

PRIVATIZING THE COMMONS?
A POLITICAL ECOLOGY OF MEXICO'S 1992 AGRARIAN REFORM IN QUINTANA
ROO, YUCATAN PENINSULA

By

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To Jean-Gaël and Chloë

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LIST OF ABBREVIATIONS

CFE	Community Forestry Enterprise
FDI	Forest Dependency Index
GTZ	German Society for International Cooperation (<i>Gesellschaft für Technische Zusammenarbeit</i>)
PA	Special Attorney's Office for Agrarian Affairs (<i>Procuraduría Agraria</i>)
PAI	Parcelization Attitude Index
PPF	Pilot Forestry Program (<i>Plan Piloto Forestal</i>)
PROCEDE	Program for the Certification of <i>Ejido</i> Land Rights and Titling of Urban Housing Plots (<i>Programa de Certificación de Derechos Ejidales y Titulación de Solares</i>)
QCA	Qualitative Comparative Analysis
RAN	National Agrarian Registry (<i>Registro Agrario Nacional</i>)
SEMARNAT	Secretary of the Environment and Natural Resources (<i>Secretaría del Medio Ambiente y Recursos Naturales</i>)
SERAI	Sale of <i>Ejido</i> Rights Attitude Index

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Neoliberal privatization policies bring the debate regarding the merits of private property over common property to the forefront. Exemplary of this global trend, Mexico's 1992 agrarian reforms opened up the country's vast network of common property regimes, known as *ejidos*, to the possibility of privatization. While many proclaimed that the 1992 reforms would lead to the disappearance of the *ejido*, now, almost 20 years later, *ejidos* are still fundamental to Mexico's rural landscape. This study examines both the material and ideological impacts of the 1992 reforms by examining land tenure institutions, land use and land cover change, as well as attitudes towards land privatization among *ejidos* and their members in southeastern Mexico. This study contributes to the field of common property studies by addressing a noted gap in research regarding how factors at varying scales combine to shape institutional and resource management outcomes within the commons. This study explores internal factors, including ideologies regarding land and resources, as well as external factors, including *ejidos*' historical, cultural and environmental contexts in order to gain a holistic understanding of how common property regimes respond to policy change.

Results demonstrated that the 1992 reforms did not lead to the conversion of *ejidos* to private property. Rather, *ejidos* exhibited varying institutional responses, ranging from maintaining common ownership to informal privatization. Ethnicity was a key factor conditioning *ejido* responses, with Mayan *ejidos* remaining collectively-held and Mestizo *ejidos* adopting, albeit informally, privatization schemes. This study also demonstrates that land tenure arrangements, with varying bundles of individual rights, relate to specific land use and forest cover change patterns. Survey and remote sensing data show that informally privatized *ejidos* had larger individual landholdings, more land in use, and higher rates of deforestation. Attitudes towards privatization and the sale of *ejido* membership rights varied among common property residents. I highlight two prevailing models of land and rights, one individual and one collective, that are shaped by land tenure institutions and individual characteristics, such as origin and ethnicity. In sum, this dissertation illustrates how macro-level policies are interpreted and re-configured by local actors to produce heterogeneous outcomes.

CHAPTER 1 INTRODUCTION

In 1992 Mexican President Salinas initiated a broad scale reform of Mexico's rural sector, amending the constitutional articles that had governed the country's vast formalized common property regime, known as the *ejido*, since the Mexican Revolution (1910-1917). As part of the 1992 reforms, the Mexican government instituted a program allowing – but not requiring– *ejidos* to distribute individually titled land to their members. In effect, Mexico's 1992 agrarian reforms shifted governance of the *ejido* and the resources within its holdings from the state to the local level, exemplary of a global trend towards decentralization of natural resource management and neo-liberal economic policies.

This dissertation details the political ecology of Mexico's 1992 agrarian reform through the investigation of the evolution of land tenure institutions, land use, land cover change, and local perceptions of forest dependence and land privatization within common property regimes in Quintana Roo, Mexico. The dissertation consists of three chapters to be submitted to peer-reviewed journals as independent papers. The first chapter (Chapter 2) examines land tenure arrangements among 27 common property regimes to determine drivers of land tenure change. The second chapter (Chapter 3) investigates the relationship between forest cover change, land use, property rights and forest dependency. The third chapter (Chapter 4) looks at varying attitudes towards privatization and *ejido* membership sales among *ejido* residents. The concluding chapter of this dissertation (Chapter 5) synthesizes the results of the three papers and discusses their relevance for scholars and practitioners.

In this introductory chapter I provide a summary statement of the problem this dissertation addresses, a historical context for the research, and an overview of the methods employed.

Statement of the Problem

This dissertation sounds in on a centuries-old debate regarding the conceptualization and efficiency of property rights regimes. Enlightenment thinkers, such as John Locke, argued that property rights were derived from a human's capability to transform land through labor, rather than linked to social hierarchy and divine right. In Latin America, different concepts of property emerged, distinctly shaped by indigenous tenure regimes and colonization. In the 20th century, property rights in Latin American were the center of political upheaval, revolution and reform, redefining once again concepts of land and ownership. Peasant-led land reforms, such as those following the Mexican Revolution, introduced the idea that land had a function beyond the needs and desires of its owner, which was to provide benefits to society, thereby justifying the expropriation of land by the state to fulfill these social functions (Ankersen and Ruppert, 2006).

Despite peasant upheavals and the emergence of new forms of property, such as Mexico's communal land grants, private, individual property continues to be viewed as a measure of civilization and a cornerstone of the nation building process (Craib, 2004; Scott, 1998). Private property has been considered by many as critical to economic growth, the expansion of capitalism and to providing incentives for increased efficiency, innovation and learning (de Soto, 2000; Ellsworth, 2002; North and Thomas, 1977). In contrast, common property rights over resources have been characterized by some as backwards, inefficient and leading to overexploitation (Hardin, 1968). In this vein, the

evolution of property rights is viewed as a linear process, from communal property to private property and from diverse customary systems to legible standardized units (Demsetz, 1967).

One of the most influential and often cited property rights theorists is Garrett Hardin, whose 1968 article in *Science*, “The Tragedy of the Commons” has provoked significant debate regarding property rights and natural resource management (Hardin, 1968). Hardin argued that human tendency is to overexploit common pool resources in pursuit of self-interest, even if destruction is the ultimate result. “Ruin is the destination towards which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all” (Hardin, 1968: 1244). Following this line of reasoning, individual rights are seen as the most efficient because they decrease the social and economic costs of individual gain seeking behavior, and in turn, lead to the greatest overall benefit to society. Communal forms of ownership are considered doomed to failure, as individual maximizing behavior and eventual resource scarcity would lead either to collapse or to the evolution of individual rights.

Throughout the 1970s and ‘80s, scholarship related to the commons challenged the validity of Hardin’s model. Scholars included anthropologists, political scientists, human ecologists, and economists. Hardin’s critics launched their attacks on several fronts, focusing on Hardin’s definition of common property, the dominance of the freerider problem in his human behavioral model, and the inevitability of the tragedy of the commons (Dietz, Dolsak, et al., 2002).

Hardin, and his followers, assumed that common property is equivalent to open access, that resources belonging to everyone, in essence, belong to no one (Smith, 1981). Accordingly, property rights are divided into two categories; those with rules, called exclusive rights or “private,” and those with no rules, called “public,” “communal,” or “common.” Hardin’s critics point out that this binary vision of property fails to acknowledge the continuum of institutional arrangements between private property and open access, and that this error leads to erroneous assumptions regarding natural resource management within the commons (Ciriacy-Wantrup and Bishop, 1975; Dietz, Ostrom, et al., 2003; Hanna, Folke, et al., 1996; McCay and Acheson, 1987). Bromley states:

The fallacy of the tragedy of the commons allegory is that in failing to understand property, and thus to see the world as dichotomous between open access (which is bad) and private property (which is claimed to be good), the commentators could leap from the presumption of destruction to the presumption of wise management, with one quick sleight of hand. (Bromley, 1989: 872)

In addition, common property theorists point out the overlapping nature of collective and individual rights within common property regimes, such that common property may be defined, in some instances, as “shared private property” (McKean, 1992: 251).

The tragedy of the commons model also assumes that “freerider” behavior would dominate, such that all users would seek to maximize benefits while externalizing costs to other users. In response, Hardin’s critics argued that the freerider problem was an “assurance problem;” one of individuals coordinating behavior around rules or norms within a context of uncertainty regarding others’ behavior (Runge, 1986). According to this mode of thought, “tragedy of the commons” scenarios do not necessarily result from

the freerider problem, but from “the inability of interdependent individuals to coordinate and enforce actions in situations of strategic interdependence” (Runge, 1986: 631).

Many early common property studies focused on how individuals and societies regulated behavior by means of internal institutions and provided evidence that the tragedy of the commons are, in fact, avoidable (McCay and Acheson, 1987). To provide just one example, in his seminal study of complex property systems in the Swiss Alps, Netting (1976) demonstrated that some resource characteristics, such as low productivity and high variability, led users to develop collective management strategies. In 1985, a National Science Foundation Panel on the Study of Common Property Resource Management created a common framework of analysis to facilitate communication across disciplines and to work towards a comprehensive and collective set of research findings (Dietz, Dolsak, et al., 2002). The process was very fruitful, leading to the publication of numerous articles and edited volumes that have since refined the study of common property (see Berkes, Feeny, et al., 1989; McCay and Acheson, 1987; Ostrom, 1990). These publications, in addition to a wealth of case studies on common property institutions, illustrated that common property institutions could successfully and sustainably manage their resources and examined the conditions that facilitated their success.

Despite evidence that common property regimes may provide economic, social and environmental benefits to communities in developing countries, Hardin’s “tragedy of the commons” model still provides a persuasive narrative in support of privatization. Property rights reforms, including privatization of common property regimes, remain high on the development agenda, with diverse objectives of poverty eradication,

economic development and improved natural resource stewardship. These neoliberal policy trends pushing for the privatization of common property regimes, such as Mexico's 1992 reforms, bring the debates regarding the merits of different property regimes to the forefront. Those in favor of individual titling and formal property rights claim that such reforms will regularize existing informal transactions and spur economic development (de Soto, 2000). Conversely, scholars have pointed out that titling efforts may, in fact, be the "wrong prescription" for poverty alleviation and may create new vulnerabilities (Bromley, 2008; Meinzen-Dick and Mwangi, 2008). The impact of property regimes and property rights reform on natural resource management is especially relevant, considering that an estimated twenty-five percent of forest resources are owned and or managed by communities worldwide (White and Martin, 2002), and in Mexico alone, 80% of forest resources are held collectively (Bray, Merino-Pérez, et al., 2005). Mexico's 1992 reforms, and the subsequent transformation of the *ejido* sector, provide an ideal opportunity to examine natural resource management, and their land use and land cover change outcomes, under various property rights regimes.

While the merits of diverse forms of property rights continues to be debated, it is clear that policy changes, such as property rights reform, have "inevitable consequences for power structures, institutions, livelihoods and physical landscapes" (Batterbury and Fernando, 2006: 1851). Whatever the intended goals of political change, such as Mexico's 1992 reforms, these consequences may vary significantly at the local level. Recent studies show diverse local responses to political and institutional change. Tsing (2005) examines how, in an increasingly globalized society, new global-local connections produce heterogeneous and unexpected outcomes, what she terms

“friction.” Agrawal’s study of environmental governance in India demonstrates myriad ways in which policy change alters local institutions, relationships between individuals, communities and the state, as well as between humans and their environment (Agrawal, 2005). Studies of Mexico’s post revolutionary and 1992 agrarian reforms provide rich accounts of how policies governing the rural *ejido* sector have been reinterpreted, re-negotiated, and ultimately, reshaped by local actors (Haenn, 2006; Joseph and Nugent, 1994; Nuijten, 2003; Perramond, 2008; Wilshusen, 2010). This dissertation seeks to contribute to this body of literature on local experiences of policy reform, by detailing community level and individual responses to Mexico’s 1992 reforms.

Historical Context of the Study

In this section I provide a brief account of the history of Quintana Roo, from pre-colonial to recent history. Through this chronological account, I highlight how human and environmental interactions in the study region are intertwined with struggles over access and control over resources, ethnic conflict, and struggles over meanings and interpretations of rights and resources. In this section, I focus on the pre-colonial and colonial periods, the post-Independence and Caste War era, and the early agrarian reform and regional development periods. Figure 1-1 shows a map of the study region.

Pre-Colonial Human-Environment History

The Yucatán peninsula is a transitional zone between tropical monsoon and tropical wet-dry climates (Foster and Turner, 2004). The region has shallow karstic soils, with very little aboveground water. Forest areas are considered wet-dry tropical forests, and are differentiated by upland forests and bajo forests (Bray and Klepeis, 2005; Foster and Turner, 2004). The forests are far from “pristine,” having been in use

by the Maya for thousand of years and exposed to severe weather events such as hurricanes and fires (Bray, 2004; Kiernan and Freese, 1997)

The ancient Maya reached the height of their civilization, in terms of population and extent of power, between 500-1000 AD (Foster and Turner, 2004). Foster and Turner suggest that the impact of such a high population density on the landscape was substantial, resulting in deforestation and proliferation of grasses and weedy species (Foster and Turner, 2004). The Maya “collapse” occurred sometime between AD 800 and 1000, and the region was virtually abandoned. The reasons for the collapse are still debated (Diamond, 2005; Foster and Turner, 2004; Hodell, Curtis, et al., 1995).

The first Spaniards to set foot on the peninsula were the unfortunate survivors of a shipwreck, the majority of whom were killed by the Maya upon arrival (Restall, 1997). One of two survivors, Gonzalo Guerrero, integrated into the Maya population and led a successful Maya resistance movement to Spanish invasion throughout the 1520s (Restall, 1997). Maya resistance was broken down due to disease and the disruption of trading with other populations by the Spanish, and the Spanish adventurer Francisco de Montejo was able to establish a colony in present day Mérida in the 1540s (Restall, 1997).

The Colonial Period

The Spanish conquest of the Yucatán was conditioned by several important factors that differentiated the conquest from other regions of Mexico and Latin America. The most important was the Yucatán’s lack of mineral wealth, rich soils and abundant water, as well as the existing social and economic structure of the Maya. The Spaniards soon discovered that the Yucatán lacked precious metals, had a harsh climate, and karstic soils unfavorable to agricultural production of traditional European

crops. In extracting surplus from existing peasant production systems, the Spaniards did not create or impose new agricultural production systems that would compete for resources or demand new forms of labor organization from peasants (Patch, 1993).

The continuation of pre-colonial agricultural production in the hands of the indigenous, and the slow development of external markets for goods by the colonists, resulted in the protection of indigenous production and land tenure systems. Little is known about pre-colonial Maya property rights; however, it is known that rights were not solely collective, but that individuals, kin groups or lineages could hold property apart from the village as a whole (Patch, 1993). During the early colonial period, Maya land tenure systems were maintained alongside and incorporated into the Spanish law, rather than subsumed (Patch, 1993).

The success of the Spanish colonization of the Yucatán was due to the fact that it “lived off Indian society without destroying it” (Patch, 1993: 92). This would change in the later colonial period. Throughout the early colonial period, there were two distinct spheres of production and social relations, the indigenous and the Spanish (Farriss, 1984). Farriss argues that the parasitic relationship of the colonizers enabled the survival of the Maya; indeed, in the last decades of the 18th century, the Yucatán had the highest proportion of indigenous population of the Mexican colonies (Farriss, 1984: 108).

The late colonial period, roughly framed by the latter part of the 18th and early 19th centuries, was characterized by a fundamental shift in the colonial production system from the control of peasant production systems to more intensive hacienda systems. Population growth and increasing external demands placed a strain on the peasant

agricultural production system. In addition, colonial and church systems traditionally used for extracting surplus from peasants, such as tributes and ecclesiastical taxes, were disintegrating. In response to both internal demands for foodstuffs and external demands for exportable raw materials, such as cotton, sugarcane and later henequen, landed estates turned to agricultural production to meet demands (Patch, 1993: 154). By the end of the colonial period, the hacienda became the mode of production in the Yucatán, resulting in the reorganization of labor, territory and indigenous production systems. “The European attack on the basic subsistence patterns of the Maya, which had not occurred in 1547, was finally to occur three hundred years later” (Strickon, 1965: 48).

Regional development was not homogenous, with most of the hacienda expansion occurring in the Northwest of the peninsula, incorporating Maya into the new production system by means of a burgeoning debt peonage system. Maya agriculture declined, with an increase in peasant laborers on the new haciendas and migration from Maya villages to haciendas in the late 18th century (Patch, 1993). The southeastern region remained undeveloped and sparsely inhabited by Maya continuing to practice small-scale agriculture independent of the new economic order. These communities were outside of the extent of the government’s reach at that time, and considered “unauthorized communities” (Patch, 1991: 58). Outside interests in this region were linked to the extraction of *palo de tinto*, or dyewood. Throughout the early colonial period, pirates as well as British and Spanish forces competed for the extraction of dye wood, but by the later colonial period the British controlled most of the dyewood economy (Bonfil, 1997).

Post Independence and Caste War Era

The spread of liberalism and Enlightenment ideas from Europe to the newly independent Spanish colonies in the early 19th century brought about changing concepts and laws regarding property rights and the rural economy. During the century following Independence and prior to the Mexican Revolution, the state asserted its control over territory by means of legislation designed to privatize land, and especially focusing on the dissolution of indigenous forms of property and colonization of *terrenos baldíos*, or unused lands. Legislation was supported by a growing state fixation with cartography and land surveying in order to legalize and standardize property boundaries, as well as a liberalist discourse favoring private property over collective (Craib, 2004; Patch, 1991).

The 1825 Law of Colonization built upon the Constitución de Cadiz (1812), seeking to modernize and liberalize property systems and the agrarian economy via the division of communal lands and colonization of *terrenos baldíos*. Racist sentiments permeated the regional liberal discourse regarding the inefficiency of the Maya system of communal land tenure, and bolstered new agrarian laws promulgating private property and colonization of *terrenos baldíos* (Patch, 1991; Tannenbaum, 1933). As a result of the ensuing land rush, eight hundred thousand hectares became private property, most of which was located in the sparsely populated, Maya dominated region of the southeast (Patch, 1991: 69).

The land rush in the southeast led ultimately to heightened control of land and resources by creoles, and further marginalized the Maya in this region. In 1847, the free Maya rebelled, and initiated one of Latin America's bloodiest and most successful indigenous rebellions. The Caste War has recently been viewed by scholars such as

Cline (1948), Patch (1991), and Reed (2001), as a struggle for land and access to resources, revising earlier accounts that cast the war as a racial issue (Patch, 1991: 53). The Maya effectively mobilized large groups, forged alliances with Belizeans to supply arms, and negotiated with the British, allowing them to enter Mexican territory to extract dyewood in exchange for cash and ammunitions (Bonfil, 1997).

