it puts on land-use institutions. Furthermore, the land outside MITK is essentially full, and increasing land-use pressures may eventually rupture the property-rights agreements signed in 1997. Scenario 3 considers what happens if the governance system breaks down (i.e., no common-property

tenure). Does it make a difference? What would the region look like 20 to 30 years from now?

The simulations are intended to present a rough diagnostic of possible land uses in the future and are limited to a 50-year period. Although the timeline may appear relatively short, due to the limitations of the simulated models, it is unrealistic to attempt to predict land-use pressures beyond 50 years (Dodds 1994; Wilkie et al., 1998). In a similar study that simulated future agricultural and hunting pressures in a reserve in Zaire, Wilkie and colleagues limited their predictions to 40 years.

4.3 Models

I ran the simulations with two different models of the relationship between population growth and area under agriculture. Model A predicts a 1:1 relationship between population growth and land use. In contrast, in model B, I use a compound growth equation to estimate a scenario where the land use does not grow at the same rate as population (Boserup, 1965; Dodds, 1998, 1999; Turner and Shajaat Ali, 1996; for discussion and review see Carr, 2004). In this case, I assume that population grows at a higher rate than land use because of two possibilities relevant for this study area: (1) other sources of income outside the territory that reduces the needs of subsisting farming, and (2) intensification of agricultural production. Appendix C at the end of this dissertation shows the data used in the models to simulate each scenario. The model specifics are shown below.

Model A

Model A is based on the work of Dodds (1994) who built upon work by Carneiro in the 1960s to develop a model of population and land use. It starts with land use in 2003 and simulates the different scenarios assuming that population and land use increase at the same rate. Model A uses the amount of land required per person and the average time land is cultivated and fallowed in swidden systems to estimate the total land used for the study area. The total land used U for a given population i (i = Miskito, mestizo) in time t would be:

$$U_{i,t} = \left(\frac{C_i + F_i}{C_i} \right) P_{i,t} L_i \quad , \quad (\text{eq.1})$$

where C_i is the average number of years a field is cropped, F_i is the average number of years fields are left fallow before being replanted, $P_{i,t}$ is the total population in time t , and L_i is the total land needed per individual during a year, including crops and pasture land. Using a simple compound growth equation, the total estimated population will be:

$$P_{i,t} = P_{i,1995} (1 + r_i)^t \quad , \quad (\text{eq. 2})$$

where $P_{i,1995}$ is the initial population estimated in 1995 (TNC, 1997b) and r_i is the estimated future annual population growth rate for each ethnicity (Hurtado de Mendoza, 2001; Stocks, 1998). This model gives a more “pessimistic” outcome because it predicts a relatively fast growing rate of land use.

Model B

Model B gives more “optimistic” predictions because it assumes that the rate of land-use growth is slower than the rate of population growth. Dodds (1999) shows that for Miskito in the Rio Plátano Honduras—for a period between 1961 and 1996—land use grew at a lower rate than population. Following his work I estimate that the land-use growing rate is 62.47% of the population annual growing rate. I use a compound growing formula to estimate the land use U for a given population for time t :

$$U_{i,t} = U_{i,1995} (1 + g_i)^t \quad (\text{eq. 3})$$

where g_i is the estimated land-use growing rate for Miskito or mestizo calculated as a percentage of the population growing rate as mentioned before.

5 RESULTS

The analysis of the current status of agricultural expansion in Bosawas reinforces the findings from chapter 3 and shows that the Miskito residents within the territory of MITK are better able to control agricultural expansion than the Miskito outside the territory. The findings show that the common-property rights and their respective boundary rules and monitoring mechanisms established in 1997 are working to stop outside encroachment

and promote forest conservation within Pueblo Nuevo and, more generally, MITK. In contrast to those in Pueblo Nuevo, the residents of Plis are struggling to defend their communal lands and maintain farmland and forests for future generations. Furthermore, simulations of possible future changes and challenges to the land-use system show that MITK and Pueblo Nuevo are in a better position to tolerate increasing demands on their land and still retain forest cover than is Plis.

5.1 Forest Cover and Land-Use Pressures in Pueblo Nuevo and Plis

Residents of Pueblo Nuevo and forest guards from MITK maintain that no new mestizo families have settled in MITK since 1997. Many cited the physical demarcation of their boundaries and establishment of territorial rights as crucial factors in stopping mestizo invasions and clandestine land sales. In response to the “Miguel questionnaire” statement about the ability of the residents to prevent mestizo encroachment, the majority of the residents interviewed stated that they could prevent (and are preventing) mestizo encroachment (see Table 6.2).

In contrast to the optimism expressed by the MITK residents, the Miskito of Plis were more pessimistic about their ability to maintain their lands. As shown in Table 6.2, the majority of those interviewed in Plis stated that the community is not able to prevent mestizo encroachment. Many complained that they have lost much of their communal lands to mestizo invasions and previous land sales. Although the community tried to demarcate its remaining lands in 2002/2003, the Miskito of Plis and their mestizo neighbors disagree over where the community boundaries should be and at least one Plis family is currently engaged in a land fight with a mestizo neighbor.

Table 6.2. Ability to Control Mestizo Encroachment

	Can Prevent Mestizos	Can't Prevent
Pueblo Nuevo	7	1
Plis	1	5

The difference in land-use patterns and population density between Pueblo Nuevo and Plis illustrates what conditions in Pueblo Nuevo might be like today had they not been included inside MITK. In my analysis of the 2003 land-cover image in combination with estimates of population densities, I find Plis surrounded by mestizo settlements with very little room for growth. Table 6.3 shows the land cover in Pueblo Nuevo and MITK and in Plis and the mestizo buffer zone, and Figure 6.2 provides a graphic representation of the land coverage in 2003. In Figure 6.2, the dotted black lines show the community boundaries for Pueblo Nuevo, MITK, and Plis in the mestizo buffer. The southern boundary of Pueblo Nuevo is the southern boundary of the MITK territory. Note that *ralo* forest is specified in Table 6.3 but, for simplicity sake, is not distinguished in Figure 6.2—all forest is represented in one category.

The differences in forest cover and population density in Pueblo Nuevo and Plis are striking. As previously shown in Table 6.1, land-use pressures outside MITK are far greater than those within. Pueblo Nuevo has maintained far larger community boundaries and has much lower population densities than Plis. Pueblo Nuevo occupies approximately 3,057 ha, whereas Plis occupies only 244 ha, less than 0.5% of the total mestizo territory. The Miskito living in Plis have the highest population density in the region with 51 persons per km². In contrast, in Pueblo Nuevo, the Miskito have on average only four persons per km². Even the mestizos have more land than those living in Plis, as the average population density for the rest of the mestizo buffer is approximately 22 persons per km². In other words, this means that the average household in Pueblo Nuevo has roughly 161 ha available to work, the average mestizo family has 25 ha available to work and the residents of Plis have, on average, only 12 ha of land per household.

Table 6.3. Land-Cover Patterns, 2003

Community	Forest	<i>Ralo</i> Forest	Agriculture	Pasture & Fallow	Other^a	Total
Pueblo Nuevo	14.5%	58.2%	2.3%	15.3%	9.7%	100.0%
Miskito Territory	34.3%	46.6%	3.5%	11.2%	4.4%	100.0%
Plis	0.0%	62.8%	4.2%	31.0%	1.9%	100.0%
Mestizo buffer	5.7%	43.0%	9.1%	36.8%	5.5%	100.0%

^a Includes clouds and rivers.

Source: Hayes and Murtinho (under review)

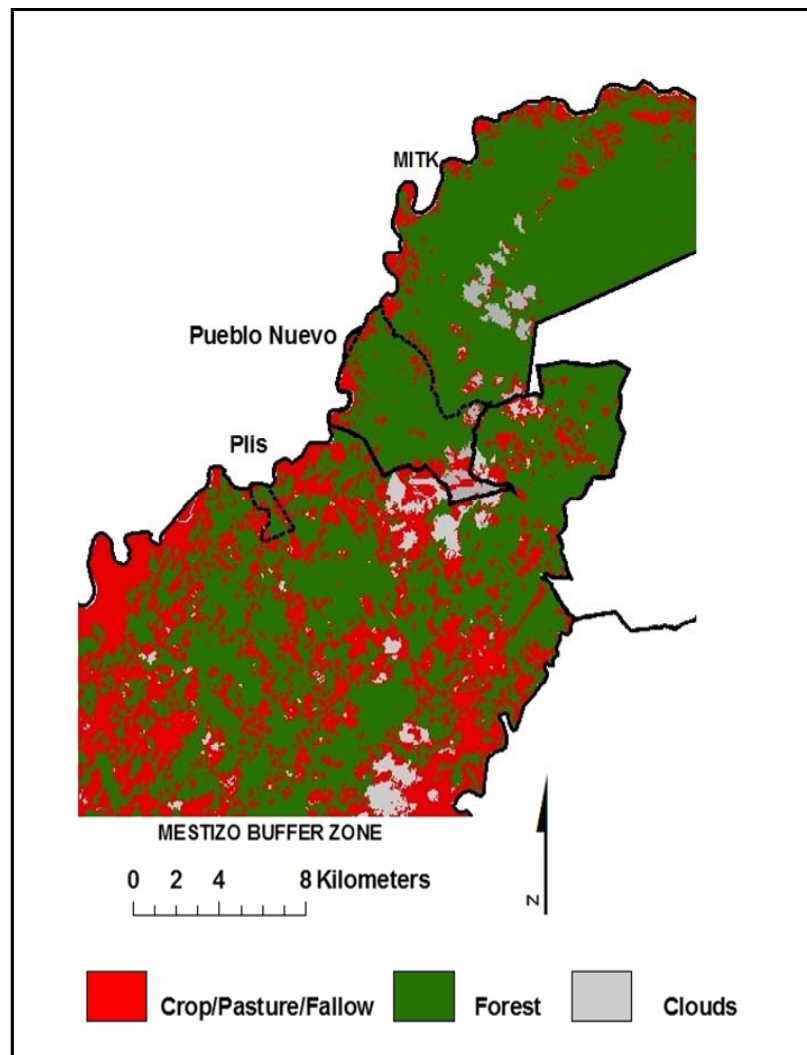


Figure 6.2. Comparison of Land Cover in MITK Territory and Bosawas Buffer Zone, 2003

The differences in population densities and land-use practices are reflected in the amount of land under pasture, agriculture, and forest in the two regions. Although much of the region is covered in *ralo* forest, Pueblo Nuevo, and MITK in general, maintains a higher percentage of total forest cover, and has more mature forest than the mestizo territory. In 2003, 81% of the southern half of the Miskito territory was covered with forest and approximately 14% was covered by crops, fallow, or pasture. In contrast, less than half of the mestizo territory was forest covered, the majority of it thin forest cover, and the other half was in crops, pasture, or fallow.

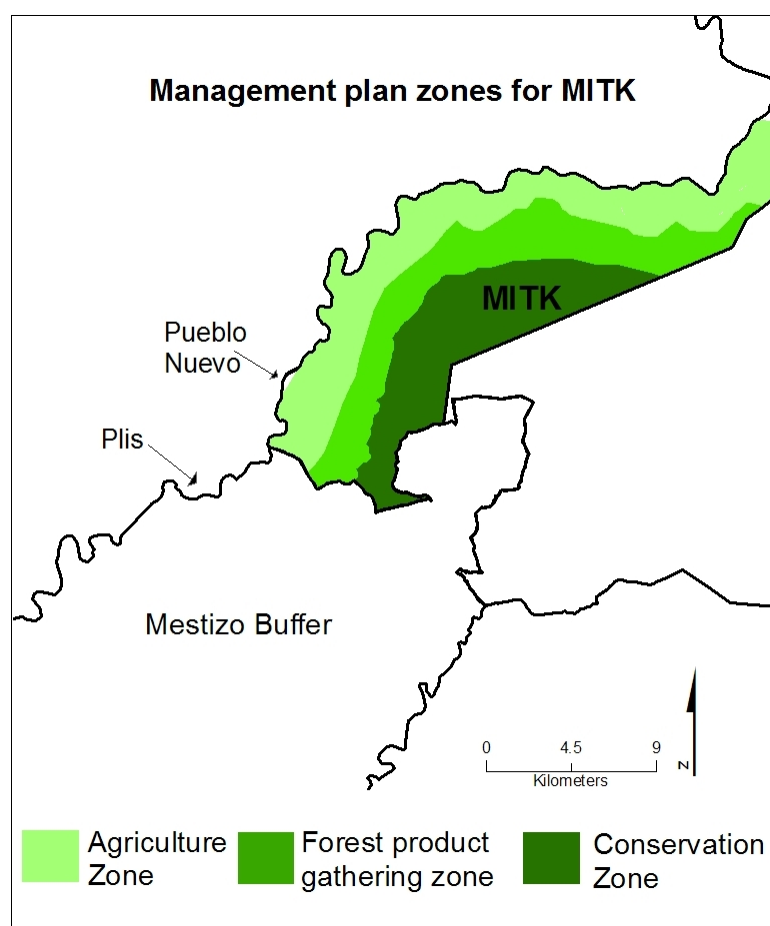
Although Plis does not have as much forest cover as Pueblo Nuevo, its percentage of total forest cover surpasses the percentage of total forest cover in the mestizo territory.

Nevertheless, Plis does not have mature forests within the community boundaries; all of its forested land is classified as *ralo* forest. This may be due in part to the geography of the region and to the traditional migratory land-use practices of the Miskito people. In an interview, the founder of Plis said that only small fragments of forest remain that have never been farmed. He said that the quality of harvests have deteriorated because the people are no longer able to let the land rest for a number of years and that today, no virgin forests remain.

5.2 Miskito Agricultural Expansion in MITK: Miskito Compliance with their Management Plan

In MITK, the territorial management plan restricts where residents can cultivate crops and where they will conserve forests. In general, residents appear to be complying with the land-use zones. As stated, the Miskito communities of MITK designated areas of land for agriculture, minimal forest use, and strict forest conservation. Using the 2003 MARENA land-cover image, I calculated the percent of land cover (forest, agriculture, crop and fallow) for each zone of the management plan.

Figure 6.3 shows the management zones in MITK, and Table 6.4 shows the land cover within each zone. Given the current land-use practices, it appears that agricultural expansion is not an immediate threat to the forest conservation zones in MITK. Overall, the residents are in compliance with the land-management plan. The table shows that, in accordance with the rules of the management plan, most of the crops, pasture, and fallow are located in the agricultural zone along the river Coco and its subsidiaries. The majority of the agricultural fields, pastures, and fallow lands are in the agricultural zone. In the forest-product gathering zone and the conservation zone more than 80% of the land is covered by forests. This percentage could be higher, if as I expect, some of the clouds are obscuring forest cover. However, it does appear that a small percentage of agriculture (approximately 1%) and fallow/pasture (6%) is in the conservation zone. Residents state that these areas (particularly the southeastern corner of MITK) are known to be the earlier work of mestizo farmers. Nevertheless, future research is required to explain these land-use practices.^{iv}



Source: Hayes and Murtinho (2005)

Figure 6.3. Land-Use Zones for MITK

Table 6.4. Land-Cover Patterns by Zones in MITK, 2003

	Forest	<i>Ralo</i> Forest	Agriculture	Pasture & Fallow	Other ^a	Total
Agriculture zone	10.4%	60.0%	7.2%	20.3%	2.2%	100.0%
Forest-product gathering zone	47.3%	46.1%	1.1%	4.3%	1.1%	100.0%
Conservation zone	52.7%	29.9%	1.1%	6.0%	10.2%	100.0%

^a Includes clouds and rivers.

Source: Hayes and Murtinho (2005)

5.3 Simulations of Future Land-Use Scenarios

The simulations further reinforce the current land shortages in Plis and the mestizo territory. As residents state, and both models find, all land is currently occupied in Plis. Similarly, all land in the mestizo territory is predicted to be already occupied or occupied within the next four years. Future population pressures and more extensive land-use needs will only further stress the current system. In contrast to those communities in the mestizo buffer, the results from simulations run on land use in MITK show that if the residents retain their current land-use practices and population growth rates, forest cover, particularly in the regions designated for minimal forest use (forest-product gathering) and strict forest conservation, appears relatively secure. Furthermore, the simulations show that given the relatively low population densities and secure access to their territories, the Miskito of MITK are in a much better position to address changing land uses while still maintaining forest cover than are their Miskito and mestizo neighbors to the south.

Table 6.5 shows the predicted outcomes in Pueblo Nuevo and the southern half of MITK for three scenarios: (1) Miskito Only, (2) Miskito with Cattle (four to five heads of cattle per household), and (3) Miskito and mestizos (no MITK boundaries). In each scenario, I calculated the time it would take to fill an area equivalent to the agricultural zone, the forest-product gathering zone, and the entire southern half of the territory (an area that includes the conservation zone).

Table 6.5. Land-Use Simulations for Pueblo Nuevo and MITK

Scenario	Community	Number of Years to Fill Agricultural Zone		Number of Years to Fill Agricultural & Minimal-Use Zone		Number of Years to Fill Total Area	
		Model A	Model B	Model A	Model B	Model A	Model B
(1) Miskito Only	Pueblo Nuevo	50	>50	>50	>50	>50	>50
	Miskito Territory	28	50	44	>50	>50	>50
(2) Miskito with Cattle	Pueblo Nuevo	35	>50	49	>50	>50	>50
	Miskito Territory	14	26	29	>50	39	>50
(3) Miskito & Mestizo (no boundaries)	Pueblo Nuevo	16	32	21	39	24	44
	Miskito Territory	21	39	31	>50	36	>50

The scenario results presented in Table 6.5 are the following:

(1) Miskito Only. According to both model A and model B, if residents in Pueblo Nuevo maintain their current land-use practices and population growth rate, they will not use all of the lands designated as the agricultural zone in the next 50 years. In considering the entire southern region of MITK, model A predicts slightly more pessimistic land-use outcomes. Model A estimates that all land in the agricultural zone of MITK will be used within the next 28 years; however, model B estimates that given land-intensification measures, the agricultural zone will not be completely occupied within the next 50 years. If the Miskito maintain their current land-use demands and population growth rates, neither model predicts that they will need to cultivate forests in the conservation zone in the next 50 years.

(2) Miskito with Four or Five Heads of Cattle per Household. Model A estimates more pessimistic outcomes if the Miskito begin to acquire cattle. In the community of Pueblo Nuevo, the acquisition of cattle would not drastically change land-use patterns in the near future. However, if we consider the broader impacts on the entire southern half of MITK, both models predict that if each household had four or five heads of cattle, all land in the agricultural zone would be used within the next 50 years. And, furthermore, according to model A, all land including the forest conservation zone could be under agriculture or pasture in the next 40 years.

(3) Miskito and Mestizo (No MITK Boundaries). Scenario 3 illustrates the importance maintaining MITK territorial boundaries and indigenous property rights over their lands. Perhaps the greatest threat to the forests is if mestizo respect for the territorial boundaries falters and the mestizos were to expand into the Miskito territory. In Pueblo Nuevo, model A predicts that if the mestizos were to enter the community, all land in the agricultural zone would be used in the next 16 years and the entire community would be under agriculture or pasture within the next 25 years. Model B estimates that all land in the agricultural zone of Pueblo Nuevo would be occupied within the next 32 years.

Similarly, both models A and B predict that if mestizos were to settle in MITK, the entire agricultural zone of the southern half of the territory would be used in 20–40 years.