The Caste War had a profound impact on the demographics of the region. A total of 300,000 people died during the Caste War, one half of the population of the Yucatán (Joseph, 1982: 22). Some areas were more heavily impacted than others. In the frontier zone of Quintana Roo, there were some 85,000 independent Maya in 1850. By 1900, this same region's population had dropped to 10,000 (Konrad, 1991: 146), most of whom were either rebel Mayas or *chicle* extractors (Aguelles, Aguado, et al., 2001; Bonfil, 1992). The Caste War is generally thought to have ended in 1901, when Quintana Roo was incorporated as a national territory, and the Maya headquarters at Chan Santa Cruz (today, Felipe Carrillo Puerto) were occupied by Mexican forces. However, the Maya rebellion would continue until the 1950s under the leadership of General Francisco May.

In the post Independence years, regional economic development was facilitated by legislation favoring private holdings concentrated in the hands of the elite, in addition to practices and discourse designed to control labor and repress indigenous resistance. The regime of Porfirio Díaz (1876-1910) instituted a nationwide movement towards economic "modernization." In Yucatán this meant development of the export driven henequen industry. The Yucatán's henequen industry had a virtual monopoly over the world's supply of fiber, a much-needed commodity for agricultural industries in the US.

Henequen sales made Yucatán one of the richest states in Mexico, and its profits supported the modernization of Mérida, and regional infrastructure improvements (Joseph, 1982).

With the high level of revenue generated by the henequen industry and the almost total involvement of Yucatán's population in the henequen sector, "by the turn of the century, the southeast was little more than a colonial appendage of the dominant henequen zone" (Joseph, 1982: 32). While partially due to biophysical conditions and market access, the spatial heterogeneity of henequen production was also a remnant of the Caste War, during which time many plantations were destroyed during the fighting or suffered from lack of labor to maintain production. The impact of the Caste War was felt especially in the southeast, where the destruction was more widespread and few plantation owners wanted to reestablish themselves in the rebel territory of Quintana Roo.

At this time, the southern region's economy was developing around the export of the sap from the chic-zapote tree (*Maniklara Zapota*) for chewing gum. In the last decades of the official Caste War and throughout the early 1900s, the Maya traded *chicle*, rather than hardwoods, for British ammunition, eventually taking control of smuggling routes (Forero and Redclift, 2006). In an attempt to promote territorialization by means of economic development, limit the expansion of relations between Maya and British Honduras, and regulate forest extraction, Porfirio handed out concessions for forest exploitation along the coast and the Rio Hondo. Both national and foreign companies were given concessions, some reaching 1 million acres (Bonfil, 1997). The new concessionaires recruited *chicleros*, or *chicle* tappers, from states such as Tabasco

and Veracruz, and, until 1919, the Maya maintained their position as suppliers and smugglers, with the *milpa* as their primary economic activity (Forero and Redclift, 2006).

The Mexican Revolution and Early Agrarian Reform in the Yucatán

By the end of the Porfiriato, land ownership was concentrated in the hands of the elite, with .2% of landowners controlling 87% of rural landholdings (Assies, 2008).

Some 15 million peasants, 95% of the rural population, remained landless (Thiesenhusen, 1996: 36). In 1910, a series of events, including protests over the re-election of Porfirio Diaz, the assassination of the elected President Madero and a *coup d'état* by General Huerta, sparked the outbreak of civil war, now known as the Mexican Revolution (Assies, 2008). It is considered the first “peasant war of the twentieth century” (Wolf, 1969), and resulted in approximately 1.5 million deaths between 1910 and 1917 (Assies, 2008).

The principle demands of the Mexican Revolution were “Land and Liberty (*Tierra y Libertad*)” and the restitution of lands claimed through the privatization of indigenous property and land concentration by elites during the prior century. The extent of the land reform following the Mexican Revolution in 1917 is a reflection of the breadth and intensity of the popular mobilization regarding land issues (de Janvry, Sadoulet, et al., 2001). Article 27 of the 1917 Constitution created a mechanism for the distribution of lands to peasants, and new forms of property ownership, which included state-held lands, private property and communal property. All land, water and natural resources were deemed part of the national sovereignty, thereby giving it the authority to expropriate large landholdings in order to restore and redistribute land to dispossessed indigenous and rural peasants. Communal property was designated as *pequeñas propiedades*, *ejidos* and indigenous *comunidades*. The *ejido* is, in essence, a

collective land grant given by the state to a group of organized peasants, with its own internal governance structure recognized by Mexican law. Between 1917 and 1992, access to land was granted to 52% of households via the *ejido* (de Janvry, Sadoulet, et al., 2001).

In post revolutionary Mexico, the concept of agrarian reform was not backed by a singular ideology. Rather, Mexico's leading intellectuals and policy craftsmen debated how the agrarian reform was to be carried out in the decades following the Revolution (Craib, 2004). The concept of *pequeña propiedad* was framed by the Constitutionalist ideology regarding agrarian reform, which juxtaposed small private landings, characterized by a Lockean view equating land, "sweat equity," capital and progress, with the hacienda, which represented injustice, backwardness and privilege (Joseph, 1982). The Zapatistas favored the restitution of indigenous lands via the collective *ejido*. Luis Cabrera, one of chief intellectuals behind the 1917 agrarian reform policy, tried to reconcile the Constitutionalist ideal of the *pequeña propiedad* with the Zapatista concept of the *ejido*. He saw the *ejido* as a steppingstone to *pequeña propiedad*, a means to educate indigenous and peasants in landownership, creating the new "*ejidatario* class" that would achieve the real goal of the Revolution, the establishment of small individual land holdings (Joseph, 1982).

In the Yucatán peninsula, the most prominent and active land reform administrations of Governors Salvador Alvarado (1915-1918) and Felipe Carrillo Puerto (1922-1924) were infused with the tension between conflicting visions of agrarian reform and struggles for control and access over forest resources. Carrillo presented a more radical socialist reform than his predecessor, based on the idea of peasant control of

the means of production and collective enterprise. Carrillo promoted the integration of the Maya into his revolutionary program (even speaking in Maya in his inaugural speech) and established the first *chicle* cooperatives in the south (Forero and Redclift, 2006; Joseph, 1982). Despite the ultimate failure of his socialist revolution, Felipe Carrillo Puerto remains today a great mythological hero of the Revolution, and a symbol who would be brought forth by various actors in years to come to gain popular support. Carrillo's successor as governor, Siurob (1927-1931), sought to reverse any further control given to the Maya over forest resources, and made it his mission to undermine the unauthorized Maya administration of General May. Siurob succeeded in 1929, and in a public ceremony, the Maya came under state administration (Forero and Redclift, 2006). According to Konrad, this period of federal insertion in the southern Yucatán peninsula, concomitant with the pacification of the Maya, led to deforestation as the territory was opened up to forest exploitation (Forero and Redclift, 2006; Konrad, 1987: 501 in).

President Lázaro Cárdenas (1934-1940) has been considered by many to be the first to bring the Mexican Revolution to the Yucatán. During his presidency (1934-1940), the Yucatán was the centerpiece of Cárdenas' land reform policies and political attention (Forero and Redclift, 2006).

Yucatán's physical and historical isolation from the rest of Mexico, the power still wielded by landowning families, the lack of heavy industry, and the high incidence of Maya monolingualism and rural poverty all added up, from the perspective of the national Cardenistas, to a backward region in need of 'Mexicanization' and modernization. (Fallaw, 1997: 13)

Cárdenas' vision for agrarian reform in the Yucatán was an economic, social and political transformation of the rural sector. At its heart, was the expropriation and redistributions of the henequen plantations as collective peasant enterprises in the north

and the formation of *chicle* cooperatives in the south. Unlike the former attempts to establish *chicle* cooperatives, Cárdenas tied the cooperatives directly to “collective *ejidos*.” These collective *ejidos* were part of seven legal forest reserves created by Cárdenas in 1935 (Forero and Redclift, 2006). Individuals were granted rights to 420 hectares within the reserve. In central Quintana Roo, ten *ejidos* were established between 1935-42, averaging 35,000 hectares (Bray and Klepeis, 2005). Cárdenas crafted a discourse merging a respect for the Maya tradition, especially their collective traditions and spirit of enterprise, while attempting to transform it and incorporate it into a centralized form of capitalism (Semo, 1993).

During Cárdenas’ administration some 20 million hectares were granted to over 800,000 peasants throughout Mexico (Thiesenhusen, 1996: 37). Despite these achievements, recent scholarship points to the ways in which *Cardenismo* was “compromised” in the Yucatán by struggles between regional elites and federal policies, by fiscal limitations to carry out agrarian reform, and by lack of a unified popular mobilization of rural and urban workers (Fallaw, 2001). In addition, anthropologist Alfonso Villa Rojas observed that what many historians have claimed to be apathy on the part of the Maya towards Cárdenas’ reform was actually resentment due to the inference of the federal government in Maya territory, in effect, “redistributing” what was never theirs to begin with (Villa Rojas, 1987: 202). “Undoubtedly, few states in the Republic have experienced such a disappointing history of agrarian reform as Yucatán” (Joseph, 1982: 297).

Regional Development

During the years following Cárdenas’ agrarian reform until the 1980s, extraction, production and commercialization of forest products, such as *chicle* and timber,

continued to be highly controlled by the state. The *chicle* boom started to decline after WWII, and by the 1950s, one half of the original *chicle* cooperatives were defunct due to mismanagement (Forero and Redclift, 2006). Commercial logging had begun in the southern Yucatán peninsula in the 1890s, and in 1940s and '50s, logging activity increased dramatically in the south and new areas in central Quintana Roo were opened for timber extraction in the late 1950s (Bray and Klepeis, 2005). The majority of the logging was carried out by parastatal companies (Bray and Klepeis, 2005).

In the 1960s and '70s, Quintana Roo and Campeche encountered a second wave of agrarian reform, colonization, and influx of government sponsored development projects. The *ejidos* established during this period were agricultural based and were smaller than the older *chicle* based *ejidos*, on average 20 ha per person (Bray and Klepeis, 2005). Large scale state led development projects, such as cattle ranching and rice cultivation, in concert with colonization efforts, led to increased deforestation and population growth, with the state's population increasing from 26,967 in 1950 to over 225,000 in 1980 (Instituto Nacional de Estadística Geografía e Informática, 2000). Few reaped the benefits of these development projects due to government mismanagement (Bray and Klepeis, 2005).

In the 1970s, as part of the state's modernization plan in the Yucatán, the federal government began developing the tourism industry in northern Quintana Roo to stimulate economic development, attract foreign capital and generate jobs (Clancy, 1999). National and foreign investment converted Cancun from a sleepy fishing village to a mega-resort, increasing annual visitors from 99,000 in 1975 to 3 million in 2005 (Secretaría del Turismo, 2006). Tourism has become the most important economic

activity in the state, accounting for some 47% of employment and over 37% of income generated (INEGI, 2004). In the past decade, several studies have examined economic and social impacts of tourism in Quintana Roo. These studies argue that tourism development, primarily focused in Cancun, has not spread economic development to peripheral areas as anticipated (Brenner and Aguila, 2002), and thus migration to work in larger tourism centers is necessary for locals to capture the benefits of development (Clancy, 2001). Short term and permanent migration from rural communities to tourist areas provides an influx of wage income and/or remittances from tourism to the rural sector, but also has consequences in terms of social relations and changing cultural meanings associated with traditional livelihood activities, such as the *milpa* (Juarez, 2002).

By the 1980s, the timber concessions granted to the parastatal companies ended, in part due to forest depletion and in part due to increasing pressure from *ejidatarios* who argued for the right to benefit from forest resources. In 1983, multiple institutions (including state and federal governments, the German Society for International Cooperation, formerly known as GTZ or *Gesellschaft für Technische Zusammenarbeit*, and foresters) created an innovative conservation and development program called the Pilot Forestry Program (PPF, *Plan Piloto Forestal*) for sustainable forest management. The goals of the program were to 1) establish permanent forest extractive reserves, 2) create enduring local institutions for forest management, 3) develop participatory models for sustainable forest management, 4) build organizational and technical capacity, and 5) create community forestry enterprises (CFEs) (Bray and Klepeis, 2005). Fifty *ejidos* joined the initial PPF program, and some 500,000 ha were

designated as permanent forest reserves (Arguelles and Armijo-Canto, 1995), 250,000 ha of which were established in central Quintana Roo alone (Bray and Klepeis, 2005). Bray et al. claim that this was “the first time in tropical America that communities had voluntarily declared an end to land-use change within their communities” (Bray, Merino-Pérez, et al., 2003: 675).

The *Plan Piloto Forestal* has been studied extensively (see Bray, 2004; Flachsenberg and Galletti, 1998; Galletti, 1998; Robinson, 2000; Taylor and Zabin, 2000) and even proposed as a model for community forest management throughout the world (Bray, Merino-Pérez, et al., 2003). The CFEs vary substantially in the region, both in forest quality and in their institutional arrangements, generating varying outcomes of success with the PPF. The economic benefits of forestry are dependent on the biophysical endowment of the *ejido*, which translates into their authorized annual timber volume. Kiernan argues that “the best stewards of forest among Quintana Roo’s *ejidos* are the larger ones, which hold sizeable production forests and significant endowments of higher-value wood species and *chicle*” (Kiernan, 2001). In addition, different management styles within the *ejido*, as well as internal and external land pressures affect the success of the CFE (Robinson and Gongora, 2000; Wilshusen, 2005).

The 1992 Agrarian Reforms

Scholars have argued that Mexico’s land reform ended with Cárdenas (Hellman, 1983; Thiesenhusen, 1996). They assert that the presidential administrations following *Cárdenas* incorporated the rhetoric of land reform and the ideals of the Mexican Revolution, yet their actions and policies favored the elite, provided few benefits to the rural sector and “slowed the process of land reform until the trend culminated in the

1980s...with a virtual abandonment of the *agrarista* commitment“ (Hellman, 1983: 92-93). The abandonment of the state’s commitment to agrarian reform was codified in the 1992 revision of the 1917 Mexican Constitution by the administration of President Carlos Salinas de Gortari. The 1992 reforms released the state from further responsibility to provide more land for the creation of *ejidos*, and lifted restrictions on *ejidatarios* to buy, sell and use *ejido* lands as collateral. This reform has been described as “the slaughter of one of the sacred cows of revolutionary iconography” (Craib, 2004: 256). Some scholars have referred to these reforms as Mexico’s “second agrarian reform” (de Janvry, Gordillo, et al., 1997) and “counter-reform” (Deere and Leon, 1998; Haenn, 2006). For this dissertation, I use the term “1992 reforms,” since the 1992 reforms do not have the same objectives as Mexico’s first agrarian reform, and the term counter-reform is quite value laden.

Mexico’s 1992 reforms are characteristic of the second wave of agrarian reforms in Latin America that followed in the wake of structural adjustment programs, bringing to an end the previous era of land reform and promoting the individualization of collective rights (Castillo, 2004; de Janvry, Sadoulet, et al., 2001). The proponents of Mexico’s 1992 reforms claimed that the liberalization of the rural sector and devolution of authority to the local level would increase rural participation in a more globalized Mexican economy, revitalize rural land markets and improve agricultural productivity (Ibarra Mendivil, 1996; Nuijten, 2003).

In order to implement the 1992 reforms, Salinas’ administration revised Constitution and the Agrarian Law (*Ley Agraria*), which governed the *ejido* sector, and created a program to facilitate the distributions of individual titles to *ejidatarios*, called

the *Programa Nacional para la Certificación de Derechos Ejidales* (PROCEDE, Program for the Certification of *Ejido* Land and the Titling of Urban Housing Plots), which ended in 2006. Through PROCEDE, *ejidatarios* had the option to 1) receive certificates to their share of common use land, 2) parcel all or some portion of common use lands, making them eligible for titling, and 3) receive titles to urban housing plots (*solares*) and/or agricultural parcels through the *ejido*'s decision to adopt *dominio pleno*. The revised Agrarian Law (Ley Agraria) was published on February 23, 1992. The main provisions are detailed below (adapted from the 1992 *Ley Agraria*):

- The government ended all distribution of federal lands for the creation of new *ejidos* (repeal of Article 2 of original Ley Agraria).
- *Ejidos* may certify *ejido* boundaries, and individual *ejidatarios* may obtain certificates of land rights via the voluntary participation of the *ejido* in PROCEDE. A meeting to decide on *ejido* participation in PROCEDE must have one half plus one of the total membership present. If the majority is not present, a second meeting is called without quorum requirements. Then, the *ejido* must vote with a two-thirds majority to participate in PROCEDE (Article 56).
- *Ejidatarios* with certificates of individual parcels may sell, rent, or mortgage land. The decision to sell individual parcels to outsiders must be approved by a two-thirds majority vote of the *ejido* council (Article 79, 80, 81)
- Once the majority of *ejido* lands are parcelized, that is once individual certificates are distributed to members, the *ejido* may decide to privatize these parcels (adopt *dominio pleno*, or fee simple) with a two-thirds majority vote of the *ejido* council. *Ejidatarios* may then solicit a property title for their parcel (Article 81, 82).
- *Ejidatarios* do not have to reside in the *ejido* or personally work the land to maintain membership rights. (Article 79)
- *Ejidatarios* can form associations or sub-groups within the *ejido* (Article 111). In addition, *ejidatarios* can associate with outside investors, by entering joint ventures or entering into production contracts (Article 100). This also includes the possibility of foreign investors, although foreign ownership is limited to 49% of the enterprise (Article 130).
- Limits on maximum property size were maintained in accordance with the original law. The maximum area for agricultural lands is 100ha, for forest lands 800 ha, and for grazing lands the amount needed for 500 head of cattle. Joint ventures

may not exceed the total amount of land allotted to *ejido* members participating in the joint venture (Article 126).

- *Ejidatarios* may transfer *ejido* membership rights to other *ejidatarios* or *ejido* residents. The spouse and children of the *ejidatario* have the first right of refusal (Article 80).
- Article 59 of the original *Ley Agraria*, stating that individual parcels may not be designated in forest lands, was maintained.

While the vast majority of *ejidos* nationwide entered into PROCEDE (26,227 *ejidos* as of 2005), few have fully privatized. As of 2007, fifteen years after the reforms, less than 10% of the *ejidos* have actually become fully privatized (Registro Agrario Nacional, 2007). In Quintana Roo, the majority of the state's *ejidos* entered into the PROCEDE program (87%), but most *ejidos* (98%) certified their common use areas, without certifying individual parcels (RAN, 2007).