Scenario 3 reinforces that the mestizos are in fact a fast threat, and the difference in Miskito and mestizo agricultural practices and forest conservation is further exemplified if we consider how long it would take a household in each group to completely occupy 100 ha with crops, pasture, and fallow lands. According to the models it would take at least 48 years for the Miskito household to cultivate 100 ha of land using their current agricultural practices. In contrast, it would only take 7–10 years for the mestizo household to cultivate the same amount of land. Thus far, the boundaries appear to be holding the fast threat of mestizo occupation, and the slow threat of Miskito forest exploitation does not appear in the immediate future.

6 DISCUSSION: AGRICULTURAL EXPANSION AND FOREST CONSERVATION UNDER INDIGENOUS MANAGEMENT

The comparison of population densities and forest cover in Pueblo Nuevo and Plis confirms that the territorial rights established by the Miskito of MITK are serving to control mestizo agricultural expansion into Pueblo Nuevo and the surrounding lands within MITK. This protection from mestizo encroachment does not, however, extend beyond the territorial boundaries. The Miskito of Plis do not enjoy the low population densities and extensive areas for agriculture and forest protection that the Miskito of Pueblo Nuevo do. Given that the mestizos occupy all the land surrounding Plis and lands right up to the MITK boundaries, it seems reasonable to predict that if the Miskito residents had not established their territorial boundaries and rights over their lands, today, Pueblo Nuevo, like Plis, would also be surrounded by mestizo settlements. As of 2003, however, those in Pueblo Nuevo had approximately 10 times the amount of land than those in Plis.

The relatively low population densities in MITK enable residents to maintain their customary land-use practices while keeping large expanses of inland forests relatively intact. The results from my analysis of the 2003 satellite image and an analysis of forest connectivity by Stocks and colleagues (in press) found that the forests in Pueblo Nuevo,

and MITK more broadly, are in better condition in terms of connectivity and overall forest cover than are forests in Plis and the broader mestizo buffer zone. The analysis of land cover with respect to the MITK management plan illustrates that, for the most part, the Miskito are cultivating only in the agricultural zone. The percent of forest cover in MITK is more than double that of the mestizo territory, and the interior area of MITK is largely uninhabited. In contrast, the forests in the mestizo territory are fragmented with population centers spread throughout the hills. And, while the Miskito of Plis have managed to retain a relatively high percentage of their land in forest, the remaining forest cover is thin as the community no longer has mature forests to gather forest products from or to farm. Likewise, the land that they do still hold is only a small pocket surrounded by mestizo-occupied territory.

In considering the future sustainability of indigenous forest management with respect to agricultural expansion and forest conservation, in the near future the Miskito can maintain their traditional land-use practices and sustain their forest conservation zone. It is unclear what will happen over time as populations increase and land-use demands change. Two of the greatest threats to MITK forests are the acquisition of cattle and the dissolution of the territorial boundaries. It is difficult to assess whether an increase in mestizo migration will occur and whether mestizos will at some point decide that they no longer wish to respect the MITK boundaries. To date, I found no evidence that mestizos would encroach on indigenous lands in the near future. Nevertheless, as new mestizos arrive and the collective memory of the property-rights process fades into history, mestizos may become less willing to comply with land-use restrictions crafted by others.

With respect to regulating their own agricultural expansion, particularly the threat posed by pasturelands, the Miskito in MITK have two advantages that do not emerge in the simulations. First, they have a land-management plan that they are currently following. Neither the Miskito in Plis, nor their mestizo neighbors have developed a plan to manage their lands and therefore have not come to any collectively decided decisions about what they want their future environments to be like. Plis does not have a governing body that is officially recognized, nor does it have a communitywide land-use plan. Land use within Plis is dictated by the founder, an elderly gentleman. In interviews, some residents expressed concern that the land may be parceled out or sold when the founder is

no longer alive to lay his claim. In the mestizo buffer, the mestizos are organized, but they are not recognized by the Nicaraguan government as the rightful owners or managers of their lands. This limits their abilities to address changing conditions and participate in decisions that will affect future land use in the region.

Second, the Miskito of MITK have the organizational experience and structure to address new land-management challenges. In any governance scenario—public, private, or common property—it is impossible to foresee all future challenges. Increasing Miskito population pressures and cattle ranching may stress the land-use institutions. Nevertheless, the residents of MITK have the advantage of having participated in establishing their common-property rights and a set of rules to restrict land use. The Miskito's success in developing new rules to address mestizo encroachment may facilitate their ability to create new rules and additional enforcement mechanisms that may become necessary as land-use pressures grow.

Recent literature in environmental management highlights the importance of creating management institutions that enable resource users to monitor and appropriately address changes in their resource systems (Berkes et al., 2003; Holling, 1978). A weakness of the simulations is that they do not account for the Miskito peoples' abilities to monitor their environment and make appropriate institutional changes as the social-ecological dynamics change.

I have limited information with which to estimate how MITK residents will be able to monitor and address new environmental challenges. I can state that they are in a better position to do so than they were before they established territorial rights. The Miskito of MITK have a governing body that is recognized as having the authority to make decisions with respect to land use in MITK. They also have a land-use plan that is, at the very least, a first step in governing their lands for the long term. In conversations with the Miskito leader responsible for organizing the forest guards and managing the territorial lands, he stated that he was concerned that not all residents know where the forest conservation zone in MITK begins. He stated that in the future, he hopes to work with the forest guards to physically demarcate the conservation zone. This is a very simple example of an institutional change to address future forest and land-use demands.

7 CONCLUSIONS

The present situation in MITK looks promising for continued forest conservation. Although the future is uncertain, in contrast to the foreseen threats to forest lands in Plis and the mestizo territory, in MITK, the simulations do not necessarily predict over-exploitation. The forests in MITK are not immediately threatened due to mestizo or Miskito agricultural expansion, and the residents of MITK are in a better position than their Miskito neighbors in Plis to address future land-use challenges.

However, three important caveats must be examined when considering how the results of this study might influence future policy recommendations. First, is the amount of land available to those living in MITK. The demarcation process in Bosawas occurred before mestizos had occupied vast expanses of Miskito lands. This enabled the Miskito to demarcate a territory large enough to sustain current and future land-use needs, and in turn, extend the duration of the long-term threat of Miskito land use into the unforeseeable future.

Second, the results from Bosawas concur with other common-pool resource management studies that find that clear boundaries, user participation in the management rules, and monitoring and enforcement are institutional traits of long-enduring common-pool resource arrangements (Ostrom, 1999, 2005). It is important to recognize, however, that the process, not the simple establishment of indigenous rights, but the actual demarcation and rule-making processes are vital to the success MITK has had thus far. The demarcation, titling, monitoring, and enforcement activities that have contributed to MITK's success will remain vital components in assisting how MITK residents address land-use challenges in the future.

Finally, as in any management regime, the future remains uncertain. In response to the critique made by some conservationists that indigenous institutions are likely to change under increasing market pressures and/or acculturation (Redford, 1991; Terborgh, 2000), I analyzed a series of scenarios that could influence future forest conservation in Bosawas. The common-property-rights institutions operating in MITK have the benefit of governing a relatively small population that has rights to a large expanse of land, and,

therefore, forests are not immediately threatened by nominal changes in land-use practices.

Nevertheless, the time frame is relatively short, and there are numerous changes that could possibly occur in the region. The scenarios presented in this dissertation only consider how agricultural expansion might threaten forest conservation in the future. Some might argue that other, more prominent threats to the region include timber concessions or the establishment of some other extractive industry in the reserve. Others might rightfully note that if roads are built in the region, this could drastically change the land-use practices of the indigenous residents. It is true that a drastic change in land-use practices could completely destroy Bosawas forests, but this threat is not unique to MITK or any other common-pool resource management arrangement. Public lands are at least as vulnerable to institutional change as common-property lands, as governments around the world are known for deciding to open up protected areas for mining, timber harvesting, oil exploration, or other extractive ventures.

In response to the conservationists' critique that we are only trading a fast threat for a slow one, the evidence presented here does not confirm their predictions of overexploitation. Neither does it, however, provide assurance that the Miskito will necessarily conserve their forests. The simulations present just some of the possible challenges the communities in MITK will face in the future. We cannot predict the complete array of challenges or the array of possible responses. We can however, compare how forests in the same region are faring (and might fare in the future) under two different management regimes.

The forests in the Miskito communities in MITK are in better condition than the forests in the Miskito communities in the Bosawas buffer. Furthermore, residents in MITK are better equipped to address changes in their environments and land-use demands. In contrast to Miskito people living on public lands, the ones living in the MITK territory have the advantage of having a locally established and monitored management plan that should not change without the consensus of the communities. There is no reason to believe that communal consensus is any less capable of sustaining forests than legislated protection. Thus far the residents of MITK have demonstrated their

ability to conserve their forests, and it appears reasonable to assume that they will continue to do so in the proximate future.

Footnotes for Chapter 6

ⁱ This chapter is based on an article that I co-authored with Felipe Murtinho: Hayes, T. and Murtinho, F. “Indigenous Forest Reserves: A Means to Sustainable Forest Management or a Band-Aid Solution?” submitted to *Development and Change* in September 2006.

ⁱⁱ Areas, populations and land cover are only given for the southern half of MITK (as shown in Figure 5.1). Satellite imagery was not available for the northern half of MITK.

ⁱⁱⁱ See discussion of estimations of cultivable land in section 4, Data and Methods

^{iv} I showed the map of the red regions (areas of agriculture/fallow/pasture) in the southwest corner of MITK to several Miskito leaders and forest guards. All assured me that a mestizo previously worked in the region, but that presently no one worked there. They could not account for the land-cover shown in the map and stated that all along the border is forested. I tried the visit the region, but it was too remote to reach.

CHAPTER 7
CONCLUSIONS:
UNDERSTANDING THE DYNAMIC INTERPLAY BETWEEN PROPERTY RIGHTS, LAND-USE
NORMS, AND AGRICULTURAL EXPANSION

1 INTRODUCTION

Around the world, researchers, policy makers, and citizens are all struggling to devise policies that will conserve our natural systems while sustaining our social systems. With respect to forest management, one of the most pressing issues is how to protect frontier forests from agricultural expansion. In this dissertation I explored *if* and *how* we might design forest governance regimes that recognize and complement resource user rights and rules and achieve our forest conservation goals for a region.

The examination of how forest governance arrangements can include the institutional dynamics and demands of the resource users flies in the face of many traditional notions of environmental conservation and forest management. Traditional conceptions of natural resource management assume that resource users are incapable of managing natural resource systems. Followers of the conventional forest conservation protected-area paradigm contend that we cannot meld resource users' institutions and natural resource demands with environmental conservation; that environmental conservation ultimately depends on strict regulatory and enforcement mechanisms enacted by a strong central government (Hardin 1968; Putz et al., 2001; Redford and Richter, 1999; Terborgh, 1999, 2000).

No doubt exists that trying to achieve forest conservation goals while recognizing the rights and customs of the forest users is a risky endeavor. Compelling concerns include whether resource users can organize to curtail their consumptive forest uses and whether their governance systems are robust and capable of addressing varied threats to their traditional institutions in order to sustain forest cover (Barrett et al., 2000; Berkes and Folke, 2000; Dietz et al., 2003; Terborgh, 1999).

The results from this study, however, demonstrate that with respect to efforts to conserve frontier forests, resident resource users may be better able to control agricultural expansion than government managers. The results suggest that the fortitude of traditional residents' governance systems is critical in sustained forest management and, furthermore, that the broader policy environment may have a significant impact in determining whether residents' traditional land-use institutions remain robust when confronted with mestizo migration and changing land-use demands.

2 SUMMARY OF FINDINGS

The central thesis I posed in the introduction to this dissertation is that property rights that support indigenous peoples' customary land-use institutions and landholdings will serve to bolster the ability of indigenous residents to control mestizo encroachment and enhance overall forest conservation in the Mosquitia corridor. I hypothesized that mestizo encroachment disturbs indigenous land-use customs, and that control over mestizo migration depends on recognition of indigenous peoples' communal rights to their lands. In comparing indigenous and government management of forest reserves, I argue that protected-area policies that fail to reinforce indigenous people's land rights and practices will be incapable of stopping mestizo encroachment unless very large investments are made in third-party monitoring and enforcement, such as patrol forces, courts, and jails.

The findings from the empirical analyses support my central thesis. In the case of Río Plátano and Bosawas, I find that mestizo migration does disturb indigenous land-use institutions. Furthermore, I find that property-rights policies that support indigenous common-property rights are more effective at controlling mestizo expansion, and sustaining local land-use institutions, than is public management. Indigenous residents in Nicaragua who hold territorial rights to their lands are better able to conserve their forests than are those living under public management in Honduras.

In the analyses, by comparing two very similar reserves with respect to location, market integration, demographics, and mestizo migration, I was able to tease out the impact of different property-rights arrangements on mestizo expansion and indigenous

land-use institutions. In chapter 3, I carefully examined how different characteristics of the property-rights arrangements in each reserve impacted mestizo migration. Institutional analysis combined with field visits and satellite imagery enabled me to identify the different property rights and rules operating in each reserve and their respective consequences on agricultural expansion. For example, in comparing rights, rules, and agricultural expansion in Río Plátano and Bosawas, I found that AFE-COHDEFOR in Río Plátano and the indigenous residents in Bosawas created similar land-management rules on paper. The application of these rules in the two reserves, however, differed significantly. Unlike AFE-COHDEFOR, the indigenous residents of Bosawas applied their land-use rules by physically demarcating the boundaries of the indigenous homelands and employing a group of forest guards to monitor the boundaries. The findings in chapter 3 show the importance of clearly defined boundaries and monitoring mechanisms to control agricultural expansion, and demonstrated that the indigenous residents of Bosawas were more effective at exercising their property rights and respective rules and stopping agricultural expansion than was the Honduran government.

In chapter 4, I examined how encroachment disturbs the indigenous land-use institutions and compared how individuals responded to mestizo encroachment at different decision-making levels. I contrasted the traditional land-use customs with land-use rules made by the Miskito leaders and with land-use institutions in three Miskito communities with different encroachment histories. The findings demonstrated that mestizo migration stresses indigenous common-property customs. In the context of Río Plátano, where the broader policy environment gave very little recognition or support to indigenous governance arrangements, I found that mestizo encroachment gradually deteriorated the integrity and robustness of the Miskito land-use customs.

The findings from Bosawas demonstrate, however, that under a different policy context, indigenous institutions remain robust and thrive in response to mestizo encroachment. Counter to the institutional deterioration occurring in Río Plátano, indigenous residents in Bosawas responded to mestizo encroachment by further defining their common-property rights and bolstering communal support for their land-use customs.

In chapter 5, I presented a more discerning analysis of how the respective property-rights processes impacted the evolution of indigenous governance systems and overall compliance with land-use restrictions in each reserve. I found that the property-rights process in Bosawas facilitated indigenous forest management and bolstered indigenous common-property rights in two ways. First, NGOs involved in the process reduced the costs of collective action necessary in concretizing indigenous land rights by helping to organize meetings and mediate conflicts. Their presence also helped to create a sense of importance and establish legitimacy of the de facto governance agreements. The import that NGOs gave to the process of establishing indigenous rights thereby reduced the risk of non-compliance, as all actors recognized that they were making a serious commitment in establishing a set of land rights and rules.

Second, I found that mestizo and indigenous resident participation in the establishment of indigenous rights and land-use restrictions was critical to compliance. The analysis in chapter 5 demonstrated that the on-the-ground processes, not simply the prescribed policies, impact individual land-use decisions in the Mosquitia. In contrast to arguments that forest conservation demands strict enforcement measures and heavy sanctions, the findings in Bosawas are that indigenous and mestizo residents comply with land-use restrictions out of respect for the set of land-use rules they created; not because of government regulations or out of fear of costly sanctions. In interviews with mestizo and indigenous residents in Bosawas, they consistently mentioned participation in defining the territorial boundaries and land-use rules within those boundaries as critical in their decision of whether to comply with the respective governance arrangement.

The analysis and results presented in chapter 6 further support the thesis that property-rights policies that support indigenous land rights bolster indigenous residents' abilities to address agricultural expansion, both expansion caused by mestizos and the indigenous residents themselves. By comparing agricultural expansion and land-use institutions in a Miskito community within the boundaries of the Miskito territory to a Miskito community outside the territorial boundaries, I found that Miskito residents holding territorial rights in Bosawas are better able to prevent current encroachment pressures and address *future* land-use demands than are their Miskito neighbors living on public lands in the Bosawas reserve. The indigenous residents within the territory used

their collective-choice rights to craft a management plan intended to regulate both internal and external land-use pressures and promote sustained forest conservation. Those on public lands are struggling just to maintain their current communal lands and sustain their traditional land-use practices.

The study findings demonstrate that it is possible, and at times more effective, to design forest governance regimes that complement local resource-user land-use institutions and achieve forest conservation goals. The study also suggests the intricacies involved in designing such a governance arrangement. Institution building is not easy, not from the ground up nor from the top down. The following highlights some specific findings that may contribute to our theoretical understanding of resource management and institutional change and guide the practical application of designing forest governance regimes.

3 THEORETICAL AND POLICY IMPLICATIONS

One of the most fascinating and challenging aspects of this study is the analysis of institutional change in response to a disturbance. Mestizo migration, the creation of roads, and the introduction of exploitative industries are all common disturbances that threaten traditional institutional systems and forest conservation throughout Latin America. However, relatively little is known about how traditional peoples change their customary institutions in response to such external shocks (Berkes and Folke, 2000; Richards, 1997). Theories of institutional change are varied and range from predictions that institutions will collapse under stress caused by an outside disturbance to predictions that institutions are sticky and resistant and that even when confronted with drastic change, institutions will maintain their core characteristics (Gluckman, 1968; Knight, 1992; North, 1990; Peters and Pierre, 1998; Terborgh, 1999).

Findings from this study have significant theoretical and policy implications for our understanding of institutional robustness and its relationship to forest management. The study confirms that mestizo encroachment does disturb traditional indigenous land-use institutions and produces institutional change. Findings from Río Plátano and Bosawas

illustrate that the indigenous land-use institutions of the Miskito and Mayangna peoples have not remained stagnant in the face of mestizo encroachment. In some cases, the indigenous residents have adapted their traditional institutions to make them more resistant to mestizo encroachment; in other cases, residents are changing their customary practices and conforming to mestizo systems. The findings from this dissertation suggest however, that the policy process may mediate the impact and toll that the mestizo disturbance has on indigenous governance systems.

3.1 Indigenous Response to Persistent Mestizo Encroachment: Institutional Change in the Context of Tenure Insecurity

An important contribution of this study is the analysis of how mestizo migration disturbs the indigenous traditional land-use practices and the responses that indigenous residents have as encroachment persists over time. In my analysis of institutional change in Río Plátano, I found that under public management, indigenous common-property institutions weaken over time. The longer a community has experienced Miskito encroachment, the more likely it is that individuals will adopt mestizo private-property practices. Furthermore, the longer a community has experienced Miskito encroachment, the less likely it is that they will have faith in their own ability to control mestizo migration.

For example, in Ahuas, a community that has yet to experience Miskito encroachment, the community has not collectively organized to monitor mestizo migration or land sales. Nevertheless, individual residents are positive that they can prevent future encroachment. In comparison, in Wampusirpe, a region that first began to experience mestizo migration in the last few years, residents have organized to monitor mestizo settlements, but they struggle to stop land sales. Furthermore, residents are less optimistic than their neighbors in Ahuas about their ability to prevent mestizo encroachment. Finally, although Banaka was one of the first communities to organize itself to monitor mestizo migration, the monitoring activities have severely deteriorated over time, and residents in Banaka are the least likely to believe that their community can prevent mestizo encroachment.