Research has demonstrated that the reform's anticipated regularization and modernization of the *ejido* sector have not been realized (Cornelius and Myhre, 1998b; Craib, 2004; Nuijten, 2003; Stephen, 1998b; Zepeda, 2000). The lack of effectiveness of the reforms may be attributed to the following factors. First, the reforms do not address more fundamental problems of Mexico's rural sector, such as markets and subsidies, limiting the options for transformation of the rural sector (Dunn, 2000; Nuijten, 2003). De Janvry argues that some *ejidos* are better poised to modernize production systems, leading to greater differentiation among *ejidos* (de Janvry, Sadoulet, et al., 2001). Secondly, land ownership has socio-political and cultural dimensions that may run counter to the underlying economic rational of the reforms (Cornelius and Myhre, 1998b). Thirdly, land tenure practices (including land sales) have been developing and occurring outside of the legal framework in many *ejidos* since before the 1992 reforms and formalization efforts have failed to regularize these illegal arrangements (Nuijten,

2003; Perramond, 2008). Further, rich case study research of the reforms' adoption from across Mexico, such as studies by Nuijten (2003), Haenn (2006), Perramond (2008), demonstrate that the reforms have not been universally adopted, generating a wide range of local responses.

The overarching objective of this dissertation is to understand community and individual responses to the 1992 reforms in one region in Mexico. Given the geographic and cultural diversity of Mexico it is impossible to assume that policies will have the same impact in different localities, with their unique biophysical, historical and cultural contexts. Therefore, this dissertation does not attempt to generalize the impact of the 1992 reforms for Mexico as a whole. Rather, by focusing on one municipality in Quintana Roo, I seek to understand the local and uneven adoption of the 1992 reforms, as well as how local responses affect institutions, landscapes, and ideologies regarding land and rights to land. Specifically, I examine the following questions:

- How have *ejidos* responded to the opportunity to privatize, specifically in terms of changing land tenure institutions? (Chapter 2)
- What drivers (biophysical, cultural, political and economic) have led to different institutional outcomes? (Chapter 2)
- How are land tenure institutions correlated with land use and forest cover change within *ejidos*? (Chapter 3)
- How do different social groups within *ejidos* understand and value privatization and the sale of *ejido* membership rights? (Chapter 4)

Methods Overview

This dissertation is called a political ecology of Mexico's 1992 agrarian reform because it examines the interface of policy, humans and the environment. Political ecology has enriched our understanding of environmental change by looking at how

natural resource managers are constrained by near and distant political, social, and economic forces (Robbins, 2004; Schmink and Wood, 1987). Political ecologists highlight how individuals and groups experience and understand environmental, institutional and political change differently, resulting in plural outcomes and diverse frameworks to understand nature and society (Paulson and Gezon, 2004; Peet and Watts, 1996). Political ecology provides a conceptual starting point for this dissertation with the objective of understanding relationships among multiple and nested scales including the national policy arena (the 1992 reforms), the environment, local institutions (*ejidos*), communities, and their individual members.

In addition, this study seeks to address a recognized need for new methodological approaches to the study of the commons. The study of the commons has often been constrained by single case studies that limit the ability to reach general conclusions regarding cause and effect. Problems with identifying and assessing cause and effect are further compounded by the large number of variables affecting common property regimes (Agrawal, 2001). In response to these issues, Agrawal (2001) calls for structured comparative case studies, large purposive samples and statistical analyses to examine the strength and direction of causal chains. Another common criticism of the study of the commons is that they are overly focused on internal characteristics and processes. McCay and Jentoft emphasize “the importance of specifying property rights and their embeddedness within discrete and changing historical moments, social and political relations” (McCay and Jentoft, 1998: 21). I designed the study to incorporate these suggestions by: 1) including a large purposive sample common property regimes to understand drivers of land tenure change, 2) employing Qualitative Comparative

Analysis to systematically compare and assess causal relationships, and 3) examining the external context of common property regimes, as well as individual frameworks of meaning regarding land rights and resources.

Field Research

Field research was conducted from February 2008 through June 2009. Several exploratory trips to the region (May, August 2006, February 2007, Summer 2007) helped define research questions and establish contacts within communities, NGOs, government agencies and educational institutions (ECOSUR, *El Colegio de la Frontera Sur*, and UIMQRoo, *La Universidad Intercultural Maya de Quintana Roo*).

The study had three major components. The first component was an investigation of the land tenure status of 27 *ejidos* and their varying economic, biophysical, socio-cultural and political contexts. Methods employed during this research phase included semi-structured interviews with *ejido* leaders and key informants within the sample *ejidos* and in non-governmental and governmental agencies. In addition, I researched the archives within the National Agrarian Registry (RAN, Registro Agrario Nacional) and the Special Attorney's Office for Agrarian Affairs (PA, *Procuraduría Agraria*) to understand land tenure histories, the relationships between local institutions and agrarian reform agencies and resistance to the 1992 reforms. I also used secondary sources, including census data and forestry documents, to understand *ejido* level demographic characteristics and livelihood strategies. Results from this research phase are presented in Chapter 2.

The second component of the research was an in-depth study of eight of the 27 *ejidos* investigated in phase one. The objective was to gain a deeper understanding of land tenure arrangements and their contexts, as well as the underlying frameworks of

meaning surrounding rights and resources. I purposively sampled eight *ejidos*, to maximize variation among key variables such as land tenure status, ethnicity and involvement in community forestry. Within each *ejido*, I used RAN *ejido* membership lists as a sampling frame to randomly select 10% *ejido* member households to include in the study.

Data were collected using a structured survey of *ejido* members (Appendix A), with 90 items, and shorter survey of non-*ejido* members, usually the spouse or adult children of the *ejido* member, with 42 items (Appendix B). The surveys were written in Spanish, with some items translated into Maya. I trained Mexican research assistants, including four undergraduate students from UIMQRoo, to conduct interviews. Several of the trained assistants were bilingual (Spanish and Maya) and conducted interviews in Maya. Between November 2008 and June 2009, we interviewed 194 *ejidatarios*, and an additional 158 *ejido* residents. The structured surveys yielded quantitative data on landholdings, land use, economic activities and income from forestry activities, in addition to ethnographic data on interviewees' perceptions of privatization, the sale of membership rights and forest resources. Results from this phase of the research are presented in Chapters 3 and 4.

The third component of the research was the study of relationships between land tenure, resource management and forest cover change. The objective was to investigate the link between the institutional environment and forest cover change within the 8 sample *ejidos*. This part of the study combined an analysis of forest cover change over a period of 26 years (1984-2010) within eight *ejidos*, land use histories compiled from semi-structured interviews with key informants, and perceptions of forest

dependency among 354 *ejido* residents. I collected approximately 275 training samples in eight *ejidos*, sampling *ejido* lands either by car or by foot with a local guide who also provided land use, land history and institutional information for each data point. These research findings are presented in Chapter 3.

Description of Survey Respondents

Of the 352 people interviewed, 194 were *ejidatarios* and 158 were members of an *ejidatario*'s household. Fifty-three percent of the respondents were men and 47% were women. The average age of respondents was 50.33 years (range 16-94). The majority of respondents were from Quintana Roo (70.4%), while 17.3% were from Yucatan state, and 12.3% were from other states, including Tabasco, Veracruz, Michoacán and Chiapas. The average time living in the *ejido* was 41 years (range 0-83). Forty-five percent of respondents spoke Maya, 27% were bilingual, and 28% spoke Spanish. Most respondents (73.6%) had primary education or less. Just 20.6% of respondents had some secondary education, while 5.8% had received a high school education or beyond. The majority of respondents were catholic (70.1%), 20.1% were part of another religious group (evangelical or protestant) and 8.9% had no religious affiliation.

Among the *ejidatarios* interviewed, the average age was 54.22 years (range 16-94). The average number of years as an *ejidatario* was 27.3 (range 0-65). Ninety-two percent of *ejidatarios* interviewed were male. Of the *ejidatarios* interviewed, 15.2% were among the *ejido*'s founders, while the majority received their membership rights after the foundation of the *ejido* (65.2%). Sixteen percent of respondents inherited their membership rights from a family member. Three respondents reported buying their *ejido* membership right and three reported receiving the membership right after a family member ceded their membership right.

Data Analyses

The mixed method approach of this dissertation required a variety of data analysis techniques. Statistical analyses of secondary data and interview data were conducted using SPSS. In addition, I constructed three indices to measure forest dependency (Forest Dependency Index, FDI), attitudes towards parcelization (Parcelization Attitude Index, PAI), and attitudes towards the sale of *ejido* membership rights (Sale of *Ejido* Rights Attitude Index, SERAI). The scales were constructed through an iterative process. First, I solicited indicator statements for the three domains of interest from key informants through freelists and semi-structured interviews. Next, I worked with bilingual (Spanish/English and Spanish/Maya) speakers to refine and translate indicator statements. Then, I pilot tested the indicator statements in three communities that were fairly representative of some of the sample *ejido* variation (forestry vs. non-forestry, Maya vs. Mestizo, and parcelized vs. commonly-held). I used a convenience sample of a total of 78 *ejidatarios* in the three communities. After collecting the pilot data, I conducted reliability and factor analyses in SPSS to test the unidimensionality of the scale and to reduce the number of indicator statements. Both the FDI and PAI were reduced to 8 items each, and the SERAI was reduced to 6 items. The three scales were included in both the *ejidatario* and household member questionnaires. Once data were collected, I ran reliability and factor analyses once again with the objective of reducing items to improve the scales' reliability. Results for the Forest Dependency Index (FDI) are presented in Chapter 3, and PAI and SERAI results are presented in Chapter 4.

I employed Qualitative Comparative Analysis (QCA) to examine which conditions affect land tenure outcomes in Chapter 2. QCA is an analytical strategy that combines

case study research with quantitative variable-oriented research to unravel causal relationships (Ragin, 2000). Data were analyzed using fsQCA, a software designed specifically for QCA (Ragin and Drass, 2006).

Land Use Land Cover Change (LULCC) analyses were used to investigate forest cover change among eight study *ejidos*. The dissertation uses LULCC analyses of the study region for years 1984 and 2000 previously conducted by Dr. Edward Ellis. Dr. Ellis then updated the analyses for a second time period, 2000-2007/2010, using Landsat 7-ETM images from December 5, 2007 and February 28, 2010. Land use and land cover data were derived from supervised classification image processing procedures based on 275 GPS ground truthing points collected in the field between 2008 and 2009.



Figure 1-1. Map of Quintana Roo, Mexico.

CHAPTER 2 PRIVATIZING THE COMMONS? OUTCOMES OF MEXICO'S 1992 AGRARIAN REFORMS IN SOUTHEASTERN MEXICO

Changes to Article 27 of Mexico's Constitution, allowing the privatization and sale of previously inalienable communal lands, sent a thunderbolt through rural production systems in that country. These changes shook the foundations of Mexico's revolutionary pledges to provide for the rural poor, and indicated the nation's commitment to open market property ownership. This chapter investigates Mexico's 1992 agrarian reforms with the analysis of land tenure changes among 27 common property regimes, known as *ejidos*, in the municipality of Felipe Carrillo Puerto, Quintana Roo, Mexico. We investigate how *ejidos* have responded to opportunities to privatize communal land, with a focus on the drivers of different land tenure outcomes.

Specifically, we investigate the following questions:

- How have *ejidos* responded to the opportunity to privatize, specifically in terms of changing land tenure institutions?
- What factors influence the willingness of *ejidos* to privatize?
- What is the role of ethnicity, livelihood strategies, and *ejido* demographic and biophysical characteristics in shaping institutional responses?

This study builds upon previous research into the ways in which macro-level policies are interpreted and shaped by local actors and their historical, political, economic and biophysical contexts (Agrawal, 2005; Batterbury and Fernando, 2006). We explore institutional outcomes of Mexico's 1992 reforms in an attempt to understand informal land tenure arrangements within Mexico's *ejidos*, and to examine how nationally implemented property rights reforms are filtered by local characteristics. In particular, we investigate hybrid land tenure arrangements within 27 *ejidos* following Mexico's 1992 agrarian reforms. We present a property rights continuum to

characterize hybrid arrangements that combine elements of common and private property regimes to form a complex mosaic of rights and resource management regimes. Using Qualitative Comparative Analysis we examine how ethnicity, livelihood strategies and demographic and biophysical characteristics interact to determine these distinct hybrid property regimes. Based on quantitative and qualitative evidence, we argue that ethnicity is a critical factor in land tenure outcomes, acting in concert with historical contexts of *ejido* foundation, land use and management strategies, and relationships between local actors and the state to shape responses to the 1992 reforms.

In addition to theoretical interest in land tenure reform and local responses to policy implementation there is also a practical need for such research. Property rights reform and land titling programs are increasingly viewed as prescriptions for development (Broegaard, 2009), and yet reconciling existing, and often, informal land tenure arrangements with formal property regimes remains an elusive task for development agencies (Unruh, 2006). This research aims to provide insights to improve our understanding of the diverse impacts of Mexico's 1992 reforms. In doing so, it seeks to identify potential points of friction between formal land titling programs and local realities, as a means to help improve development initiatives targeting land reform.

This chapter is organized into four parts. In the first section, we discuss Mexico's 1992 reforms, highlighting the tension between the predicted response of the *ejidos* to the reforms and the unevenness and complexity of the reforms' adoption by *ejidos*. The second section describes the study site and methodology. The third section details

findings and analysis. Here we present a property rights continuum in order to describe land tenure arrangements found in sample *ejidos*, as well as the results from our analysis of the varying factors influencing those land tenure outcomes. In the final section, we present our discussion of the results and conclusions.

Mexico's Agrarian Reform

In 1992, President Salinas initiated the reform of the 1917 Constitutional amendment, Article 27. One of the hard-fought prizes of the populist-led Mexican Revolution, Article 27 created a mechanism for the distribution of lands to peasants, and new forms of property ownership, including the collective land grants known as *ejidos*. Mexico's original agrarian reform mandated one of the biggest and longest lasting experiments in common property management that devolved over 50% of the nation's arable land to peasants and provided access to land to some 52% of households between 1917 and 1992 (de Janvry, Sadoulet, et al., 2001). All land, water and natural resources were deemed property of the state, thereby giving it the authority to expropriate large land holdings in order to restore and redistribute land to dispossessed indigenous and rural peasants. Up until the 1992 reforms, *ejido* members, called *ejidatarios*, retained collective land rights, but did not have alienation rights, nor could they legally attain individual land titles.

Mexico's legislative change in 1992, here referred to as the 1992 reforms, came in the wake of structural adjustment programs and a neoliberal turn in government that brought to an end the previous era of land reform, and promoted the individualization of collective rights (Castillo, 2004; de Janvry, Sadoulet, et al., 2001). Specifically, the revision of Article 27 released the state from further responsibility to provide more land for the creation of *ejidos*, and lifted restrictions on *ejidatarios* to buy, sell and use *ejido*

lands as collateral (Ley Agraria, 1992). The proponents of the 1992 reforms claimed that the liberalization of the rural sector and devolution of authority to the local level would allow peasants to participate more freely and engage in the benefits of a globalized Mexican economy, revitalize rural land markets and improve agricultural productivity (Assies, 2008; Ibarra Mendivil, 1996; Nuijten, 2003). In addition, proponents hoped that, by legalizing privatization, informal *ejido* land tenure arrangements would be regularized (Assies, 2006). Critics feared that the legislative changes would bring about the re-concentration of lands in the hands of the elite, exacerbating social inequality, urban migration and environmental degradation in rural Mexico (Bray, 1996; Cornelius and Myhre, 1998c).

The Mexican government created a program to facilitate the distributions of individual titles to *ejidatarios*, called the Program for the Certification of *Ejido* Land Rights and Titling of Urban Housing Plots (PROCEDE, *Programa de Certificación de Derechos Ejidales y Titulación de Solares*), which ended in 2006. Through PROCEDE, *ejidatarios* had the option to receive certificates to their share of common use land, to receive titles to urban lots (*solares*), or to parcel all or some portion of common use lands and receive individual titles. While the vast majority of *ejidos* entered PROCEDE (87% as of 2005), few have fully privatized. As of 2007, fifteen years after the reforms, less than 10% of the *ejidos* had actually become fully privatized (Registro Agrario Nacional, 2007).

Evidence from Mexico has shown that formal privatization efforts have not been fully embraced (De Ita, 2006; Goldring, 1998; Nuijten, 2003; Perramond, 2008). Studies point to varying outcomes of the 1992 reforms, including the resilience of common

property regimes, the co-existence of *de facto* and *de jure* property regimes, and the emergence of hybrid property regimes that combine aspects of private and common property regimes (Barnes, 2009; Barsimantov, Racelis, et al., 2010; Nuijten, 2003; Perramond, 2008; Wilshusen, 2010). Other factors may explain lackluster response to privatization, including economic and environmental constraints. High transaction costs of formalizing property regimes may not be compensated by the benefits of exclusive, individual rights (Muñoz-Piña, de Janvry, et al., 2003). Thompson and Wilson (1994) argue that in areas of low agricultural productivity and high environmental variability, such as in the arid regions of Northern Mexico, the persistence of commons regimes over privatization is a rationale and efficient response. De Ita claims that “the lack of interest in titling...can be related to cultural and historical criteria, and not only to commercial ones” (De Ita, 2006: 158). Perramond (2008) argues that regional geographic and socio-economic factors differentiate privatization processes.

Property rights scholars have argued that formalization efforts, such as the 1992 reforms, are not implemented in an institutional void; rather, they are often superimposed upon complex, localized and informal land tenure institutions (Meinzen-Dick and Mwangi, 2008; Unruh, 2006). In these cases, “new legislation...interferes with existing property rules and property relationships. Whatever the introduction of new property forms may have, they will always be shaped by the historically grown property regimes” (Benda-Beckmann and Benda-Beckmann, 1999: 2; in Nuijten, 2003: 494). Local context, including existing land tenure arrangements, history, socio-political dimensions, cultural norms, and resource characteristics, may influence the response of actors and institutions to formalization efforts (Baland and Platteau, 1998). As a

consequence of varying concepts of property and pre-existing informal land tenure arrangements, agrarian reform is played out in a multi-linear, oftentimes conflictive process.

Study Site and Methods

The objective of the study was to examine institutional responses, in terms of land tenure arrangements, to the 1992 reforms and to analyze factors influencing these outcomes. We chose Quintana Roo, where many *ejidos* have entered into the PROCEDE program (87%), but the vast majority of these *ejidos* (98%) only certified their common use areas without titling individual parcels. The state's low adoption rate of formal individual land titling (less than 2% of the state's *ejidos*) (RAN, 2007), in concert with its large indigenous population and presence of collective forest management, allow us to explore localized processes of the 1992 reforms and the drivers of varying land tenure outcomes. We selected a sample of 27 *ejidos* from the 56 *ejidos* in the municipality of Felipe Carrillo Puerto, Quintana Roo (Figure 2-1). A purposive sample was chosen to maximize variation among key independent variables such as ethnicity, livelihood strategies and *ejido* size.

Ejidos vary in terms of land tenure status, size, ethnicity, origin, and livelihood strategies. Key characteristics of sample *ejidos* are presented in Table 2-1. Two periods of *ejido* formation differentiated these *ejidos* by not just ethnicity, but also livelihood strategies, area and ratio of land to *ejido* members. First wave *ejidos*, or those established in the decades following the Mexican revolution, were primarily established for groups of people living in forested areas that subsisted on *chicle* production. Most of these inhabitants were traditional Mayan populations that had inhabited the region since the mid to late 1800s. Second wave *ejidos*, or those

established in the 1960s and 1970s, were smaller *ejidos* designated for agricultural production. Primary beneficiaries of these *ejidos* were migrants from Central Mexico, where land scarcity and population expansion put pressure on the national government to create agricultural *ejidos* in other parts of the country.

Data were collected through secondary sources and interviews with key informants. Secondary data included recent census data, archives in the National Agrarian Registry (*Registro Agrario Nacional*) and the Special Attorney's Office of Agrarian Affairs (*Procuraduría Agraria*), and forestry permits from Mexico's Secretary of Environment and Natural Resources (SEMARNAT, *Secretaría del Medio Ambiente y Recursos Naturales*). We conducted interviews with key informants to determine existing land tenure arrangements within each of the 27 *ejidos* and to gather data on natural resource management, livelihood strategies, *ejido* governance and response to the 1992 reforms. In addition, we conducted interviews with key informants in government institutions and non-government forestry agencies to gain a broader regional picture of land tenure changes and forestry activities.

We used data from key informants to characterize land tenure arrangements among sample *ejidos*. We then employed Qualitative Comparative Analysis to examine how *ejido* characteristics influence land tenure arrangements. Qualitative Comparative Analysis (QCA) is an analytical method which marries an in-depth case study approach with variable oriented, quantitative methods, for the purpose of unraveling causal complexity (Ragin, 1987). QCA uses the fundamental mathematical concept of set theoretic relations to explain the relationships between social phenomena. Set theoretic

relations are nested and therefore asymmetrical. For example, *ejidos*, private landholdings and conservation areas are subsets of property types in Mexico.

QCA was chosen to better understand the relationship between land tenure outcomes and their drivers because of three major benefits. First, QCA was designed for small-n studies, making “it possible to establish a measure of empirical intimacy with cases and at the same time to formulate generalizations” (Ragin, Shulman, et al., 2003: 324). Secondly, QCA emphasizes the combined effects of causation, meaning that outcomes are most likely determined by a combination of conditions and that there may be multiple causal pathways leading to the same outcome (Ragin, 2008). Thirdly, QCA highlights the role of empirical knowledge from the cases themselves in providing external input and criteria to calibrate quantitative measurements.

Given a defined outcome of interest, in our case land tenure arrangements, the first step was to determine, theoretically and empirically, the causal conditions of the outcome. Based on a review of common property literature and data gathered through interviews with key informants, we determined causal conditions of land tenure outcomes (e.g. privatized or commonly-held) to include ethnicity, *ejido* size (both in terms of area and ratio of land to *ejidatario*), and forest dependency. In essence, these conditions represent subsets of *ejidos*, for example, large *ejidos* vs. small *ejidos* or Mayan *ejidos* vs. Mestizo *ejidos*.

We operationalized these conditions on the following criteria:

- Ethnicity: *ejidos* were scored with regards to their membership to the set of “Maya *ejidos*” based on census data regarding the percentage of inhabitants speaking an indigenous language in each *ejido* and archival data on the origin of *ejido* members. We calibrated data using ethnographic data from key informants concerning self-reported ethnicity and origin of *ejido* residents and the presence of

indigenous resource management practices. The resulting sub-sets of *ejidos* were Mayan *ejidos* and Mestizo *ejidos*.

- Forest dependency: combines secondary data reporting authorized timber harvest volume per *ejido* member, where higher volumes per *ejido* member indicated higher levels of forest resource dependency, with data from key informants regarding the importance of forestry as a livelihood strategy. The resulting sub-sets of *ejidos* were forestry and non-forestry *ejidos*.
- Size: based on the total area of *ejido* lands in hectares. We labeled the resulting sub-sets big and small *ejidos*.
- Land ratio: indicated the ratio of total *ejido* land per *ejido* member in hectares. The resulting sub-sets were those with high ratios of land per *ejido* member and those with low ratios of land per *ejido* member.

Next, we combined quantitative indicators with qualitative case study knowledge to evaluate each *ejido* as to how much they belonged to the defined subsets (e.g. Maya vs. Mestizo, forestry vs. non-forestry, big vs. small, and high ratio vs. low ratio of land per member), assigning *ejidos* a membership score for each of the causal conditions. We employed “fuzzy set” measurements that allow for degrees of membership, with scores ranging between 0 and 1, where 0 indicates non-membership and 1 indicates full membership. The mid-point score of .5 denotes maximum ambiguity of membership, neither in nor out (Ragin, 2008). Fuzzy sets provide more nuanced measurement tools that allow for degrees of membership, rather than simply presence or absence. For example, in our study, an *ejido* may not be easily categorized as Mayan or Mestizo, but rather may exhibit some characteristics of traditionally Mayan *ejidos*, e.g. most members originated from Quintana Roo, and not others. Fuzzy sets were calibrated both quantitatively and qualitatively, with cut-off points qualitatively assessed using both theoretical and empirical evidence about the specific cases in the study.

To quantify land tenure outcomes, we created fuzzy membership scores for the 27 *ejidos* based on their land tenure typology. The scores ranged between 0 and 1.0,

where a score of 0 indicated non-membership to the set of privatized *ejidos*, and 1.0 indicated full membership to the set of privatized *ejidos*. Thinking in terms of a continuum of property rights, with collective rights on one end and individual rights on the other, a 0 would indicate an *ejido* on one pole (common) of the continuum, where a score of 1 would be given to an *ejido* that fell on the opposite pole (individual) of the continuum.

Once membership scores were determined for the outcome (land tenure arrangements) and causal conditions, we used the software program fsQCA (Ragin and Drass, 2006) to create two models of land tenure outcomes, “common” and “private.” For each model, we analyzed configurations of causal conditions for the given outcome, assessed the distribution of cases across possible combinations, and excluded configurations that did not meet frequency and consistency thresholds. The frequency threshold assesses the relevance of each combination of causal conditions based on the distribution of cases across the possible configurations. Given the relatively small sample size (n=27), we used a frequency threshold of 1. The consistency threshold assesses the proportion of cases within each configuration that displays the outcome, where a low proportion of cases with the given outcome indicate that the configuration may not be considered a subset of the outcome. We used the fsQCA standard consistency threshold of .80 in our analyses.

The ultimate goal of the fsQCA models was to determine which conditions (e.g., ethnicity, forest dependency, *ejido* size and land ratios) are necessary and/or sufficient to produce a given outcome (e.g., privatized or commonly-held land tenure arrangements in this case). Necessity means that a condition must be present for the

outcome to occur. Sufficiency means that when a condition is present, a given outcome occurs; however, the same outcome may also occur in the absence of the condition due to the presence of other causal conditions. It is often difficult to find cases of perfect necessity or sufficiency; therefore, it is important to consider the relative frequency of cases.

Results

Land Tenure Arrangements: A Property Rights Continuum

Before presenting our findings, it is important to clarify the terms used to describe property arrangements. We consider land tenure to consist of a “bundle of rights” that may be allocated individually or collectively, including use, management, exclusion and alienation (Schlager and Ostrom, 1992). Therefore, a land tenure arrangement embodies some configuration of these rights. By common or communal, we denote land belonging to a public entity, in this case the *ejido*, and a bundle of rights that are allocated collectively. By private or individual, we denote land that is appropriated by an individual or group of individuals, and is therefore, no longer available to the public. In this case, the bulk of rights are allocated to individuals. Some rights may still be held collectively, such as alienation rights, as we demonstrate below. The process by which a public land becomes private can be a state-led process, such as formal titling, but can also signify the individual appropriation of a land by means of local authority or local institutional recognition. In this study, the term privatization is used to describe both formal and informal processes of individual appropriation.

Results from this study demonstrate that property rights within the sample of 27 *ejidos* in the municipality of Felipe Carrillo Puerto were neither wholly common nor wholly individualized. Rather, we found a continuum of property rights with hybrid

arrangements of communal and private ownership. None of the *ejidos* in our study undertook the legal process to title individual holdings. Of the 27 *ejidos* studied, eight *ejidos* had informally privatized more than 50% of *ejido* lands following the reforms. Nineteen *ejidos* maintained communal ownership, in some cases along with quasi-private spaces.

In Figure 2-2, we depict a continuum of property rights arrangements that range from common property regimes on the far left of the continuum to individually-held, or privatized, property regimes on the far right of the continuum. The arrangements in between these two extremes represent varying kinds of hybrid common-private arrangements that will be described more below. Each square represents the *ejido*, with the small square in the lower left-hand corner representing the residential area. Residential areas are comprised of household lots, called *solares* that are recognized by the *ejido* authorities and community, and in some cases, residents may also be granted legal titles to the residential lots. The gray zones in types A-C depict common use areas. Legally recognized communal forest reserves are located in the top right corner of the polygon. Table 2-2 describes the configuration of use, management, exclusion, alienation rights, or “bundle of rights,” allocated to individuals within each property right type. In the next section, we describe in more depth these property regime typologies and their bundles of rights, as well as report the distribution of sample *ejidos* along the property rights continuum.

Type A represents an *ejido* in which all lands are commonly held, including both agricultural areas and forest reserves. Common use areas may be designated for collective resource management, such as forestry. Individuals may retain the right to

extract resources from common use areas, including firewood, non-timber forest products, as well as timber for residential construction. However, management, exclusion and alienation rights are collectively held. This represents the most stereotypical version of common property regimes, such that all areas are considered open access. In fact, in the 27 *ejidos* studies, none conformed to this stereotypical model.

In Type B, parts of the common use area may be claimed by *ejido* members or rented to community residents for agricultural use. (In this model, dotted circles represent temporary cultivation areas). This represented the most common form of land tenure found among sample *ejidos*, with 70% (19 *ejidos*) percent fitting this typology. Typically, individual parcels are used for 3-5 years, in accordance with traditional slash and burn agricultural practice in the region. Temporary use rights tend to be informally recognized by the *ejido* authorities. In some cases, *ejidos* employ a more formal process for requesting temporary use rights from the *ejido* general assembly. Among Type B *ejidos*, we found that in predominately Mayan *ejidos*, family groups informally claimed cultivation areas for longer periods of time. In some cases, these areas were referred to as *ranchos* which may be passed down through the generations. However, ownership did not imply exclusion in these cases. Other *ejido* members could access firewood and other products within cultivation areas, and possibly use abandoned plots within the larger cultivation area with or without permission of the family group. In sum, individuals may retain use rights and in some cases management rights, however; exclusion and alienation rights are held collectively.

The establishment of permanent agricultural parcels (depicted as solid polygons within common use areas) differentiates Type C *ejidos* from Type B. In our sample, 2 *ejidos* (less than 10% of the sample) conformed to this typology. This represents the co-existence of common and private spaces within what are legally considered common use areas. In these cases, *ejido* members or households are granted *de facto* “ownership” rights to a specific area for an unspecified period of time. As with temporary parcels, *ejidos* employ a range of methods for requesting permission, and no legal documentation is granted to the rights holder; however, local institutions may recognize and in some cases provide documentation of individual rights. In these parcels, individuals may invest in more than typical *milpa* agriculture. Permanent parcels may include pasture, with improvements such as the cultivation of specific grass species and fencing, as well as agro-forestry plots with citrus and timber species. While members are considered owners and they have the right to exclude certain activities from their land, they do not have alienation rights over the land itself. However, if the *ejidatario* decides to cede his or her membership to the *ejido*, the use and *de facto* ownership rights to the parcels transfer with the membership right. Among type C *ejidos*, individuals may hold use, management and even some exclusion rights. We considered these *ejidos* as falling on the private or individual side of the property rights continuum as the *de facto* privatized parcels made up 50% or more of what was considered common use area.

As *ejidos* move closer to the individual side of the property rights continuum, common use areas may be converted to *de facto* private land holdings (Type D). Six *ejidos* in our sample internally divided common use areas, including the majority of

common forest reserves. This was in fact the most common form of privatization among the *ejidos* in our sample, representing 22% (6 *ejidos*) of all cases and 75% of all privatized eight *ejidos*. Under this model, the *ejido* maintains its legal designation as common use; however, internally all common use lands are divided among *ejido* members, who enjoy management, exclusion and in some cases alienation rights over these *de facto* private properties. Individuals may be granted certificates of ownership by the *ejido* general assembly; however, these do not offer the same protections as a legal title granted by the state. According to key informants in these *ejidos*, land holdings may be sold independently of membership rights, although these are not legal land sales. We found that in the majority of Type D *ejidos* land was most often sold along with the *ejido* membership right. In our study, forest reserves were often included in informal privatization processes, despite the clause of the Article 27 stating that specific types of land, including forested land, could not be sub-divided. In sum, the bundle of rights pertaining to this land tenure arrangement include individual use, management and exclusion rights, as well as *de facto* alienation rights.

Type E represents an *ejido* that has taken the legal route to formally divide and title common use areas, as depicted by parcels delineated by solid white lines. None of the *ejidos* in the study fit into this land tenure typology. Of Quintana Roo's 277 *ejidos*, only five *ejidos* had taken this formal route to privatization by 2008, and these *ejidos* were atypical of the region, in that they were located in areas of either intense tourism development or urban expansion. The formal privatization process happens when the *ejido* general assembly votes to convert the *ejido* to *dominio pleno*, which in legal terms refers to absolute title with unrestricted rights, or a full bundle of individual rights.

Under *dominio pleno*, *ejido* members may then subdivide *ejido* lands and legally title individual holdings. In this case, it is possible for *ejido* members to cede their membership to the *ejido*, in effect, converting the property from an *ejido* property to a private property and withdrawing it from the *ejido*, as depicted by the solid white areas.

Identifying Factors Influencing Land Tenure Arrangements

We used QCA to examine how *ejido* characteristics combine to produce land tenure outcomes among 27 sample *ejidos*, as characterized in the property rights continuum described above. We used data from secondary sources and interviews with key informants to construct fuzzy set models of 1) private land tenure outcomes (Types C, D, E) and 2) common land tenure outcomes (Types A, B). In Table 2-3, we report the fuzzy membership scores given to each *ejido* for land tenure outcomes and causal conditions of ethnicity, forest dependency, size, and land ratio. The truth table, Table 2-4, demonstrates the different configurations of conditions associated with a private and common land tenure outcomes. At the end of each row, the number of cases demonstrating the combination of casual conditions is reported along with the total number of cases for the private outcome (8) and the common outcome (19). While 16 configurations are logically possible (number of causal combinations = 2^k , and k = the number of causal conditions), only 11 configurations actually exist in the cases studied.

We then derived solution-sets for a model examining the causal conditions that are necessary or sufficient for membership to the set of privatized *ejidos* (types C, D, E). We then repeated the analyses to examine the conditions that are necessary or sufficient for membership to the set of commonly-held *ejidos* (types A, B). We present quantitative results from these two models and then use data from case studies to interpret these findings. Within these results, note that variables in capital letters

indicate the presence of the condition or that its value is high, while lower case denotes the absence of the attribute or a low value.

In the QCA model for the private outcome, the truth table (Table 2-5) shows the configurations of conditions with at least one case present, as well as provides the consistency scores for the various configurations of conditions. The 1 and 0s in the outcome column “tenure” indicate if the consistency threshold of .80 was met, meaning if the configuration of conditions was perfectly or nearly sufficient to produce the given outcome (in this case “private” tenure outcome). From the truth table, we see that of the 8 cases with the private outcome, 50% of cases share the characteristics of a low ratio of land per member, not Maya, not forest dependent and small (maya*forestry*size).

We then ran the analyses in fsQCA to examine membership to the set of commonly-held *ejidos*, meaning that the land tenure outcome was “common” as depicted in Type A, B or C of the property rights continuum (Figure 2-2). The truth table (Table 2-6) reports the 6 configurations of conditions that resulted in the common outcome and the number of cases that displayed each configuration. High consistency scores for these configurations indicate that almost all cases with these configurations were a subset of the “common” outcome. From the truth table, we can begin to discern some patterns in the common tenure outcome. *Ejidos* that shared the conditions of being Maya, small in size, low land to *ejidatario* ratio, and not forest dependent (MAYA*ratio*size*forestry) accounted for 37% of the cases with the common outcome. *Ejidos* that shared the causal conditions of being Maya, large in size, with a large land to *ejidatario* ratio, and not forest dependent (MAYA*RATIO*SIZE*forestry) represented the second highest percentage of cases with the common outcome, accounting for 26%

of cases. The conditions of being Maya and not forest dependent are present in both of these configurations, while size and ratio of land to member are variable.

The solutions report the combinations of conditions, or solution-sets, resulting in the private outcome. For each configuration, raw coverage, unique coverage and consistency scores are reported. Raw coverage calculates the percentage of the total membership in the outcome that a given configuration of conditions covers. Unique coverage calculates the unique contribution of a given configuration of conditions to the outcome, in other words, when not appearing in concert with other combinations of conditions. By finding the configurations with the highest unique coverage scores we may identify the most essential configurations of conditions to produce a given outcome. The consistency scores for each configuration measure the degree to which each configuration of conditions is a subset of the outcome, and therefore is sufficient to produce the given outcome. Summary scores for the truth table solutions are provided at the bottom of the list of combinations of conditions. Solution coverage measures the proportion of the outcome explained by the complete solution. Solution consistency measures the degree to which the solutions generated are subsets of the outcome.

The standard analysis feature of fsQCA determines three solutions, termed parsimonious, intermediate and complex, for a given outcome based on different treatments of the configurations. The parsimonious solution permits the use of all configurations, regardless of whether or not they produce the given outcome, thereby incorporating more evidence to produce a solution. This helps generate a logically simpler and more pared down solution. The complex solution does not use configurations displaying negative outcome to produce a solution, and therefore is the

most complex, as it does not eliminate conditions based on negative cases. The intermediate solution is a compromise between the parsimonious and the complex. To determine the intermediate solution, the user provides information as to which negative cases to allow in the analysis, given theoretical or empirical knowledge of the cases. In the next section, both the parsimonious and intermediate solutions are presented for the analyses of private and common land tenure outcomes.