The changes occurring in the Miskito communities, however, did not necessarily reflect the institutional changes made by the Miskito leaders. The analysis of how the Miskito people of Río Plátano are adapting their land-use institutions to address mestizo encroachment illustrated disjuncture and tension between the rules made by Miskito leaders and decisions made by individuals in their respective Miskito communities. It also demonstrated that institutional changes in response to the mestizo disturbance are not necessarily linear, uniform, or coherent.

With respect to the disjuncture between decisions made by the Miskito leaders and decisions made by individual residents, the analyses in chapters 4 and 5 illustrated how mestizo encroachment pits the traditional social benefits of common-property regimes, such as shared access and withdrawal rights to forest lands and shared access to all community lands, against the individual benefits of increased tenure security and profits from land sales derived from adopting mestizo private property institutions. Furthermore, the discussion of the costs of collective rule making and the results of Miskito land-use preferences and preoccupations demonstrated the tug-of-war that occurs within indigenous communities over whether to incur the costs and risks involved in defending customary land-use decisions and common-property rights.

The fissures that mestizo migration produces in Miskito common-property institutions present a challenge to environmental governance. From a policy perspective, the gap between leaders' decisions and individuals' actions should caution against assuming that what leaders say represents what individual do. The findings from the three communities in Río Plátano suggest that any broad-based governance arrangement needs to gain the support of the majority of the residents, not just the leaders. If we were to gauge the robustness of the Miskito land-use institutions in response to mestizo encroachment solely on the decisions and attitudes of the Miskito leaders, we might conclude that the land-use institutions of the Miskito of Río Plátano remain strong and are capable of addressing the threats posed by mestizo migration. This is not necessarily the case, as the findings suggest that the longer a community is exposed to mestizo encroachment, the more uncertain Miskito residents are with respect to whether they can (or perhaps want to) prevent mestizo colonization.

3.2 Property-Rights Policies and the Robustness of Traditional Institutions

The comparison of land-use institutions in Río Plátano and Bosawas demonstrates the impact the broader policy environment can have on the evolution of common-property institutions. Similar to arguments made by Ensminger (1997) that the broader property-rights environment can greatly influence the evolution of local property-rights institutions, the findings from Río Plátano and Bosawas are that protected-area property-rights policies and programs can have a decisive impact by either supporting or thwarting common-property institutions.

In accordance with Taylor and Singleton (1993), who hypothesize that increased heterogeneity in a resource user group will produce the need for greater definition of resource rules and monitoring, the results from Río Plátano and Bosawas demonstrate that mestizo encroachment produced more exclusive land-use rules. Contrary, however, to the predictions by Demsetz (1967) that as a resource increases in value, individuals will favor private-property arrangements, this study shows that the evolution of property rights depends on the broader policy environment. The territorial property-rights institutions in Bosawas have not evolved into private-property regimes.

In the case of Río Plátano, where a sense of insecurity surrounds all tenure rights, the study found that indigenous residents do, over time, begin to adopt private-property institutions. This is not, however, their first response to the demographic and market threats posed by mestizo expansion. In Río Plátano and Bosawas the first response of the residents to mestizo encroachment was to establish and defend their communal rights to the land. Upon learning of mestizo colonization of their homelands, indigenous residents in Río Plátano and Bosawas did seek to create a more exclusive property-rights system, but they demanded that the property-rights arrangement protect their shared rights to the land and forest resources.

In Bosawas, the creation of common-property institutions was supported by the broader political environment, and today, residents continue to comply with their customary common-property institutions and appear resistant to mestizo encroachment. In contrast, in Río Plátano, customary rights and institutions have not been respected or supported by the broader protected-area policy environment. Over time in Río Plátano, as

tenure insecurity has increased under government jurisdiction and with continual mestizo migration, some residents have begun to adopt and prefer private-property arrangements.

The findings from Bosawas and Río Plátano suggest that there may be a pivotal window of opportunity when property-rights policies might be most effective. For example, in Río Plátano, conditions in Wampusirpe appear to indicate a window of opportunity for a supportive property-rights policy as Miskito residents expressed desire for support for indigenous resident's rights and institutions. Residents in Wampusirpe recognize the problem of encroachment and have begun to organize and seek support for their institutions to prevent mestizo encroachment. In contrast, Ahuas has not yet reached the stage where residents recognize the problem of mestizo encroachment and are willing to undergo some costs in organizing to prevent mestizo encroachment.

Likewise, conditions in Banaka now make it extremely difficult for property-rights policies to support Miskito rights and land-use institutions. Although the native residents originally organized and sought support to establish and monitor their communal landholdings, this support never materialized. Today, Miskito residents in Banaka have lost faith in their abilities to make rules and prevent mestizo expansion. Mestizos and Miskito are now intermixed within the region, making the creation and application of a common-property-rights regime all the more complicated.

In comparison, in Bosawas, external support for indigenous rights to control mestizo expansion came within the window of opportunity of institutional change. In Bosawas, as in Banaka and Wampusirpe, residents recognized the threat of mestizo encroachment and prior to gaining outside support, Bosawas indigenous residents had begun to organize to stop the expansion. Although it may have been largely coincidental, TNC began to work in the region and provided a supportive political environment at an opportune moment. The mestizos had not become fully integrated with the indigenous residents in the region, and while the indigenous residents had begun to self-organize and address the problem of encroachment, they had yet to experience recurrent failures that deteriorate resident trust in the strength of their traditional institutions. The support from TNC and later Centro Humboldt contributed to a supportive political environment for land-use institutions in favor of common-property traditions and the establishment of territorial common-property rights.ⁱ

3.3 Linking Property Rights, Institutional Robustness, and Forest Conservation

The institutional analysis combined with analyses of satellite imagery and encroachment patterns found that Bosawas reserve under indigenous common-property management has been better able to control agricultural expansion caused by mestizo settlers than has the publicly managed Río Plátano reserve. The use of institutional analysis to understand the impact of the different property-rights arrangements demonstrated however, that it is not simply a matter of public management versus common-property management. The implications of this study are that the actors who hold the rights, the rules they make, and the processes they enact to apply and enforce these rules make a difference when it comes to controlling agricultural expansion and conserving frontier forests.

The findings that clearly defined boundaries and monitoring serve to control mestizo migration are consistent with other theories and studies of successful resource management (Bruner et al., 2001; Gibson et al., 2000; Hanna et al., 1995; McKean 1992; Ostrom 1990, 1999; Terborgh, 1999). As noted earlier, conservationists repeatedly call for clearly defined boundaries and third-party monitoring and enforcement mechanisms to protect valuable ecosystems and biodiversity (Bruner et al., 2001; Terborgh, 1999). The findings in the comparison of Río Plátano and Bosawas are, however, that it is the indigenous residents, not the public agency, who have successfully created and maintained clearly defined boundaries and monitored their land-use rules. The findings defy the conservationists' assumptions about the inherent effectiveness of public management and challenges to indigenous resident's abilities to conserve forests.

Field visits and interviews conducted in Río Plátano found that when AFE-COHDEFOR was given jurisdiction over the reserve, government officials drafted a set of rules on paper that restricted mestizo access into the cultural zone of Río Plátano reserve, but in practice, these rules were never applied. The boundaries in Río Plátano were never physically demarcated, and monitoring and enforcement by AFE-COHDEFOR was sporadic at best. In contrast, in Bosawas, residents chose to establish their collective-choice rights by creating and applying boundary and scope rules that clearly defined their territorial boundaries and restricted mestizo access and withdrawal rights. The rules were applied and enforced through the physical demarcation of the

territorial boundaries and the creation of a corps of forest guards to monitor the boundaries and the management rules.

I want to reiterate that successful forest conservation does not necessarily depend on public, private, or communal governance. My findings on property rights and agricultural expansion suggest, instead, that forest conservation depends on who has the interest and commitment to negotiate and prescribe a set of rules, and the desire to invest resources to apply the rule prescriptions. Río Plátano and Bosawas have very similar management rules on paper, but managing agencies AFE-COHDEFOR and the Biosphere Project have chosen to invest in other aspects of reserve management in Río Plátano, whereas the indigenous residents of Bosawas chose to invest time and money in key institutional mechanisms, namely boundaries, guards, and a forest management plan, to conserve their forest resources.ⁱⁱ

The second contribution of the analysis of property rights, indigenous institutions, and forest conservation, is that it was not just who held the rights, but the process that established their rights and the subsequent rules that has led to successful forest conservation in Bosawas. Contrary to the deterrence model used by the conventional protected-area paradigm, the findings from Bosawas demonstrate that compliance is not dependent on third-party monitoring and costly sanctions. Rather, the results suggest that participants are more willing to accept and comply with rules that limit their benefits from a natural resource system if they are entitled to participate in collective-choice decisions about these limits. Some might argue that it was the simple creation of boundary lines and patrol guards that served to stop mestizo migration into the territories and that the property-rights process had little to do with mestizo migration. I contend that the boundary rules and the property-rights processes had to go hand-in-hand.

The inability of the Miskito residents of Plis to defend their lands from mestizos is one example that demonstrates that just drawing a boundary line is not sufficient to stop mestizo encroachment. The residents of Plis cut their own boundary line around their community in 2001 and 2002. Nevertheless, this boundary is hotly contested by the mestizos and has not always been respected. Several mestizos noted that they were not consulted when the residents of Plis cut their communal boundaries, and whereas they

respect the territorial boundaries of the Miskito territory to the north, they do not necessarily respect the boundaries of Plis.