Table 2-7 reports the intermediate and parsimonious solutions generated by fsQCA from the truth table for the private land tenure outcome. For the intermediate and parsimonious solutions generated for membership to the set of privatized *ejidos*, high consistency scores ($>.80$) indicate that the combination of conditions are subsets of the outcome of private *ejidos*. The parsimonious solution demonstrates that not being Maya (*maya*) is a nearly sufficient condition of privatized *ejidos*, given the consistency score of .825. The coverage score of .673 indicates that not being Maya alone is a necessary condition to produce the outcome.

These results are further confirmed in the intermediate solution, as all 4 solution sets leading to private land tenure outcomes include not being Maya (*maya*). All 4 solution sets have high consistency scores, indicating that all configurations are nearly sufficient in producing private land tenure outcomes. However, three of the solution sets had low unique coverage scores, indicating that these configurations did not uniquely account for the given outcome, and therefore do not represent necessary configurations of conditions in the private land tenure outcome. The solution set *forest*maya*ratio*, meaning *ejidos* that are not forest dependent, not Maya and that have a low land to member ratio, uniquely accounted for 40% of the proportion of cases

with the privatized outcome. While this configuration accounted for the highest proportion of cases and has a high consistency score (.88), the raw and unique coverage scores are still less than .50, indicating that the solution set is sufficient, but not necessary to membership in the set of private *ejidos*.

Using the standard analyses in fsQCA, we generated the intermediate and parsimonious solutions for the model of membership in the set of *ejidos* with the common outcome. The intermediate solution indicates two solution sets, and the parsimonious solution provides one logically simplified configuration (Table 2-8). The first intermediate solution-set (forest * MAYA) demonstrates that the absence of forest dependency and being Maya are sufficient conditions to produce the “common” land tenure outcome. The consistency score of .915 indicates that the configuration is a nearly sufficient subset of the outcome. *Ejidors* that are members of the set of cases that are Maya and not forest dependent account for 75.5% of the cases of *ejidos* that are commonly held; however, their unique contribution to the outcome (unique coverage) is less than 30%.

The second intermediate solution set is the combination of being Maya and a high ratio of land to *ejido* member (MAYA*RATIO). The high consistency score (.9615) indicates that the combination of these 2 conditions are nearly sufficient to produce the expected outcome of common land tenure; however, low raw and unique coverage scores do not imply the necessity of these factors in producing the expected outcome. The most striking finding from the truth table and the resulting parsimonious solution is that ethnicity, or membership to the set of Mayan *ejidos*, is both a highly sufficient and necessary factor in producing the expected outcome of commonly held tenure.

Discussion

The results of this study point to two important findings. The first demonstrates that a range of property rights exist within the *ejidos* of Quintana Roo, and that these rights are often hybrid arrangements of common and private, *de facto* and *de jure* rights. Second, the study delineates, through the use of Qualitative Comparative Analysis, how land tenure arrangements are the result of multiple conditions and their interactions. Placing these results within the context of prior studies of Mexico's 1992 reforms, as well as qualitative evidence from the field, allows us to more deeply explore land tenure change in the wake of policy reforms. In this section we discuss salient findings of hybrid property arrangements and the interaction of *ejido* characteristics, such as ethnicity and livelihoods, with land tenure outcomes.

This study demonstrates that *ejidos* did not follow a linear path towards privatization as some of the reforms' proponents had hoped and as some property rights scholars would have predicted, confirming the results of previous studies of the 1992 reforms (Barsimantov, Racelis, et al., 2010). In our study, the majority of *ejidos* remained collectively-held, while others exhibited hybrid property arrangements merging collective and individual rights. None of the *ejidos* opted for legal individual titles, but rather privatized via internal and informal agreements delineating quasi-private rights while maintaining the legal shell of communal title. As a result, we found that land tenure arrangements did not fit into discrete categories of "individual" or "common." Rather, we conceptualized *ejido* land tenure arrangements as falling along a property rights continuum, where *ejidos* embodied diverse land tenure arrangements centered around bundles of rights with varying degrees of informal and formal recognition.

We suggest that varying land tenure arrangements are the result of the selective adoption of the 1992 reforms by *ejidos* in our study. This selective process, by which *ejidos* hybridize collective and individual rights and ideologies, is what Wilshusen (2009) terms a “selective accommodation” of the *ejidos* to the 1992 reforms. Accommodation, in contrast to resistance or acquiescence, implies agency on the part of *ejido* members in adopting aspects of the 1992 reforms that further their interests and/or did not imply significant economic or social risks, for *ejido* members (Haenn, 2006; Nuijten, 2003; Perramond, 2008; Wilshusen, 2010). Studies of *ejido* response to the 1992 reforms have demonstrated accommodation in various forms, including attempts by *ejidatarios* to leverage privileges as both *ejidatarios* and private property owners (Haenn, 2006), selective accommodations based on localized resource management regimes (Perramond, 2008), continuation of illegal and informal land sales (Bouquet, 2009; Nuijten, 2003), and the resilience of communal property (Barnes, 2009).

Factors Influencing Land Tenure Outcomes

Among sample *ejidos*, ethnicity was a key factor in producing land tenure outcomes according to the QCA models. All of the cases with land tenure outcomes on the private end of the property rights continuum (land tenure types D and E) were considered ethnically mixed *ejidos*, with a low percentage of Maya speaking inhabitants and the majority of residents coming from states in central Mexico, such as Veracruz, Tabasco and Michoacán.

Our study points to the fact that ethnicity may be linked to different ideologies regarding land use and management. Valdez (2008) argues that the *ejido* is an important cultural institution that sustains indigenous traditions and identities. Ethnic identity also carries both socio-cultural and historical connections to the land. As such,

issues regarding land ownership encompass socio-political and cultural dimensions that may run counter to the underlying economic rationale of the 1992 reforms. Related research found that Mayan and Mestizo *ejidos* had different ideologies about land and land management. In one Mestizo *ejido*, a key informant originally from Tabasco stated that *ejido* members had worked on internally designated individual landholdings since the foundation of the *ejido*. For them, he claimed, maintaining common use areas was simply not part of their traditional land use:

We always had the idea to parcelize. We brought another idea with us from Tabasco (other than the traditional Maya idea), and that is: what belongs to no one, no one takes care of. *Siempre teniamos la idea de parcelarnos. Traemos otra idea (de los Mayeros): lo que es de nadie, nadie le cuida.*

In this case, ideologies regarding land and resource management shaped informally privatized land tenure arrangements pre-dating the 1992 reforms. When the 1992 reforms were announced, key informants said that they hoped that the reforms would allow the *ejido* to regularize informal arrangements. However, the prohibition of the parcelization of forested lands meant that privatized holdings in the *ejido* of Reforma Agraria could not be legally recognized. Therefore, the *ejido*'s informal and local land tenure system continued parallel to the legal system established by the 1992 reforms.

Ethnicity also plays a critical role in defining how local actors respond to the state, and therefore, conditions responses to state implemented policies such as the 1992 reforms. In Quintana Roo, ethnicity was central in the Caste War, which pitted Mayans against Mestizos in a decades long struggle for land and access to resources (Patch, 1991; Reed, 2001). For many, the establishment of *ejidos* was another chapter in a long history of Mayans versus the state. As Cornelius and Myhre state, "the legacy of (often violent) struggles for land attaches *ejidatarios* to their communities for social and

cultural reasons that are not highly susceptible to market logics” (1998a: 438). Among forestry communities in Quintana Roo, *ejidatarios* have been protesting and organizing around access to resources since the 1950s (Bray, 1995; Forero and Redclift, 2006), resulting in a politicized discourse of land rights infused with symbolic reference to the Maya’s tradition of collective resource management. A photo of a mural in Felipe Carrillo Puerto’s municipal center (Figure 2-3) attests to the discourse linking indigenous culture to opposition to the 1992 reforms. The caption states: “In recent years indigenous people have faced the biggest threat yet: Neoliberalism” (Figure 2-4). Among Mayan *ejidos*, there was a perceived risk of entering PROCEDE program including the fear that the state would reclaim *ejido* lands or that residents would be taxed as though they were private property owners. In addition, *ejidatarios* did not feel that the tenure situation was precarious and, therefore, they had little incentive to privatize. Similarly, these fears help explain why *ejidos*, including both Mayan and Mestizo, opted to informally privatize rather than undergo the potentially costly legal process.

We expected that forest dependency would be a key condition for commonly-held land tenure arrangements, based on previous empirical and theoretical research which argues that there are certain benefits to managing forests collectively rather than individually, such as economies of scale in production as well as increased management and administrative efficiency (McKean and Ostrom, 1995). Qualitative Comparative Analysis did not point to forest dependency as a necessary condition for common land tenure outcomes. In fact, of the eight cases of privatized *ejidos*, three were considered forestry-dependent. In two *ejidos*, forest lands remained common use

areas and were collectively managed, while other common use areas lacking valuable timber were parcelized for individual use.

Reforma Agraria is an example of a Mestizo forestry *ejido* that had informally privatized forest lands since prior to the community forestry initiative. Key informants stated that collective land holdings were simply not part of their land use tradition, prior management experience or knowledge, as most residents emigrated from the primarily agricultural states of Veracruz and Tabasco. As a result of the individual land use ideology, forestry was practiced on individual land holdings and timber sales were managed by individuals, rather than the *ejido* as a collective entity. In the eyes of the state, forestry was practiced collectively, since the permanent forest reserve is technically designated on communal lands and timber permits are authorized at the community level, rather than individually. Local institutional arrangements, including a system for allocating authorized timber volumes to individuals for harvesting, have evolved to ease the tension between the collective logic of state mandated forest management and *de facto* individual control over forest resources.

While we did not test how other, non-forest-based livelihood strategies influenced land tenure outcomes using fsQCA, qualitative evidence suggests that non-forest livelihoods may play a greater role than forest dependency in shaping land tenure outcomes. Traditional slash and burn agricultural systems found within predominately Mayan *ejidos* rely on access to a shifting mosaic of land parcels in space and time (Alcorn, 1998; Gomez-Pompa, 1987). Common use areas guaranteed access to land. Parcelization was viewed by many inhabitants as potentially limiting access to suitable agricultural lands.

Additional qualitative evidence suggests that non-forestry livelihood activities, including cattle grazing, vegetable production and state sponsored reforestation projects, contributed to the recognition of more permanent individual parcels. In some cases, the failure of previous community-based initiatives for forestry, cattle grazing or agricultural parcels taxed local institutional mechanisms for collective action and conflict resolution, contributing to the informal privatization of common use lands. In Cuahutemoc, *ejido* members participated in a state-led cattle initiative; however, mismanagement of the project and conflict among members led to a breakdown in governance and factored into the eventual decision of the *ejido* to informally privatize all communal lands, including the bulk of permanent forest areas (Barsimantov, Racelis, et al., 2010).

Another example of the interaction between between livelihood strategies and local institutional arrangements is the recently and informally privatized *ejido* of Chunhuhub. Once considered a hub of forestry activity in the region (Anderson, 2005), in the past decade illegal timber harvesting resulted in the revocation of the *ejido*'s forestry permit. According to key informants, *ejido* authorities lacked the skills or political will to curtail illegal logging activities within such a large *ejido*, both in terms of area and membership (15,819 ha and 303 members). This was cited by key informants as one of the main motivations for parcelization in the *ejido*. One stated: "Now, with parcelization, what happens (in his parcel), is his problem. *Ahora, con el parcelamiento, lo que pasa es su problema*". After parcelization, *ejido* authorities were alleviated of the burden of policing, as management authority was devolved to individual *de facto* owners

of forested lands. Along with the rise in individual freedom, parcelization also resulted in previously unsanctioned land use and timber extraction, according to key informants.

Other factors influencing land tenure change and *ejido* response to the 1992 reforms include interpretations of the new legislation and its benefits and risks to *ejidatarios*. Varying interpretations of the 1992 reforms and PROCEDE by local actors as well as diverse models of land and rights affected the adoption (or non-adoption) of the titling program, in some cases resulting in the hybrid property arrangements that combine private and common spaces. Among those interviewed, many cited strong incentives for remaining *ejidatarios*. Benefits include access to credit and other government programs that are not available to private property owners, and these benefits form a critical component of one's identity as an *ejidatario*. This confirms studies by Wilshusen (2010) and Perramond (2008) who found that *ejidatarios* feared that by converting *ejido* lands to private property, they risked exclusion from the primary entrance for rural people into the state patronage system.

Limitations of the Study

As demonstrated by our findings, QCA models can only tell part of the story. More nuanced models may help elucidate driving factors of land tenure change. Due to its complexity, further analysis and more complex QCA models, incorporating different variables and fuzzy sets, may strengthen our findings and shed light on how other social, political, and economic factors combine with ethnicity to produce distinct land tenure outcomes. It is difficult to determine the exact causality- did the reforms result in these hybrid property forms, or did they simply ratify or facilitate processes that were already in existence? Further research is needed to address the issue of causality.

Policy Implications

We have demonstrated in this study the ways in which complex and localized land tenure arrangements evolve and develop outside of legal frameworks for formal property rights in southeastern Mexico. While many *ejidos* remained registered as commonly-held, their legal simplicity masked complex informal and unregistered land tenure systems that existed parallel to the legal systems. This has important implications for policy, as these local institutions tend to be “invisible” to policymakers supporting privatization agendas, and yet policy impacts are shaped by local contexts (Bromley, 1989; Bromley, 2008; Jodha, 1996; McKean and Ostrom, 1995; Unruh, 2006). In Mexico, the disconnect between *de facto* land tenure arrangements and *de jure* rights may be problematic for *ejidatarios*. *De facto* privatization does not grant legal title to *ejidatarios*, provides few legal protections, and gives very little power to *ejidatarios* in determining fair prices for land sales. Rather than integrate *ejidatarios* into a globalized economy, the 1992 reforms and the continuation of *de facto* privatization, may instead place *ejidatarios* further on the margins.

This study detailed the emergence of hybrid property regimes in Quintana Roo following Mexico’s 1992 agrarian reforms. By characterizing these hybrid arrangements, we sought to understand how macro-scale policies are filtered through local contexts and shaped by local actors to produce distinct outcomes within Mexico’s *ejidos*. Specifically, we analyzed how *ejido* characteristics, including ethnicity, livelihood strategies, and biophysical and demographic descriptors of size, affect land tenure arrangements. QCA results highlighted the importance of ethnicity as both a necessary and sufficient condition in producing land tenure outcomes. Qualitative evidence from our cases provided a basis for interpreting this finding. We argue that ethnicity is bound

to specific land histories, land management strategies and relations between local actors and the state. Local responses to the 1992 reforms and localized process of institutional evolution demonstrate the heterogeneous and place-specific nature of policy implementation. As noted by Perramond (2008: 368), “If we are to fully understand the rise and fall of the Mexican *ejido*, we must at least recognize that local peoples, places and spaces will bend the process in very different ways”. By recognizing and investigating hybrid land tenure arrangements and their origins, we not only gain a better understanding of the impacts of the 1992 reforms, but also the process by which national scale policies are interpreted and manipulated by actors at the local scale.

Table 2-1. Key characteristics of sample *ejidos*, including year established, number of members, total area, ethnicity and involvement in forestry.

<i>Ejido</i>	Year founded	Number of members	Total area (ha)	Ethnicity	Forestry <i>Ejido</i>
Andres Quintana Roo	1969	63	6451	Maya	✓
Betania	1971	118	11036	Maya	✓
Chan-Cah Derepente	1964	103	5418	Maya	✓
Chunhuas	1942	148	45380	Maya	✓
Chunhuhub	1964	333	15819	Mixed	
Cuatemoc	1966	53	2934	Mestizo	
Dzolyola	1968	121	6439	Maya	✓
Dzula	1942	208	25804	Maya	✓
Naranjal Poniente	1999*	147	13230	Maya	✓
Emiliano Zapata	1975	117	5931	Mestizo	
X-Conha	1973	37	4457	Mestizo	✓
Noh Bec	1937	219	24123	Mestizo	✓
Nueva Loria	1979	44	3148	Mestizo	
Nuevo Israel	1966	104	8726	Maya	
Polyuc	1959	154	4662	Mixed	
Ramonal	1963	117	6825	Maya	
Reforma Agraria	1978	34	2457	Mestizo	✓
San Antonio Nuevo	1979	25	3266	Maya	✓
San Arturo	1966	63	2609	Maya	
San Jose	1968	429	21698	Maya	
Tabi	1961	80	4894	Maya	✓
Tihosuco	1943	809	56686	Maya	
Tixcacal Guardia	1962	143	7935	Maya	
Trapich	1975	29	2542	Maya	✓
X-Hazil Norte	1990	74	3843	Maya	
X-Maben	1936	544	73400	Maya	✓
X-Pichil	1941	176	31314	Maya	✓

*Note. Naranjal Poniente was originally part of Chunhuas, founded in 1942. In 1999 Naranjal Poniente was officially recognized as an independent *ejido*.

Table 2-2. Property rights typologies and configurations of individual bundles of rights including use, management, exclusion and alienation (both *de facto* and *de jure*). The number of *ejidos* in our sample for each property rights type is also reported.

Property Rights Typology	Access/Use	Management	Exclusion	Alienation (de facto and de jure)	Number of ejidos in sample
A	✓				0
B	✓	✓			19
C	✓	✓	✓	✓ (de facto)	2
D	✓	✓	✓	✓ (de facto)	6
E	✓	✓	✓	✓ (de jure)	0

Table 2-3. Fuzzy data for sample *ejidos* with land tenure status as the outcome, and ethnicity, forest dependency, size and land ratio as causal conditions.