Likewise, during the original demarcation process in Bosawas, the mestizo residents made it very clear that they would sabotage any efforts to restrict their activities if they were not permitted to participate in the property-rights decisions and if they did not agree to the rules. Both mestizo and indigenous residents recalled the periods of violence and tension between the mestizos and indigenous peoples as the indigenous residents began to exercise their common-property rights. Given the relative absence of enforcement mechanisms in the region, and the high number of mestizo settlers in comparison to the relatively low number of indigenous residents, the mestizos could easily overpower the indigenous territories if they chose not to respect the boundary lines. Nevertheless, the mestizos signed the property-rights agreement with the Miskito and Mayangna and, although it is only a de facto arrangement with minimal sanctioning capabilities, are keeping to the rules. Irrespective of legislated rules, it was the collective-choice process that occurred in Bosawas that was ultimately referred to as “the law” and complied with by both mestizo and indigenous residents.

4 POLICY LESSONS FROM THE MOSQUITIA

While it is difficult to generalize from any case study, the findings from the comparison of Río Plátano and Bosawas provide a number of lessons that present several policy suggestions with respect to ways that property-rights processes can contribute to frontier governance and promote long-term conservation goals.

4.1 The Interplay between Formal Property Rights and Local Land-Use Institutions

The study suggests that not just one property-rights arrangement serves to conserve forests. A principal lesson from this study is that property rights should be context specific and adapted to factors such as the traditional institutions of the resource users, geographic location, the specific ecosystems, the disturbances and environmental threats

under consideration, and the government infrastructure in the region. In the case of frontier forests threatened by agricultural expansion, the comparison of Río Plátano and Bosawas demonstrates that forest policies can control mestizo migration and promote greater sustained forest management by supporting indigenous residents' common-property rights and resource-use institutions. The findings from chapter 4 suggest that there may, however, be a limited window of opportunity for policy implementation. If policy support is enacted after traditional institutions have been sufficiently stressed by the disturbance and residents have begun to doubt the viability of their traditional resource institutions, it may be very difficult to revive resident institutions and support resident governance of frontier forests.

4.2 Clearly Defined Boundaries and Monitoring

The second lesson from the Mosquitia, the importance of clearly defined boundaries and monitoring, is not new, but it unfortunately remains overlooked in some property-rights and resource management arrangements. In Bosawas, the physical demarcation of the territorial boundaries was critical in stopping mestizo migration onto indigenous lands and the absence of clear boundaries in Río Plátano has left the indigenous residents' cultural zone open to continued encroachment. In both Bosawas and Río Plátano, mestizo and indigenous residents repeatedly emphasized the importance of a boundary line that was physically demarcated so that all could identify property rights. In Bosawas, the indigenous forest guards monitor and maintain this boundary. In Río Plátano, however, residents complained that their enforcement activities were weakened because they did not have recognized rights with clearly defined boundaries to their lands.

4.3 Application of Rights and Rules

The third lesson from the Mosquitia is the importance of the property-rights process and rights established on the ground. Although Bosawas residents only held de facto rights, they had the presence and the perseverance to create and apply rules to define and defend their rights. In contrast, in Río Plátano, AFE-COHDEFOR held de jure rights to manage

the lands, but they were incapable of creating and applying rules that were recognized and respected by the residents and, instead of supporting local governance arrangements, served to thwart nascent rule-making efforts.

While it may at times appear risky and challenging to craft forest policies that recognize resident's resource-use institutions and rights, failure to do so may in fact be fatal for the forests and the local institutions that have sustained them. Part of the success of the de facto rights in Bosawas may be attributed to mestizo and indigenous residents' participation in the definition of who would have rights to make decisions over the indigenous lands and in the collective-choice decisions to establish the boundary and management rules to those lands. This established governing bodies and a set of institutions that were largely respected by all. In contrast, in Río Plátano, the indigenous governing institutions were squelched by AFE-COHDEFOR, but no recognizable governance system was put in their place.

The findings from Río Plátano and Bosawas indicate that in resource management, particularly in remote regions, resident participation in the definition of resource rights and management rules are critical to obtaining compliance. Participation must not remain a vague term that implies some sort of activity on the part of resource users in management discussions. Participation must clearly enable participants to clearly define their rights for making and enacting the actual rules. All too often local attendance at resource management discussions is assumed to be sufficient for engaging community residents in conservation programs and goals. The results from the Mosquitia suggest that unless residents feel like they hold the rights to make (and veto) the rules that restrict their access and withdrawal rights, they are unlikely to comply with said rules.

4.4. Vulnerabilities: Financing Community Forest Conservation

The final lesson from this study is that the creation and sustenance of traditional resource-management institutions will most likely demand sustained financial and technical resources. Consistent funding is perhaps the greatest threat to the continued success of Bosawas and a limitation that hampers rule making and monitoring by the indigenous residents of Río Plátano.

In the initial design of this research program, I did not consider how the specific activities of external actors (in this case, NGOs) might be critical to the development and provision of indigenous property-rights and governance systems. However, the results from Río Plátano, and particularly Bosawas, clearly illustrate the need for sustained, ideally self-sustaining, support for indigenous governance organizations and their respective institutions.

The costs of negotiating, rule making, and monitoring can be prohibitive. The conservation community estimates that an additional U.S. \$27 to \$30 billion dollars is needed annually to adequately manage protected areas (Molnar et al., 2004). This estimate is generally thought to imply the need to support government agencies. Nonetheless, community organizations are not immune from management costs. While it may be less expensive and more effective to have residents rather than public agencies make rules and monitor their lands, there are very real costs involved in rule making and monitoring. Many residents in frontier communities are simply struggling to support themselves and do not have the financial means to make excursions to organize meetings, draft boundaries, negotiate rules, and lobby the government for their rights. All too many conservation programs are enacted under the assumption that community residents will volunteer to maintain and monitor conservation projects. It is unreasonable to assume that traditional resource users necessarily have the time, skill, information, and money to negotiate with other actors to define, formalize, and defend their property-rights systems and create land-management plans.

The discussion of management challenges in Río Plátano and Bosawas illustrates the difficulties traditional resource users must overcome in trying to craft new land-use rules and defend their homelands and the critical role that external agencies, such as NGOs or government organizations, can play in either supporting or thwarting their efforts. In Bosawas, TNC and Centro Humboldt were vital in supporting the establishment of indigenous common-property rights over the region. Centro Humboldt continues to have an active role in helping the indigenous association leaders draft proposals to receive grant money, refine their management plans, attend government and non-government meetings related to activities in the reserve, and pay and train the corps of forest guards.

Under the present circumstances, it is doubtful that the property-rights regimes established in Bosawas would survive without this support.

Unfortunately, in both Río Plátano and Bosawas, continued funding is problematic. As an analyst of governance arrangements for resource management, I am wary of this dependency on outside support. Funding and resources are of course, crucial to governance. The difficulty lies in how to obtain and manage these funds. The findings from Bosawas suggest that anyone wishing to engage in the development of, or study of, property-rights arrangements for traditional peoples must examine the problem of sustained funding as this is a critical limitation of the longevity of local governance arrangements.

5 ASSESSMENT OF OUTCOMES AND EFFECTS

I stated in the introduction of this dissertation that as an analyst, my interest is in the outcomes of forest conservation and institutional change. Specifically, my interest is in how different institutional arrangements might promote forest conservation by stopping mestizo colonization of the Mosquitia frontier. The results show that the common-property-rights system in Bosawas has bolstered indigenous governance in the region and permitted the residents to prevent mestizo encroachment. Forest conservation was my stated immediate policy goal for the region and with respect to present-day outcomes; Bosawas has been more successful in achieving this goal than Río Plátano.

In evaluating the effects of the two different policy processes however, it is important to look beyond the immediate goal of forest conservation and examine how each protected-area regime supports citizens' rights and governance arrangements for future frontier management. The Mosquitia is not an uninhabited virgin forest, nor is it a zoo. It is a region that has a variety of residents with different land-use demands and different development (personal and regional) goals. I noted in the introduction, and re-emphasized in my concluding remarks in chapter 6, that I believe that ultimately it will be up to the frontier residents to understand how their actions are part of the changing environment, define their particular interests, and act accordingly. Personally, I find it exorbitantly costly and politically suspect to assume that the Mosquitia will be

successfully governed via public agencies acting in remote capital cities. Therefore, in evaluating the long-term effects of the different property-rights regimes I find it crucial to consider how each property-rights arrangement facilitates local organization, learning, and decision making so the residents can assess their options and collectively decide how they want to manage their lands.

As I argued in chapter 6, I believe the indigenous residents inside the territories in Bosawas are better equipped to organize, learn, make land-use decisions, and govern their territories than are the indigenous or mestizo residents living on public lands (in Bosawas or Río Plátano). In Río Plátano, the future looks bleak. Neither the governing bodies of the indigenous residents, nor the mestizos, nor, for that matter, the government have much decision-making authority in the region. Residents frequently refer to the law of the Río Plátano as the “law of the strongest.” Whoever has the money (or the guns) decides how the resources will be used and the development activities that will occur in the region.

In contrast to the emergent chaos in Río Plátano, those living in the indigenous territories in Bosawas have a governing body that is elected by the residents, is recognized by other governing agencies in Nicaragua, and is experienced (or gaining experience) in making resource-use decisions for the territory. This is a first step in establishing long-term governance capabilities in the region.

Two potentially significant weaknesses in Bosawas, however, are the dependency on outside funding and the omission of mestizo participation in the establishment of mestizo land rights. As I discussed earlier, the fragility of the governance arrangements in Bosawas due to lack of sustainable funds and the unwillingness of forest guards to work without pay may at some point prove problematic. An additional concern is the inattention to the rights and demands of the mestizo settlers. The mestizos agreed to let the indigenous residents have their territory, but they themselves remain without governance venues to establish their demands for future land use in the region. This is a point of contention for the mestizos I interviewed in the region and a valid concern for future governance. As this study has demonstrated, given their numbers and more extensive land-use practices, mestizo respect for land-use rules and restrictions is crucial to sustained conservation of the natural resources in the region.