Cases	Outcome		Conditions			
	Ejido	Tenure	Ethnicity	Forest dependency	Size (area)	Land ratio
AQROO	0.2	0.6	0.6	0.2	0.8	
BETAN	0.2	1	0.4	0.6	0.6	
CHANC	0.2	1	0.4	0.2	0.2	
CHUAS	0.2	1	0.4	1	1	
CHUNH	0.8	0.4	0.2	0.6	0.2	
CUAHE	0.8	0.2	0	0	0.2	
DZOLY	0.2	1	0.4	0.2	0.2	
DZULA	0.2	1	0.4	0.8	0.8	
EMILI	0.8	0	0	0.2	0.2	
NARAN	0.2	1	0.8	0.6	0.6	
NISRA	0.6	0.6	0	0.2	0.6	
NLORI	0.8	0.2	0	0	0.4	
NOHBE	0.6	0.2	1	0.8	0.8	
POLYU	0.2	0.4	0	0	0	
RAMON	0.2	0.6	0	0.2	0.2	
REFAG	0.8	0	1	0	0.4	
SANTON	0.2	1	0.6	0	0.8	
SARTUR	0.2	1	0	0	0.2	
SJOSE	0.2	1	0	0.8	0.2	
TABI	0.2	1	0.4	0	0.4	
TIHO	0.2	0.8	0	1	0.4	
TIXCA	0.2	0.8	0	0.4	0.2	
TRAPI	0.2	1	0.2	0	0.6	
XCONH	0.8	0.2	0.6	0	0.8	
XHNOR	0.2	1	0	0	0.2	
XMABE	0.2	1	0.4	1	0.8	
XPICH	0.2	1	0	0.8	0.8	

Table 2-4. Truth table displaying causal configurations and land tenure outcomes for the total sample of 27 *ejidos*.

Causal conditions				Tenure outcome		
Maya	Forest	Size	Ratio	Private	Common	
0	1	0	0	0		
low	high	small	low	1	0	
0	0	1	0	0		
low	low	large	high	1	0	
0	1	0	1	1		
low	high	small	high	1	0	
0	0	0	0	0		
low	low	large	high	4	0	
0	1	1	1	1		
low	high	large	high	1	0	
1	0	0	1	1		
high	low	small	high	0	2	
1	0	1	0	1		
high	low	large	low	0	2	
1	1	0	1	1		
high	high	small	high	0	2	
1	1	1	1	1		
high	high	large	high	0	1	
1	0	1	1	1		
high	low	large	high	0	5	
1	0	0	0	0		
high	low	small	low	0	7	
TOTAL CASES					8	19

Note: 11 existing configurations, all other combinations do not exist in sample.

Table 2-5. Truth table for private model

Maya	Conditions			Number of cases	Outcome tenure PRIVATE	Consistency score
	Forest	Size	Ratio			
0	1	0	0	1	1	1
0	0	1	0	1	1	1
0	1	0	1	1	1	0.889
0	0	0	0	4	1	0.867
0	1	1	1	1	1	0.833
1	0	0	1	2	0	0.786
1	0	1	0	2	0	0.682
1	1	0	1	2	0	0.632
1	1	1	1	1	0	0.625
1	0	1	1	5	0	0.556
1	0	0	0	7	0	0.548

Table 2-6. Truth table for common model

Maya	Conditions			Number of cases	Outcome tenure COMMON	Consistency score
	Forest	Size	Ratio			
1	1	1	1	1	1	1
1	0	1	1	5	1	1
1	1	0	1	2	1	1
1	0	0	0	7	1	0.976
1	0	0	1	2	1	0.964
1	0	1	0	2	1	0.955
0	0	1	0	1	0	0.778
0	1	0	0	1	0	0.714
0	1	0	1	1	0	0.667
0	1	1	1	1	0	0.667
0	0	0	0	4	0	0.609

Table 2-7. Solution table generated by fsQCA for “private” land tenure outcome.

		Raw coverage	Unique coverage	Consistency
Intermediate solution				
	forest*maya*ratio	.449	.408	.880
	FOREST*maya*RATIO	.204	.041	.833
	size*maya*ratio	.490	.000	.889
	size*FOREST*maya	.204	.020	.833
	solution coverage	.633		
	solution consistency	.838		
Parsimonious solution				
	maya	.673	.673	.825
	solution coverage	.673		
	solution consistency	.825		

Table 2-8. Solution table generated by fsQCA for “common” land tenure outcome.

		Raw coverage	Unique coverage	Consistency
Intermediate solution				
	forest*MAYA	.755814	.279070	.915493
	MAYA*RATIO	.581395	.104651	.961538
	solution coverage	.860465		
	solution consistency	.913580		
Parsimonious solution				
	MAYA	.918605	.918605	.831579
	solution coverage	.918605		
	solution consistency	.831579		

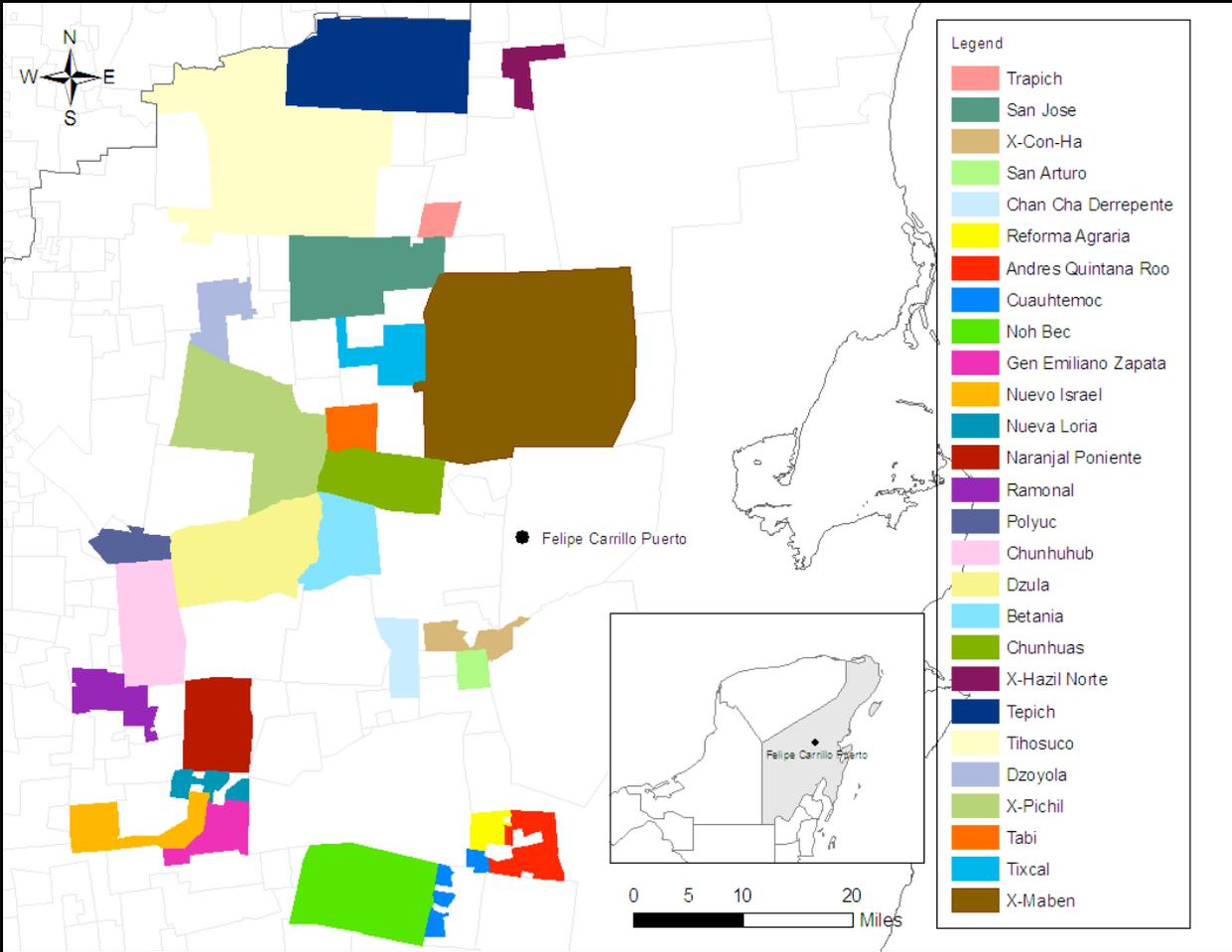


Figure 2-1. Map of sample *ejidos* in Quintana Roo, Mexico.

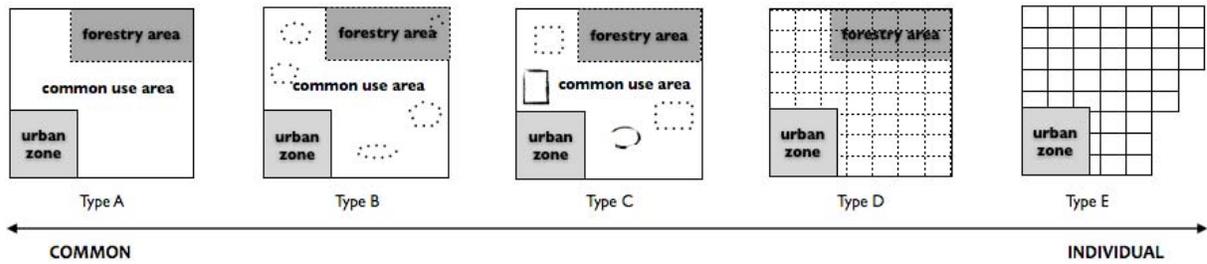


Figure 2-2. Property rights continuum depicting land tenure arrangements ranging from commonly-held, on the far left, to individually held on the far right.



Figure 2-3. Mural in the municipal center of Felipe Carrillo Puerto. Banner reads: “The Maya Zone is not an ethnographic museum; we are a people on the move”.

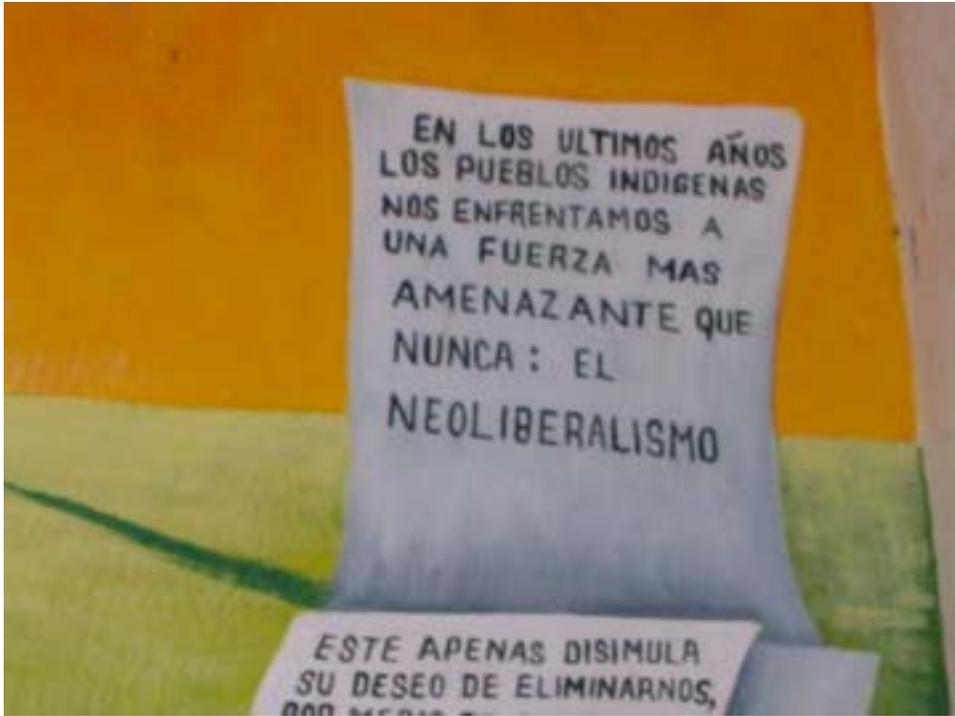


Figure 2-4. Close-up of insert in mural shown in Figure 2-3. Text reads “In recent years indigenous people have faced the biggest threat yet: Neoliberalism”.

CHAPTER 3

CHANGING LANDSCAPES FOR FOREST COMMONS: LINKING LAND TENURE WITH FOREST COVER CHANGE FOLLOWING MEXICO'S 1992 AGRARIAN REFORMS

In recent decades property rights reform has led to the reconfiguration of rural landscapes in many parts of the world via changes in land tenure and access. Property rights reform, devolving control of land and resources to local communities, is viewed by many donor agencies and scholars as a vehicle to enhance economic development and natural resource stewardship (Deininger, 2003). A recent study conducted by the Rights and Resources Initiative demonstrates that tenure reforms have resulted in an increase in the total forest area controlled by communities and individuals and a decreasing role for federal governments (Sunderlin, Hatcher, et al., 2008). While the extent of tenure reforms may be measurable in area, their impact on local resource users and their environment remains unclear. What is clear is that policy changes, such as property rights reforms, are ultimately interpreted and implemented by local resource users who in turn impact the physical landscape (Batterbury and Fernando, 2006).

Mexico provides an ideal opportunity to explore the relationships between property rights reform, land tenure institutions and the environment. The Mexican Revolution (1910-1917) established one of the largest experiments in common property management, devolving control of 50% of arable territory and an estimated 80% of forests to communities in the form of communal land grants, known as *ejidos* (Assies, 2008). In 1992, constitutional and legal reforms (henceforth referred to as “the 1992 reforms”) paved the way for the privatization of Mexico’s *ejidos* in an effort to liberalize and stimulate the rural economy (Zepeda, 2000). In essence, the 1992 reforms offered *ejido* members (*ejidatarios*) the opportunity to assume the full spectrum of property

rights, including alienation rights that were previously retained by the state. Despite widespread predictions that the reforms signaled the end of the *ejido* via privatization, and intense speculation as to the reforms' broader social and environmental impacts (Cornelius and Myhre, 1998b), many *ejidos* did not opt for the voluntary privatization of common use lands. Nor has clear evidence of the reforms' environmental impacts materialized. Several studies have examined the impact of Mexico's recent reforms on natural resource management, including new forms of organization in community forestry enterprises (Taylor and Zabin, 2000; Wilshusen, 2010) and changes in agricultural productivity (Johnson, 2001). To date, no studies have specifically addressed changing patterns in forest cover resulting from the 1992 reforms. This research seeks to fill this important gap regarding the reforms' environmental impacts.

Previously, we examined how *ejidos* responded to the 1992 reforms' push to privatize in the southeastern state of Quintana Roo, Mexico. We demonstrated that *ejidos* exhibited a diversity of land tenure arrangements, many maintaining collective tenure, while others incorporated aspects of private property. In this study we seek to understand how diverse land tenure arrangements relate to forest cover change, land use patterns and different levels of forest dependency within eight *ejidos* in southeastern Mexico. Specifically, we address the following questions:

- How are land tenure arrangements related to *ejidatario*'s land use, including individual land holding size, amount of land in use, and specific land use activities?
- What is the relationship between land tenure arrangements and forest cover change? More specifically, are commonly-held *ejidos* more effective at forest conservation than privatized *ejidos*?
- Does forest dependency influence forest cover change outcomes, such that *ejidos* that are more forest dependent exhibit lower rates of forest cover change?

We conceptualize environmental change using a political ecology approach, which emphasizes how land use and landscape changes are shaped by social relations, institutions and politics at multiple scales (Blaikie and Brookfield, 1987; Klepis and Vance, 2003; Robbins, 1998; Schmink, 1994). We view property rights institutions as key mediators between the human and natural world, and as such, consider them to be critical drivers of environmental change.

We organized this paper into five sections. In the first section, we introduce two key concepts in the study of land tenure and explore the existing debates regarding the impact of land tenure arrangements on the environment. Next, we present the regional context for our study, with a specific focus on land use histories, land tenure regimes and response to the 1992 reforms. In the third section, we discuss the methodology we employed to examine land tenure arrangements, land use and land cover change outcomes, and forest dependency. The fourth section presents the results of the study. Finally, we present our discussion and conclusions.

Key Concepts in the Study of Land Tenure

Two concepts regarding land tenure are fundamental to our study. The first key concept is that land tenure arrangements combine formal rights (*de jure*) and informal or “on the ground” rights, otherwise known as *de facto* rights. The second concept is that land tenure arrangements may be understood as distinct configurations or “bundles” of rights ranging from access to alienation. We will explain these concepts more fully below.

Land tenure arrangements are more complex than discrete legal categories of public, private or common. In many cases, individual actions are constrained by both *de jure* and *de facto* rights. *De jure* rights are those defined, allocated and protected by

the state. These include, for example, defined boundaries for individual and/or community landholdings, as well as land titling. *De facto* rights are rules determined by local users, and they may or may not be recognized by the state.

The concept of land tenure as “bundles of rights,” as defined by Schlager and Ostrom (1992), is a way of understanding distinct configurations of rights granted to individuals and groups of individuals. Bundles combine *de jure* and *de facto* rights to shape varying degrees of control over resources. Further, bundles of rights may be nested, such that individual rights function within, and may be constrained by, a larger collective bundle of rights. This concept has been used to examine forest tenure reform and its impacts on rural communities (Larson, Barry, et al., 2010) and to predict the best allocation of rights for community forest management, in terms of forest conservation and livelihoods (Barsimantov, Racelis, et al., 2011). These rights include (adapted from Schlager and Ostrom 1992):

1. Access/ use: the right to enter and withdraw resources from a defined property
2. Management: the right to regulate resource use, transform and/or make improvements upon a resource
3. Exclusion: the right to determine access to a resource, and exclude others
4. Alienation: the right to sell or lease any or all of the rights listed above

Access and use rights represent the most basic of property rights, while alienation rights give the most decision-making power to the rights holder. Some rights may be allocated individually, whereas others may be held collectively. If an individual retains all four rights, this bundle in essence represents a full private property right.

Conversely, when this same bundle of rights is held by a group, rather than an individual, the land tenure arrangement is considered a common property regime. In sum, the larger the bundle, the greater the control exercised over land and resources.

Property rights reform alters *de jure* rights allocation by changing the legislative basis for land tenure institutions. In doing so, *de facto* institutions may also be affected, giving rise to new institutions (i.e., new rules for transfer of land within communities) and perhaps invalidating or altering existing rules (Barsimantov, Racelis, et al., 2011). The legislative changes associated with the 1992 reforms allowed *ejidatarios* to legally attain a full bundle of rights. Our research, along with previous studies, demonstrates that the 1992 reforms changed both *de jure* and *de facto* land tenure institutions within *ejidos*, resulting in varying bundles of rights (Barsimantov, Racelis, et al., 2010; Perramond, 2008; Wilshusen, 2010). *Ejidos* legally recognized as commonly-held may, in fact, have diverse configurations of individual and commonly-held rights, and as a result, are neither wholly individual nor communal, but somewhere on a continuum from private to communal (Barsimantov, Racelis, et al., 2010). In this chapter, we delve deeper into these land tenure arrangements to determine the bundles of rights within each of the eight study sites, in order to understand variations in common property regimes that may shape land use and land cover outcomes.