6 IMPLICATIONS FOR FUTURE RESEARCH

This study points to several ways we can improve our understanding of institutional change, property rights, and forest management. One growing area of research, largely in the natural sciences, is the idea of matrix ecology. An ecological matrix is one that recognizes that a variety of ecosystems, including for example, pristine forests, managed forests, farms, and residential areas, may all be combined to contribute to a healthy environment. The ecological matrix is a means of environmental planning in which environmental and social systems co-exist. Thus far, the ecological matrix has focused largely on ecosystems and has failed to consider how various policy arrangements and social systems might combine with the natural systems to complete the social-ecological fabric of the matrix.

In future work, I would like to examine how matrix ecological models might be melded with polycentric governance models to enhance regional environmental management. In my own work on frontier management there are four issues that I consider crucial to improving our understanding of how to combine social and ecological systems and contribute to matrix/polycentric governance options for forest management.

First, I am particularly interested in expanding the scope of my institutional analysis of resource management systems to include the mestizo migrants, their land-use institutions and governance structures, and resource demands. This study focused on property-rights policies aimed at indigenous residents and their impact on indigenous land-use institutions. In many frontier scenarios, including Río Plátano and Bosawas, the mestizos are an equally important group of resource users who are often ignored. In both Río Plátano and Bosawas the mestizos are also without rights and in many ways their land uses have a greater impact on sustained forest conservation. In future research I hope to look at the mestizo land-use institutions and investigate the types of property-rights arrangements that might complement some of their land-use institutions while promoting sustained forest conservation.

Second, I would like to conduct a more detailed study of collective-choice rights and their relationship to compliance and frontier forest governance. Mestizo encroachment is not unique to the Mosquitia. It is occurring in other regions of Central and South America

and outside colonization of traditional peoples' homelands is a problem throughout the world. There are ample opportunities to compare the outcomes of different property-rights arrangements across Latin America. Mestizo encroachment in the Mosquitia is rather unique in that it is a more recent occurrence. Colonists have been migrating to the Amazon since the 1960s and 1970s (Hecht, 1993; Hecht and Cockburn, 1989; Southgate et al., 1991). Future studies could compare property-rights policies that were enacted in different countries in response to mestizo colonization of the frontier. In such a study, it would be important to pay particular attention to the establishment of indigenous land rights, the actors who hold the collective-choice rights, and the ability to control mestizo encroachment. Assuming certain countries' property-rights policies have remained consistent over time, the analysis would provide greater detail of how policy regimes have impacted mestizos, and provide insights into the longer-term governance stability of the different property-rights regimes.

The cross-case analysis would also be a venue to further explore the possible long-term threat of indigenous residents' resource use. In my dissertation, I have tried to explore possible future threats by comparing future land-use pressures within the indigenous territories and outside of the territories, but this analysis was largely hypothetical. The data collected in Bosawas serve as a baseline for future studies to compare (1) if the indigenous residents are able to maintain their borders, and (2) whether their land-use institutions serve to maintain their core forested areas.

Third, in the context of the frontier, the development of polycentric environmental governance arrangements often implies the evolution and creation of community and regional governance structures. This study commented briefly on the difficulties that leaders in Bosawas and Río Plátano face in trying to sustain their governance structures and their dependency on external aid. Future work and research in community-based resource management must address the issue of the sustainability of local governance organizations and the role that external agencies have in maintaining local institutions and governance organizations.

Finally, the fourth consideration in environmental governance structures returns to my interest in the collective decision-making process, but takes it one step further by considering what actors and processes influence the constitutional decisions that decide

who has rights (or restrictions) to certain lands. In environmental policy, particularly in developing countries, international non-government and government organizations frequently play influential roles in deciding how sovereign lands that do not pertain to their respective countries are used.

For example, in Bosawas, the indigenous people and mestizos engaged in a process that ultimately defined the indigenous residents' constitutional decision-making rights to their lands. These constitutional rights were later recognized by the Nicaraguan government. Nonetheless, it is questionable whether the indigenous peoples of Bosawas would have obtained land rights, had they not had the support of large NGOs. TNC decided to support the indigenous residents' demands for land, and not to support the mestizos. Similarly, in Río Plátano, the German development agencies and, originally, the U.S. Peace Corps played critical roles in pushing the Honduran government to declare publicly protected lands and in defining the environmental and developmental goals of a region about the size of the state of New Jersey. This is concerning.

When it comes to environmental protection, some assume that protecting biodiversity is above politics and something to be desired (and implemented) under any circumstances. Chapin (2004) spoke of the competing demands for forest conservation and development in his critique of collaborative arrangements between indigenous peoples and conservation organizations. Chapin noted that conservation organizations want to use indigenous peoples to promote their conservation agendas, but do not want in turn, to recognize indigenous peoples' demands for autonomy over their homelands. In the Mosquitia, I have heard from directors at two prominent conservation organizations that they do not want to get involved with tenure issues in the region because it's too political.

Environmental management is political. Any time someone places limitations and restrictions on who can use what lands and how it is a political act. It seems very reasonable that those individuals who will be most effected by the restrictions will find ways to object. The idea of matrix ecology is that different land uses can coexist while still meeting a region's ecological needs. Nevertheless, this does not eliminate conflict. Some resource-use decisions simply do not go hand-in-hand with conservation. Satisfying one group's or an individual's land-use demands will mean that some others'

demands may not be met. In future research, I would like to investigate how regional land-use goals are decided, who benefits and who loses in these regional plans, and the different venues that resource users have for voicing their demands. Future research in environmental management, and particularly frontier forest management, needs to carefully scrutinize how the goals are determined, whose demands are met by those goals, and who will suffer from the restrictions.

Endnotes for Chapter 7

ⁱ I did not discuss these findings in the dissertation, but it is important to note that in interviews the indigenous residents in Bosawas consistently expressed support for their territorial rights and the establishment of the territorial boundaries. Nevertheless, many also noted that within the territory they would like some individual rights to their landholdings. Many noted that they could not receive loans without individual titles. The political/economic limitations of living in a common-property system in a broader government system that primarily operates by recognizing individual rights is something I would like to examine in future research.

ⁱⁱ Both AFE-COHDEFOR and indigenous associations of Bosawas receive external assistance to manage their forest reserves. I argue that in Río Plátano, AFE-COHDEFOR (in conjunction with the Biosphere Project) opted to spend the money on other aspects of reserve management, not in investing in monitoring of reserve regulations. I argue that they made the decision not to invest in reserve monitoring. Note that AFE-COHDEFOR did at one time have approximately six forest guards to monitor the reserve. These guards were let go due to insufficient funds (a forest guard makes roughly \$60.00 a month). Nevertheless, the Biosphere Project is able to maintain its engineers, office space, conference meetings, and trucks (very few areas of the reserve are accessible by truck) in Tegucigalpa.

APPENDIX A

“MIGUEL QUESTIONNAIRE” STATEMENTS AND RESPONSE CATEGORIES

There is a man, Miguel (doesn't really exist), who says things about his opinions on land use in the community of _____. Are you (or the people in your household, generally in agreement with Miguel? 1) Yes agree; 2) somewhat agree; 3) do not agree; 4) don't know. Could be that you think otherwise. If disagree with Miguel, what do you think . . .

The following are Miguel's statements and the categories of responses given.

1. Miguel says that the forests are for all of the Miskito people and that only Miskito can use them.
 - a. Yes, Miskito only
 - b. Don't know
 - c. No, all Hondurans can use forest
 - d. Other
2. Miguel says that he wants an individual title for his agricultural plots.
 - a. Yes, individual
 - b. Yes, individual (but in conversation not really understand idea of title)
 - c. No, wants communal title
 - d. No, wants communal (but in conversation not really understand idea of title)
 - e. Don't know
3. Miguel says that wood is for subsistence use only, and not for commercial sale.
 - a. Yes, only subsistence
 - b. Don't know
 - c. No, should be able to sell some (for necessities)
4. Miguel says that if he had more money he would use it to buy cows. If yes, how many like (and how many have now).
 - a. Yes
 - b. Yes, but not too many
 - c. No
 - d. Buy cows and other things (not just cows)
5. Miguel says that you shouldn't put fences up because the people can't pass.
 - a. Yes, agree
 - b. No, need fences (later coded whether need fences for animals or specified to protect private property)
6. Miguel says that the community should care for/watch over the forests.
 - a. Yes, agree community
 - b. Should be each person watches over own (not necessarily community as a whole)
 - c. No

7. Miguel says that the community can prevent the entrance (settlement) of mestizos
 - a. Yes, can and are
 - b. Sometimes
 - c. No
 - d. Can, but aren't
 - e. Think they can (but actually hasn't happened yet—not a problem yet). Ie not permitted.
8. Miguel says it's important to him to have his own plot of forest land to cut wood and hunt (later asked why yes or no).
 - a. Yes, agree
 - b. No
9. Miguel says that sometimes it's necessary to sell land, but only in the case of necessity.
 - a. Yes, sell to anyone
 - b. Yes, but sell only to natives
 - c. Never sell
 - d. (wrote comments on necessity—what is considered “necessity”).
10. Miguel says that he would fight before letting anyone invade his land.
 - a. Yes
 - b. No
11. Miguel says that when someone sells land to a mestizo (or, in case of speaking to mestizo—someone not from the community), that the sale causes problems for the entire community.
 - a. Yes
 - b. Depends (depends on the person—not all outsiders bad)
 - c. No
12. Miguel says that the government should care for/watch over the forests.
 - a. Yes
 - b. Should support community
 - c. No, (then followed by either the community or the individual residents should be responsible for forests)
13. Miguel says that there is a lack of support on the part of the community for the care/vigilance of the forests.
 - a. Yes,
 - b. No
 - c. Other—this question was often misinterpreted to mean lack of support for the community (rather than by the community)
14. Miguel says that he should denounce someone who is destroying too much forest (then asked how much is “too” much and who the person would be reported to).
 - a. Yes
 - b. Depends
 - c. No
15. Miguel says that if a native neighbor doesn't have land, he would give (or loan) his neighbor a piece of land.
 - a. Yes
 - b. Depends on the person
 - c. No