Linking Land Tenure Regimes and the Environment

While scholars have debated the relationship between property rights and land use management for centuries, this debate became prominent in development discourse in the latter half of the 20th century, with mounting concern about land and resource degradation and its causes (Ciriacy-Wantrup and Bishop, 1975; Runge, 1986; Smith, 1981). Hardin's (1968) seminal paper on the "Tragedy of the Commons" spurred this debate when he argued that lands not held by the state or private parties were characterized by open access situations in which over-exploitation and resource degradation were inevitable outcomes. This argument assumed that humans, acting as

rational economic agents, seek to maximize individual gain at the expense of the common good and future sustainability of the resource base (North and Thomas, 1977). Following this rationale, communal forms of ownership were considered doomed to failure, and subsequently, private property or state ownership was seen as the key to efficient resource management and a decrease in the social and environmental costs of humans' instinctual gain-seeking behavior. This so-called "Property Rights School" provided the intellectual rationale for privatization and state ownership of what were widely considered open access lands (Ellsworth, 2002).

Critiques of the Property Rights School emerged on various fronts. First, critics pointed out that a binary vision of property rights, as either private or open access, failed to acknowledge the continuum of institutional arrangements between private property and open access, and that this error leads to false assumptions regarding natural resource management within the commons (Bromley, 1989). Research on what were considered open access lands demonstrated that they were, in fact, managed (and often successfully) by groups who had developed complex informal rules governing resource access and allocation (Dietz, Ostrom, et al., 2003; Hanna, Folke, et al., 1996; McCay and Acheson, 1987). Secondly, critics argued that scholars and development practitioners were confused regarding the relationship between property rights, economic productivity and land degradation, such that they failed to recognize degradation on private land holdings (Bromley, 1989). Lastly, others argued that more efficient natural resource management outcomes were not guaranteed by individual title or designation as public land (Ellsworth, 2002; Gibson, Lehoucq, et al., 2002).

The study of common property regimes focused on how formal and informal institutions structure rights and access to common pool resources within property regimes, with the objective to understand how these institutions shape collective resource management strategies and land use (McCay and Acheson, 1987; Ostrom, 1990; Ostrom, Dietz, et al., 2002). Common property regime theorists emphasized how internal institutions regulate behavior and facilitate collective action and collective management strategies, thereby avoiding the tragedy of the commons (McCay and Acheson, 1987; Runge, 1986). Such studies have served to debunk some myths regarding the superiority of private property over common property in terms of productivity and resource management.

To give one empirical example from Mexico, a comparative study of coffee production on *ejido* lands versus private landholdings in Chiapas set out to test the assumption that private properties led to more efficient production systems (Dunn 2000). Dunn concluded that given landholdings of equal size, private landholdings were not more productive or efficient than *ejidos*. Further, he concluded that the *ejido* provided important benefits over private property, including minimal individual risk of losing land titles through collective ownership, as well as incentives for communal resource management via social norms.

In addition, recent studies provide evidence of a positive relationship between common property regimes and environmental benefits, as seen in relatively low rates of deforestation. Three separate studies (Bray, Ellis, et al., 2004; Ellis and Porter-Bolland, 2008; Nepstad, Schwartzman, et al., 2006) used satellite imagery to compare deforestation rates within communally managed lands and indigenous reserves versus

protected areas in Mexico and Brazil. All three studies concluded that deforestation rates were lower in community managed/ indigenous areas than in protected areas, supporting the hypothesis that greater local control of resources provides ecological benefits, as well as social benefits (Charnley and Poe, 2007). Similarly, Dalle (2006) found that local land use regulations, in conjunction with a community forestry program, resulted in a high degree of forest conservation within one of our study *ejidos*. Based on this evidence, we expect that *ejidos* that are communally managed will have lower deforestation rates.

Although many studies of the commons provide evidence of greater success of communally managed lands over public lands in terms of forest conservation, related studies assert that property regime per se (public vs. private vs. communal) is less important than the institutions that structure that property regime (Gibson, McKean, et al., 2000; Gibson, Ostrom, et al., 2000; Moran and Ostrom, 2005; Tucker, Randolph, et al., 2007). These studies highlight how certain characteristics of common property regimes, including resource and user group traits, and institutional arrangements, including local rules and enforcement as well as *de jure* rules, interact to shape different outcomes in terms of forest conservation and land use. Common property regimes' function and environmental outcomes may also be influenced by the external context within which they are embedded, including macro-economic forces, cultural and historical context, and regional and national politics (Agrawal and Chhatre, 2006; Cleaver, 2000; McCay and Jentoft, 1998; Robbins, 2004). Therefore, based on these studies, we posit that environmental outcomes, in terms of forest conservation and land

use, will be conditioned by varying institutional arrangements (e.g. bundles of rights) within our sample *ejidos*, rather than by *de jure* property rights categorization alone.

A shared interest in collective management or a shared dependence on a resource may also be critical factors in determining environmental outcomes of collective resource management (Singleton and Taylor, 1992). Charnley and Poe (2007) assert that people who are more dependent on forest resources will be better forest stewards, as they have a vested interest in management and future sustainability of the resource. Collective resource management and dependence may also be linked to local users' ideological relationship to land and resources. In order to better understand the many facets of collective resource management, including conflicts and land use outcomes, some scholars suggest that we must take a closer look at resource dependence and diverse frameworks of meaning surrounding resources (Agrawal, 2007; Mackenzie, 2005). Following Charnley and Poe's (2007) arguments, we posit that higher levels of forest dependency within sample *ejidos* will result in lower rates of deforestation.

Study Site

The Yucatán peninsula's institutional context, with its extensive network of common property regimes in combination with its forest resource management history, provides a rich backdrop for the analysis of land tenure and forest cover change. The southeastern part of the peninsula, located in the state of Quintana Roo, is dominated by dry tropical forests and historically has been sparsely populated. Tensions over control and access to land and forest resources, involving local and state actors, dominated the region's history prior to Mexico's agrarian reform and the establishment of the *ejidos* (Patch, 1991).

In the decades following the Mexican Revolution, the state implemented land reforms in the region in two major waves with different visions of land use. The first wave of land reform occurred under President Lázaro Cárdenas (1935-40), who sought to merge Maya collective traditions with forest-resource extraction. During this period, several large forest *ejidos* were established, averaging 35,000 hectares (ha) each, in addition to seven legal forest reserves. (Bray and Klepeis, 2005; Forero and Redclift, 2006). The second wave of agrarian reform in the region occurred during the 1960s and '70s, with the objective of distributing land to peasants from densely populated states in Central Mexico. The *ejidos* established during this period were agriculturally based and smaller than the older forest extraction based *ejidos* (Bray and Klepeis, 2005). The state's population increased almost tenfold from 26,967 in 1950 to over 225,00 in 1980 (INEGI 2000). Population growth, along with a surge of state-led development projects promoting cattle ranching and rice cultivation, led to increased deforestation in the region (Bray and Klepeis, 2005).

While both waves of agrarian reform in Quintana Roo devolved land to peasants, forest resources were still legally owned by the state. Up until the 1980s, the state largely controlled the extraction, production and commercialization of forest products, such as *chicle* (Maniklara Zapota) and timber, within *ejido* lands. *Ejidatarios* were largely excluded from the benefits of forest resources. Pressure from grassroots organizations demanding rights to benefit from forest resources, along with the expiration of state timber concessions, led to the devolution of control of forest resources to *ejidos*. The Pilot Forestry Program (PPF, *Plan Piloto Forestal*) was created in 1983 by the German Society for International Cooperation (formerly known

as GTZ or *Gesellschaft für Technische Zusammenarbeit*), in cooperation with Mexican foresters, to establish a model for sustainable forest management within Quintana Roo's forested *ejidos*. PPF sought to promote forest conservation and community economic development through low impact logging and the creation of community forest enterprises (CFEs). Fifty *ejidos* joined the initial PPF program, and as of 2007, 68 *ejidos* are considered forestry *ejidos* in Quintana Roo (Arguelles and Armijo-Canto, 1995; SEMARNAT, 2007). In part, the success of CFEs has been attributed to the pre-existing collective governance structure of the *ejido* that was readily translated to collective natural resource governance (Antinori and Bray, 2005). While the degree of CFE success varies substantially across the region, due to organization, links to external markets, and forest resource base, studies have shown that CFEs are an integral part of what is considered a "sustainable landscape" in Quintana Roo, with relatively low rates of deforestation (Bray, Ellis, et al., 2004; Dalle, de Blois, et al., 2006; Ellis and Porter-Bolland, 2008).

It is not entirely surprising, given the collective intent of Quintana Roo's first wave *ejidos* as well as the success of the CFEs, that the 1992 reforms' push to privatize the *ejido* sector was met with trepidation and in some cases, outright resistance by *ejidatarios* in Quintana Roo. Further, the region's large indigenous population viewed the 1992 reforms as another encroachment by the state. Most *ejidos* eventually entered into the land certification program created to facilitate the privatization process (PROCEDE). However, the vast majority (98%) chose to only certify common use lands and only 3 *ejidos* opted for formal privatization of common use lands (RAN, 2007). One reason why many *ejidos* chose to certify common use lands was due to an important

clause in the 1992 reforms that prohibited the division and alienation of commonly-held grass and forest lands (Ley Agraria, Article 59).

Despite the tepid formal response to the 1992 reforms, our previous research and studies from other regions in Mexico have found that *ejidos* adopted and reinterpreted aspects of the reforms without going to *de jure* private ownership (Barsimantov, Racelis, et al., 2010; Haenn, 2006; Nuijten, 2003; Perramond, 2008). Local responses included the certification of *ejido* boundaries and receiving certificates of common use shares that allowed for the continuation of illegal land sales, and the adoption of *de facto* private landholdings without undergoing the certification and titling process. The perceived cost of titling and fear of taxation caused many *ejidos* to follow this strategy. The resulting land tenure arrangements include elements of common and private ownership that hybridize *de facto* and *de jure* rights with varying and sometimes conflicting degrees of local and state recognition.

Methods and Analyses

We combine remote sensing with analyses of institutions, land use patterns and individual perceptions of forest dependency to reveal diverse drivers of land use and land cover change. This multiscale approach, linking landscape and local level information, provides a spatial and cultural context for the study and allows us to examine both the material and cultural changes brought about by Mexico's 1992 reforms. We selected eight *ejidos* within the municipality of Felipe Carrillo Puerto in Quintana Roo (Figure 3-1). The purposive sample included four *ejidos* that remained communally-held and four parcelized *ejidos* that had informally undergone some degree of privatization. The sample *ejidos* vary on a number of key characteristics, including area, population, livelihood activities and ethnicity (Table 3-1). Community forestry was

the livelihood basis for several *ejidos* in our sample, while other *ejidos* relied on different sources of income, including agriculture, cattle ranching, wage labor in tourism centers, and remittances from the United States.

We randomly sampled 10% of the total number of *ejido* members using member lists from the National Agrarian Registry (*Registro Nacional Agrario*) as our sampling frame and conducted interviews with 198 *ejido* members in 8 *ejidos* between November 2008 and June 2009. We asked participants to provide information regarding their land use, economic activities, involvement in forestry, and their knowledge and perception of the government certification and titling program. We also conducted interviews with key informants within *ejidos*, *Procuraduría Agraria* and forestry agencies to gather information about land tenure arrangements and forestry activities.

Institutional Analyses

Institutional analyses, with the objective of understanding the allocation of rights with *ejidos*, were based on interviews with *ejidatarios* and key informants, and transects of the *ejido* with key informants to understand the spatial distribution of rights. Building upon the results of previous research that categorized *ejido* land tenure arrangements on the continuum of property rights from individual to communal (Barsimantov, Racelis, et al., 2010), we determined the bundle of rights held by individual *ejido* members using Schlager and Ostrom's (1992) criteria.

Remote Sensing Analyses

We analyzed land use/ land cover change for the periods of 1984-2000 and 2000-2007/ 2010 in the eight *ejidos* selected for this study. We used a sub-set of land use/ land cover change data for the study region for years 1984 and 2000 obtained from previously conducted remote sensing by one of the authors (see Bray, Ellis, et al., 2004;

Ellis and Beck, 2004). LULCC analyses were updated for the second time period, 2000-2007/2010, using two Landsat 7-ETM images from December 5, 2007 (Path 19, Rows 46 and 47) and two Landsat 7-ETM images from February 28, 2010 (Path 19, Rows 46/47). The 2010 image was acquired in order to resolve problems with cloud cover and hurricane vegetation damage present in the 2007 image for some of our sample *ejidos*. Land use and land cover data were derived for eight *ejidos*, applying supervised classification image processing procedures based on 275 GPS ground-truthing points collected in field reconnaissance transects within sample *ejidos* in 2008 and 2009. Vegetation and land use cover categories classified among the different *ejidos* included upland forest, lowland flooded forest, fallow vegetation, agriculture/pasture and water. In order to detect forest cover change for the two time periods, images were reclassified as “forested” and “deforested”, where forested included upland, lowland and secondary forest (over 15 years of age) and “deforested” included agriculture/pasture as well as fallow vegetation (typically less than 10 years of age) originating from agricultural use and rotations. Areas with water, cloud cover and shadows were masked out for the analyses when present. Then, deforestation rates were calculated for each *ejido* for the periods 1984 to 2000 and 2000 to 2007/2010 using the formula $dn = [S2/S1]^{1/n}$ which is a standardized deforestation indicator for environmental monitoring in Mexico where dn = deforestation rate, $S2$ = forest cover in time period two, $S1$ = forest cover in time period one and n = number of years between time periods (Palacio-Prieto, Sánchez-Salazar, et al., 2004).

Forest Dependency Analysis

Forest dependency was measured both in terms of economic benefits from forest resources, as reported by interviewees in surveys, and in terms of individual

perceptions regarding their reliance on forest resources. To measure perceptions of forest dependency, we designed a Forest Dependency Index (FDI) comprised of 5 statements, in Spanish and Maya, about different dimensions of benefits from and dependence on forest resources (Table 3-4). The index was developed through exploratory interviews with key informants, pilot tested in three *ejidos*, and then analyzed in SPSS to test the index's reliability and reduce items to improve its unidimensionality (Bernard, 2002). For the purpose of this study, individual scores were averaged for each *ejido*.

Results

Bundles of Rights

None of the eight *ejidos* in our study chose to undergo the formal privatization process offered by the 1992 reforms, so they are still considered under Mexican law to be common property regimes. Despite their homogeneous *de jure* categorization, we found a wide range in the *de facto* land tenure arrangements within sample *ejidos*. Based on data from interviews and transect walks, we organized sample *ejidos* into three types of bundles of rights: common, mixed and parcelized. Figure 3-2 depicts the bundles of rights for each type. Individual rights are nested inside collective rights, and some rights are retained both individually and collectively.

The model of a common bundle of rights corresponded to the *ejidos* of Naranjal Poniente, Tihosuco, and X-Maben. In these *ejidos*, partial bundles of rights were allocated to individuals, including access/use and minimal management rights. In practice, this bundle of rights meant that individuals had access to common pool resources, including forest resources, such as firewood, non-timber forest products and some timber for non-commercial purposes. Individuals held management rights to

temporary landholdings; however, they could not exclude other *ejidatarios* from accessing these parcels for the collection of firewood or other forest products. In *ejidos* practicing community forestry, management rights were held collectively, meaning that decisions related to the management of common forest areas were determined by the *ejido* council or smaller sub-groups of *ejido* members. Alienation and exclusion rights were held exclusively by the *ejido* as a whole, meaning that any decisions regarding membership and the sale of *ejido* lands would be made collectively.

The parcelized bundle of rights corresponded to an almost full bundle of rights held by the individual and minimal rights held collectively. The *ejidos* of Nueva Loria, Chunhuhub and Reforma Agraria fit this model. In these *ejidos*, all common use areas had been informally privatized into individual landholdings. Individual landholders retained, in practice, a full bundle of rights within the landholding, including the right to manage the land without input from the *ejido*, as well as the right to exclude others. Despite the fact that *ejidatarios* did not hold a legal title to these *de facto* parcels, individuals held alienation rights. Land and membership sales could be made independently of the *ejido*. In these *ejidos* the most common form of alienation occurred when members transferred land along with the sale of their full membership rights. Sale of individual landholdings was more problematic due to the lack of title and legal ambiguity and thus less secure for the buyer, and these kinds of sales mostly occurred among *ejido* members. Once the membership rights were sold, the *ejido* no longer retained the right to exclude these new members, although the decision to open up *ejido* membership could still be exercised by the *ejido* council. Alienation rights were

still collectively held to a certain extent, in that the *ejido* retained the right to decide with two-thirds majority to convert the *ejido* to private property.

The mixed bundle of rights modeled the land tenure arrangements of partially parcelized *ejidos* of Noh Bec and Nuevo Israel. With regards to individual landholdings, individuals retained a full bundle of rights including access/use, management, exclusion and alienation. What differentiated the mixed bundle from the parcelized bundle was that the individual bundle of rights only applied to a portion of *ejido* land. Both Noh Bec and Nuevo Israel had common use areas, including collective forest reserves, and areas parcelized into individual landholdings. Individuals controlled access and management decisions within their landholdings. In addition, individuals could exclude others from individual landholdings as well as alienate individual landholdings with or without the sale of an *ejido* membership right. Management rights within common forest areas were still maintained collectively, resulting in the allocation of management rights in both the individual and collective bundles, as shown in Figure 3-2b. For example, an *ejidatario* could decide to reforest his/her individual plot; however, any management decision for common forest areas was determined by the *ejido* council. In Noh Bec, the *ejido* also controlled access/use and exclusion rights to collective forest areas through both rules and sanctions, as well as a guarded gate at the forest reserves entrance. In Nuevo Israel, it was unclear to what extent the *ejido* controlled access of collective forest areas.

Land Use Land Cover Change Patterns

Results from remotely sensed land cover change analyses and interviews with *ejidatarios* demonstrate diverse patterns of land use and land cover change within our sample. Figures 3-4 A,B,and C present forest cover change results for the eight *ejidos*

studied for the period between 1984, 2000, and 2010 (in some cases 2007). Between 1984 and 2000, forest cover remained fairly stable within our sample *ejidos* (Table 3-2). Six of the eight *ejidos* demonstrated increases in forest cover, while deforestation occurred in two of the *ejidos*, Reforma Agraria (-.55%/yr) and Nueva Loria (-.31%/yr). Between 2000 and 2007/2010, the rate of forest cover loss exceeded gains in seven of the eight *ejidos* (Figure 3-3). Deforestation rates were highest in three of the five *ejidos* categorized as “mixed” and “parcelized”. Deforestation was highest in Nuevo Israel, with over 5% annual loss in forest cover. High deforestation rates also corresponded with the *ejidos* that reported the largest landholdings and the most amount of land under cultivation. It is important to note that land cover change analyses were conducted for a portion of the *ejidos* of Nuevo Israel and Nueva Loria due to conflicting sources of information regarding *ejido* boundaries. Based on qualitative assessments of the images with the corrected boundaries, we do not expect deforestation rates to change significantly for these two *ejidos*.