APPENDIX B
SUMMARY OF “MIGUEL QUESTIONNAIRE” RESPONDENTS

Summary of Questionnaire Respondents in Río Plátano

Region	Community	Gender		Ethnicity				Total
		Female	Male	Miskito	Mix	Mestizo	Tawahka	
Ahuas	Paptalaya	8	13	20	1	0	0	21
Ahuas	Ahuas	21	19	40	0	0	0	40
Banaka	Banaka	9	15	23	0	1	0	24
Banaka	Branz	3	4	0	0	7	0	7
Banaka	Fuente de Jacob	1	1	0	1	1	0	2
Banaka	Ibila	1	4	5	0	0	0	5
Wampusirpe	Bodega	8	8	11	1	4	0	16
Wampusirpe	Raya	4	5	10	0	0	0	10
Wampusirpe	Wampusirpe	17	20	33	0	3	1	37
Total		72	89	142	3	16	1	162

Summary of Questionnaire Respondents in Bosawas

Region	Community	Gender		Ethnicity	Total
		Female	Male		
MSB	Wina	6	4	-	10
MITK	Pueblo Nuevo	2	6	Mayangna	8
Mestizo Buffer	Yapuwas	2	8	Miskito	10
Mestizo Buffer	Plis	2	4	Mayangna	6
Mestizo Buffer	Lacos	1	6	Miskito	7
Mestizo Buffer	Plisito	1	4	Mestizo	5

APPENDIX C

SUMMARY OF VARIABLES USED IN SIMULATIONS

Demographics

Population of Miskitu in Pueblo Nuevo 1995 (persons)	86
Population of mestizos in Pueblo Nuevo 1995 (persons)	8
Population of Miskitu in MITK 1995 (persons)	1100
Population of mestizos in MITK 1995 (persons)	8
Population of Miskitu in Plis 1995 (persons)	88
Population of mestizos in Plis 1995 (persons)	5
Population of Miskitu in mestizo territory 1995 (persons)	88
Population of Mestizos mestizo Territory 1995 (persons)	3800
Miskitu population estimated growth	3.5%
Mestizo population estimated growth	12.8%

Land Use

Crop land use by Miskitu (Ha/ person)	0.52
Pasture land use by Miskitu (Ha/ person)	0.04
Total land use by Miskitu (Ha/ person)	0.56
Crop land use by mestizo (Ha/ person)	0.41
Pasture land use by mestizo (Ha/ person)	0.97
Total land use by mestizo (Ha/ person)	1.38
Fallow time (years)	5
Crop time (years)	2
Growing rate in use of land by Miskitu (Model B)	2.17%
Growing rate in use of land by mestizos (Model B)	7.93%

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EDUCATION

Ph.D. Indiana University, Bloomington, 2007
Fields of Study: Political Science and Environmental Affairs

Dissertation Title: *Forest Governance in a Frontier: An Analysis of the Dynamic Interplay between Property Rights, Land-Use Norms, and Agricultural Expansion in the Mosquitia Forest Corridor of Honduras and Nicaragua*

Dissertation Committee: Elinor Ostrom (chair), Roger Parks, Matthew Auer, and Catherine Tucker

Comprehensive Exams: Environmental Policy, Public Policy, Theory and Methods

M.A. University of California, Los Angeles 2002
Field of Study: Urban and Regional Planning

Thesis Title: *Community Partners in Co-management: Creating Opportunities for Cooperation in the Río Plátano Biosphere Reserve*

Thesis Committee: J.R DeShazo (co-chair), Randall Crane (co-chair), Susanna Hecht, and Steve Commins

B.A. Whitman College, Walla Walla, Washington 1995
Field of Study: Politics (Minor in Spanish)

Honors Thesis Title: *The Cooperative as a Development Tool: Commercial Avenues towards Sustainable Development*

ADDITIONAL TRAINING

Institute on Qualitative Research Methods 2005
Consortium on Qualitative Research Methods, Arizona State University

International Forestry, Resources and Institutions (IFRI) Program Training 2002
Workshop in Political Theory and Policy Analysis, Indiana University

Agroforestry and Participatory Education Field Techniques 1996
CHP International, Costa Rica

FELLOWSHIPS, AWARDS & HONORS

IIE Fulbright Fellowship	2005-2006
National Science Foundation Dissertation Enhancement Grant	2005
Mendel Pre-dissertation Travel Grant	2004
Award for Best Paper in Human Dimensions of Global Environmental Change, SPEA Young Researchers Conference	2004
Award for Best Paper in Institutional Analysis and Development, SPEA Young Researchers Conference	2004
Tinker Foundation Travel Grant	2003
SPEA Graduate Student Fellowship for 3 years support	2002-2005
California Planning Foundation Graduating Student Merit Award	2002
Student Merit Fellowship, UCLA Dept. of Urban and Regional Planning	2001
B.A. with Honors, Whitman College	1995

TEACHING EXPERIENCE

Visiting Instructor/Assistant Professor, Seattle University <i>Environmental Studies and Public Policy</i> Appointment with Environmental Studies and Institute for Public Service. Teach undergraduate courses in: international environmental politics, sustainable development, and research design and statistics. Graduate course in public policy.	2006
Associate Instructor, Indiana University <i>Empirical Theory and Methodology</i> Team-taught International Resources, Forestry and Institutions (IFRI) research methodology to graduate students and visiting scholars.	2003
Teaching Assistant, University of California, Los Angeles <i>Global Environmental Politics</i> Graded papers and exams for undergraduate course.	2002
Teaching Assistant, University of California, Los Angeles <i>Statistical Analysis for Planning</i> Taught statistics labs to graduate students and graded exams.	2001

RESEARCH AND OUTREACH EXPERIENCE

Research Associate, Center for the Study of Institutions, Population and Environmental Change (CIPEC), Indiana University 2003 - present

Conducted cross-sectional analysis of the relationship between property rights and forest management in protected areas.

Research Assistant, School of Public and Environmental Affairs (SPEA), Indiana University 2002

Participated in meta-analysis research project investigating the degree to which minority and impoverished communities are subjected to higher levels of environmental pollution as compared to white communities.

Educational Outreach Coordinator, PACE Environmental Services, CA 2001

Designed and taught bilingual (Spanish/English) educational energy conservation workshops for Home Energy Assistance Program (HEAP).

Volunteer Coordinator, Peace Corps, Panama 1998-1999

Coordinated agroforestry and farmer-to-farmer extension seminars for Panamanian farmers. Supervised 15 agricultural extension volunteers.

Agro-Forestry Extension Agent, Peace Corps, Panama 1996-1999

Taught soil conservation techniques to indigenous and mestizo farmers. Created a nutrition program that reached 30 communities and over 300 women (and their children).

RESEARCH AND TEACHING INTERESTS

Principal field of interest is the interplay between international, national, regional and community governance arrangements for management of shared natural resource systems. Research focuses on how different property rights arrangements influence forest management and agricultural expansion in Central America.

Teaching Interests Include:

Environmental Policy

Common-Pool Resource Management
Conservation and Development

Property Rights and Land Management
Indigenous Resource Management
Matrix Approaches to Biodiversity
Conservation

Comparative Public Policy

Theories of the Policy Process
NGOs and Public Policy

Institutional Analysis
Civil Society and the Policy Process
International Aid, Conservation, and
Development

Methods

Research Design
Qualitative Methods

Participatory Rural Appraisal
Quantitative Methods

SCHOLARSHIP

I. Publications

- 2006 Hayes, T. M. "Controlling Agricultural Expansion in the Mosquitia: Does Tenure Matter?" *Human Ecology* (in press).
- 2006 Hayes, T.M. "Parks, People, and Forest Protection: An Institutional Assessment of the Effectiveness of Protected Areas" *World Development* (in press), Available on-line October 9, 2006.
- 2005 Hayes, T.M. and Ostrom, E. "Conserving the World's Forests: Are Protected Areas The Only Way?" *Indiana Law Review* (38)3: 595-617.

II. Manuscripts in Preparation

- 2006 Hayes, T.M., and Murtinho, F. "Indigenous Forest Reserves: A Means to Sustainable Forest Management or a Band-Aid Solution?" (Submitted to *Development & Change*, Sept. 2006)

III. Selected Research and/or Consulting Reports

- 2006 "Análisis de la Expansión Agrícola en Miskitu Indian Tasbaika Kum, Bosawas, Nicaragua" Technical report prepared for Miskitu association ADEPCIMISUJIN and Centro Humboldt, Managua, Nicaragua, March 2006.
- 2006 "Resumen Comunitario de Banaka: La Expansión Agrícola en el Río Plátano" Technical report prepared for community of Banaka and MOPAWI, Raista, Honduras, February 2006.
- 2005 "Análisis de los Vínculos entre los Derechos de Propiedad y la Conservación: Lecciones de la Biosfera Río Plátano, Honduras y la Biosfera BOSAWAS, Nicaragua" Technical report prepared for The Nature Conservancy, Tegucigalpa, Honduras, November 2005.

PROFESSIONAL PRESENTATIONS

- 2006 "Controlling Agricultural Expansion in the Mosquitia: Does Tenure Matter?" Paper presented at the annual conference of the Latin American Studies Association, San Juan, Puerto Rico, March 15-18, 2006.
- 2005 "Conserving the World's Forests: Are Protected Areas The Only Way?" Paper presented at the annual conference of the American Anthropological Association, Washington, D.C., November 30-December 4, 2005.

LANGUAGES

Spanish: speak/read/write with high proficiency

English: native language