The rate of deforestation was lowest in X-Maben (-0.19%/yr), Tihosuco (-0.65%/yr), Noh Bec (-0.24%/yr) and Naranjal Poniente (-0.50%/yr). These were all predominately commonly-held *ejidos*, with the exception of Noh Bec, which we categorized as “mixed”. These same *ejidos* reported the smallest individual landholdings and the smallest areas under cultivation. These *ejidos* were also among the largest in area. X-Maben and Chunhuhub demonstrated relatively stable forest cover during this time period. X-Maben showed less than .2%/yr loss in forest cover, while Chunhuhub actually showed a gain in forest cover of .15%/yr.

Interview data reveal a range of land use patterns among sample *ejidos*. Overall, *ejido* members in commonly held *ejidos*, with smaller bundles of rights, individually controlled and used less amounts of land than members in parcelized *ejidos*. Land use activities within commonly-held *ejidos* focused more heavily on agriculture rather than pasture or agroforestry systems. Within the commonly-held *ejidos* of X-Maben, Naranjal Poniente and Tihosuco the average landholding size for individual access and use was 4.6 ha. In these three *ejidos*, landholding size closely corresponded with land under cultivation in 2008, since in commonly-held *ejidos*, land claims were based on use, rather than formal recognition. Land was primarily used for *milpa* agriculture, with greater than 75% of the landholding dedicated to this activity. This comes in contrast to mixed and parcelized *ejidos* such as Reforma Agraria, Nueva Loria, Noh Bec, where interviewees reported dedicating less than 20% of their landholdings to agriculture, and Nuevo Israel, where interviewees dedicated 43% of the landholding to agriculture.

Interviewees within mixed and parcelized *ejidos*, with larger individual bundles of rights, reported larger landholdings, more land under cultivation and livelihood activities that were capital and time intensive. The average individual landholding size among these *ejidos* was 47.7 ha. Nueva Loria had the largest average landholding size of 63.36 ha, with some *ejido* members reporting landholdings up to 120 ha. While in many cases members in these *ejidos* reported using just a portion of their total landholding, the average land in use was still higher than *ejido* members in commonly-held *ejidos*. Further, land use activities within individual landholdings included activities beyond subsistence agriculture, including pasture, reforestation and market-oriented agricultural production. Nueva Loria, Reforma Agraria and Nuevo Israel demonstrated a lower

proportion of land dedicated to agriculture and more land dedicated to activities such as cattle production and reforestation. Cattle production and reforestation require capital investments in infrastructure, such as fences, as well as a long-term time horizon. Nueva Loria had the highest proportion of land in pasture, representing on average 65% of the landholding. Reforma Agraria had the highest proportion of land dedicated to reforestation, averaging 75% of land in use per *ejidatario*. In Chunhuhub, which underwent informal parcelization in 2005 allocating approximately 40 ha to each member, the average land under cultivation remained relatively low at 3.78 ha, just under 10% of the total landholding. Within individual landholdings, the majority of land use activities were focused on market oriented vegetable and fruit production, distinguishing these activities from the traditional *milpa* agriculture in commonly-held *ejidos*. The shift from *milpa* to market oriented agriculture was in part due to the presence of irrigation wells and large flat agricultural areas that were remnants of failed mechanized agricultural projects in the 1980s, as well as the fact that Chunhuhub is more centrally located to markets in Mérida, Felipe Carrillo Puerto and Jose María Morelos.

Forest Dependency

Considering our purposive sample of forestry and non-forestry *ejidos*, we expected a range of responses regarding forest benefits and perceived dependency. Average scores for forest dependency for sample *ejidos* ranged from 1.83 (least forest dependent) to 9.20 (most forest dependent) (Table 3-3). Table 3-4 provides scale items with percent responses for the total population. Forestry was central in terms of both economic benefits and perceived levels of dependency in three out of the eight *ejidos*, including Naranjal Poniente (average FDI score=8.5), Noh Bec (average FDI score=9.2)

and Reforma Agraria (average FDI score=8.6). Members in the remaining five *ejidos* reported few economic benefits, in some cases none at all, from forest resources. Levels of forest dependency, as measured by our Forest Dependency Index, varied from .80 to 4.1 among members of the non-forestry *ejidos*.

Noh Bec, Reforma Agraria and Naranjal Poniente reported large dividends from forestry and high levels of participation in forestry. Interviewees in these communities scored the highest on the forest dependency index. Land use and livelihood strategies reflected the centrality of forestry in these communities. *Ejidatarios* commented that forestry was the basis of their livelihoods, stating: “This is what we live from. *De allí vivimos.*” In Naranjal Poniente and Noh Bec, 100% of respondents and in Reforma Agraria 91% of interviewees reported receiving benefits from forest resources. One member commented that the profits from forestry “give us the money to buy food. *Nos da el dinero para comprar la comida.*”

In five of the eight *ejidos*, members reported few economic benefits from forest resources, on average less than 800 MXP (~80 USD) per year. Not surprisingly, members of these *ejidos* also scored lower on the forest dependency index. These members reported a variety of reasons for lack of benefits from forest resources. Some interviewees cited the lack of proper administration of timber harvesting at the community level, such that the benefits do not reach members. Others simply stated that there were no more valuable timber resources in their community. Another factor, according to interviewees, was the governmental restrictions on timber harvesting. In sum, a variety of factors made forestry either an unattainable benefit to these *ejidos*, or an unreliable income source.

Discussion

The aim of this study was to understand the relationships between land tenure arrangements following Mexico's 1992 agrarian reform, land use/ land cover change and forest dependency in *ejido* communities located in the forested landscape of Quintana Roo. We expected that forest cover loss would be greater within *ejidos* that had allocated a full (or close to full) bundle of rights to individuals, including access/use, management, exclusion and alienation. We expected low deforestation rates or forest cover maintenance in *ejidos* that were more forest dependent. Our findings suggest a close relationship between forest cover change, land use and land tenure arrangements. Forest dependency did not emerge as a key condition for stable forest cover.

In our analysis of forest cover change in the 26-year period between 1984 and 2010, we found that varying rates of change may be explained by historical and institutional factors. Overall, forest cover was quite stable between 1984 and 2000 for all *ejidos*, and some *ejidos* even experienced forest re-growth. This may be explained by several national and regional macroeconomic trends. First, the national economic crisis, structural adjustment programs reducing agricultural subsidies, and dropping commodity prices led to declines in agricultural production in the entire country. As a result, less land was converted to agriculture. Further, forest re-growth followed the failure of government rural development programs based on mechanized agriculture and cattle production that instigated a burst of deforestation in the '70s and '80s. Finally, the establishment of community forestry as an alternative livelihood strategy took hold in the region, resulting in the establishment of permanent forest reserves and new incentives for forest conservation (Bray and Klepeis, 2005).

Between 2000 and 2007/2010, we found more diverse patterns of forest cover change among our case study *ejidos*. Since most of the informal parcelization occurred between 1995 and 2005 among study *ejidos*, differences in forest cover change outcomes during this time period provide opportunities for comparison of the impacts of different land tenure regimes on deforestation rates. Deforestation rates were closely associated with distinct land use patterns within commonly-held and parcelized *ejidos*. We found that *ejidos* that remained commonly-held, where individual members were only allocated partial bundles of rights, experienced less forest cover change than *ejidos* that underwent informal parcelization, allocating full bundles of individual rights to forest resources.

Based on findings from land use land cover change analyses, descriptive statistics of land use reported by interviewees and qualitative evidence, we argue that there is a relationship between patterns of forest cover change and bundles of rights. We found that larger bundles of individual rights corresponded with higher rates of deforestation, the predominance of larger landholdings and the adoption of capital-intensive land use activities. All of the parcelized *ejidos* had larger individual landholdings, independent of the size of the *ejido*, than communally-held *ejidos*. With the exception of Chunhuhub, members of parcelized *ejidos* also reported more land in use and were involved in livelihood activities that required greater investment in terms of capital and time commitment, such as cattle production and irrigated market gardens. Our findings suggest that the allocation of a full bundle of rights led to individualization of land use and transformation of livelihood systems to more land extensive and capital-intensive activities, leading to a general trend of higher deforestation rates. These findings

confirm previous research by Barsimantov et al. (2011) that suggests that a full bundle of individual rights had negative consequences for forests and forest management.

Conversely, we found that minimal allocations of individual rights (smaller bundles of rights) resulted in lower rates of deforestation and the predominance of smaller landholdings and land use activities oriented towards traditional *milpa* agriculture or forest management. Several studies have shown that community forestry enterprises are an integral part of what is considered a “sustainable landscape” in Quintana Roo, with relatively low rates of deforestation (Bray, Ellis, et al., 2004; Dalle, de Blois, et al., 2006; Ellis and Porter-Bolland, 2008). Our study suggests that the land tenure arrangements that support community forest management, with minimal individual allocations of rights to forest resources, may contribute to low deforestation rates.

However, we also posit that community forestry is just one causal path to low deforestation rates. Land use activities, such as traditional *milpa* agriculture and even intensive market gardens, corresponded to smaller landholdings and lower deforestation rates. Land use patterns within commonly-held *ejidos* were dominated by the traditional *milpa* production, a slash and burn agricultural system which necessitates temporally and spatially flexible land tenure arrangements. Further, there is both an ecological and cultural rationale for *milpa* agriculture. This system is a long-standing indigenous tradition of resource management in the region (Gomez-Pompa, 1987), and in fact, three of the four commonly-held *ejidos* are predominately Maya. Interviewees in these *ejidos* expressed concern that privatization with common use areas would disrupt *milpa* agriculture. These findings correspond to previous research conducted in the study region that suggest the importance of ethnicity and cultural context in shaping

land tenure arrangements. *Ejid*os with a strong community forestry base as well as those dependent on *milpa* agriculture were those most resistant to privatization efforts. Members in these communities often expressed fear that parcelization would lead to the demise of both collective forest management and *milpa* agriculture.

We predicted that forest dependency would lead to lower rates of deforestation; however, our results demonstrated mixed evidence for this claim, suggesting the interaction of other explanatory factors. In support of our initial hypothesis, we found that the highest rates of deforestation occurred in the non-forestry *ejidos* of Nueva Loria and Nuevo Israel, fitting the model that less forest dependent *ejidos* would engage in land use activities that predicated the conversion of forest to pasture or agricultural plots. Additional evidence included the results that showed lower rates of deforestation in the forestry *ejidos* of Noh Bec and Naranjal that had the highest scores of forest dependency. Contrary to our initial hypothesis, we found that *ejidos* of Tihosuco, Chunhuhub and X-Maben, all of which had low forest dependency scores, had the lowest overall deforestation rates, suggesting alternative causal explanations for low deforestation rates. We found further contradictory evidence in the case of Reforma Agraria, which had one of the highest average scores of forest dependency, and still demonstrated moderate levels of forest cover change between 2000-2007/2010.

Alternative explanatory factors for low deforestation include *ejido* size and livelihood activities. *Ejid*os with the lowest deforestation rates were also the largest in area, such that in smaller *ejidos* there was more pressure on land resources, resulting in higher rates of deforestation. In addition, livelihood activities in the commonly-held *ejidos* (both forestry and non-forestry dependent) were restricted to small agricultural

plots, slowing the conversion of land to larger, more permanent agricultural plots and pasture found in parcelized *ejidos* (including both “mixed” and “parcelized” bundle types). In the case of Reforma Agraria, one plausible explanation is that, since the *ejido* was parcelized, forestry was practiced individually and some individuals are not involved in forestry at all, resulting in different levels of forest dependency. Therefore, land use and landscape patterns reflect diverse interests and activities.

Given the small sample size of this study, it is important to highlight some inconsistencies in our results and explain these outlier cases. We found greater evidence of reforestation by individual members of parcelized *ejidos* than within commonly-held *ejidos*. Given the opportunity costs and long-term horizon of reforestation efforts, the allocation of permanent landholdings with full bundles of rights, including exclusion, provide security that may be an important prerequisite for individual investment in reforestation. In addition, reforestation may require greater infrastructure, such as fencing, to protect plots from animal incursions, that is more likely to be found on permanent holdings. For example, in the case of Reforma Agraria, one of the *ejidos* with the longest history of informal parcelization, while deforestation rates remained relatively high between 2000 and 2010, we also found evidence of large investments in reforestation. This finding suggests that full bundles of individual rights may also provide greater individual incentives for some forest conservation activities.

Chunhuhub was an outlier in that it was the only parcelized *ejido* to experience stable forest cover between 2000-2010, according to our analysis. Given that the *ejido* allocated a *de facto* full bundle of rights to individual members and that Chunhuhub had a low level of forest dependency, we expected higher rates of deforestation as

individuals engaged in various non-forestry land use activities on newly created permanent holdings. Why didn't Chunhuhub experience broad scale changes in forest cover? Results demonstrated that while members were allocated some 40 has each, the actual amount of land in use was relatively small, and land use activities were more intensive than extensive. Few members were involved in cattle production, although many were engaged in intensive small-scale vegetable and fruit production destined for local and regional markets. In addition, Chunhuhub had a large proportion of *ejido* members who were engaged in non-land based livelihood activities, such as government service and commercial enterprises. For these members, their landholdings might be used to supplement family subsistence, or simply maintained as a household asset that can be capitalized in times of need. Lastly, our observations in the field and from satellite imagery attest to the fact that land use change is occurring in Chunhuhub. The particular fishbone pattern along the main highway, combined with the rising frequency of *ejido* membership rights sales in Chunhuhub, suggest that more land cover change is imminent.

In this study, we examine how *ejidos* responded to Mexico's 1992 agrarian reforms, with particular attention to how local hybrid institutions, with varying bundles of rights, shaped land use and forest cover change patterns. The small sample size of this study limits our ability to apply our findings to Mexico's vast *ejido* system in response to agrarian reform, nor can these results predict what is to come for Mexico's *ejidos* and its rural landscape. Rather, our findings provide an account of the varying environmental outcomes of Mexico's agrarian reform, pointing to a dynamic landscape, in which

changing institutional arrangements within Mexico's *ejidos* are important drivers of land use and land cover change.

We highlight that the privatization process may be linked to increased conversion of forests to other land uses. We found that commonly-held *ejidos*, with smaller bundles of individual rights, experienced less deforestation than *ejidos* that had fully or partially parcelized, devolving larger bundles of rights to individuals. Under these varying land tenure regimes, individuals had different impacts on the landscape. On the one hand privatization, albeit informal, has provided new opportunities for greater capital investment in individual landholdings and a diversification of livelihood activities to include cattle production, market vegetable production and agroforestry. While in most privatized *ejidos* greater deforestation rates were encountered, in cases where agroforestry and a land intensive market crops were implemented forest cover loss was low. Conversely, commonly-held *ejidos* may be more effective at conserving forested areas while forests provide economic benefits to *ejido* members via community forest management, a seemingly win-win situation. However, we also found cases of commonly-held *ejidos* with low deforestation rates where livelihoods were based primarily in subsistence agriculture, with few options and incentives for individual investments in the land. While we have strong evidence that commonly-held *ejidos* had lower deforestation rates than privatized *ejidos* in our study, we cannot conclude that there are deterministic relationships between land tenure arrangements and environmental outcomes, as Hardin and some proponents of common pool resource management would assert. Further, we caution against overly praising the benefits of the commons, if, in fact, they become poverty traps for their inhabitants.

Table 3-1. Description of eight sample *ejidos* including total area, number of *ejidatarios*, origin and ethnicity, involvement in forest management and land tenure status.

<i>Ejido</i>	Total area (ha)	Number of <i>ejidatarios</i>	Origin And Ethnicity	Level of involvement in forest management	Land tenure
Chunhuhub	15,819	333	QRoo, Yucatán Mixed	None	Privatized
Naranjal Poniente	13,230	147	QRoo, Yucatán Maya	High	Common
Noh Bec	24,123	219	Central Mexico Mestizo	High	Mixed
Nueva Loria	3147	33	Central Mexico Mestizo	None	Privatized
Nuevo Israel	8726	104	Yucatán Maya	Moderate	Mixed
Reforma Agraria	2457	34	Central Mexico Mestizo	High	Privatized
Tihosuco	56,686	809	QRoo, Yucatán Maya	None	Common
X-Maben	73,400	544	QRoo, Yucatán Maya	Moderate	Common

Table 3-2. Average landholding size per *ejido* member, average amount of land in use and annual forest cover change rates 1984-2000 for sample *ejidos*.

<i>Ejido</i>	Land holding size (avg. ha/ member)	Land in use (avg. ha/ member)	Forest cover change 1984-2000
Chunhuhub	41.6	3.8	0.91
Naranjal Poniente	4.5	2.3	0.18
Noh Bec	84.4	10.7	0.29
Nueva Loria	63.4	29.5	-0.31
Nuevo Israel	28.2	16.1	1.3
Reforma Agraria	57.6	11.8	-0.55
Tihosuco	4.3	4.3	0.16
X-Maben	5.2	5.0	0.07

Table 3-3. Forest Dependency Index with item responses for total population.

Forest Dependency Scale Items	Agree	Don't Know/ Neutral	Disagree
Earnings from timber sales represent the majority of your household income.	33.7%	0	66.3%
Forest management is most important for the <i>ejido's</i> economy.	68.4%	6.2%	25.4%
Agriculture provides more income than timber sales for your family.	62.5%	7.3%	30.2%
You receive benefits from forest resources, such as timber sales, polewood and thatch.	42.5%	.5%	57.0%
You work in the <i>ejido's</i> forestry operation.	43.0%	0	57.0%

Table 3-4. Forest dependency results showing average Forest Dependency Index score per *ejido*, average earnings from forestry, and percent of individual landholding dedicated to forestry activities.

<i>Ejido</i>	Forest Dependency Index Score (average score for <i>ejido</i>)	Earnings from Forestry in 2008 (average per respondent MXP)	Percent individual landholding dedicated to forestry activities*
Chunhuhub	2.48	150	23%
Naranjal Poniente	8.47	4047	13%
Noh Bec	9.21	20204	44%
Nueva Loria	.80	0	16%
Nuevo Israel	3.70	0	43%
Reforma Agraria	8.55	23214	79%
Tihosuco	2.78	800	5%
X-Maben	4.10	512	16%

*Note. Forestry activities include reforestation and fruit/ citrus production.

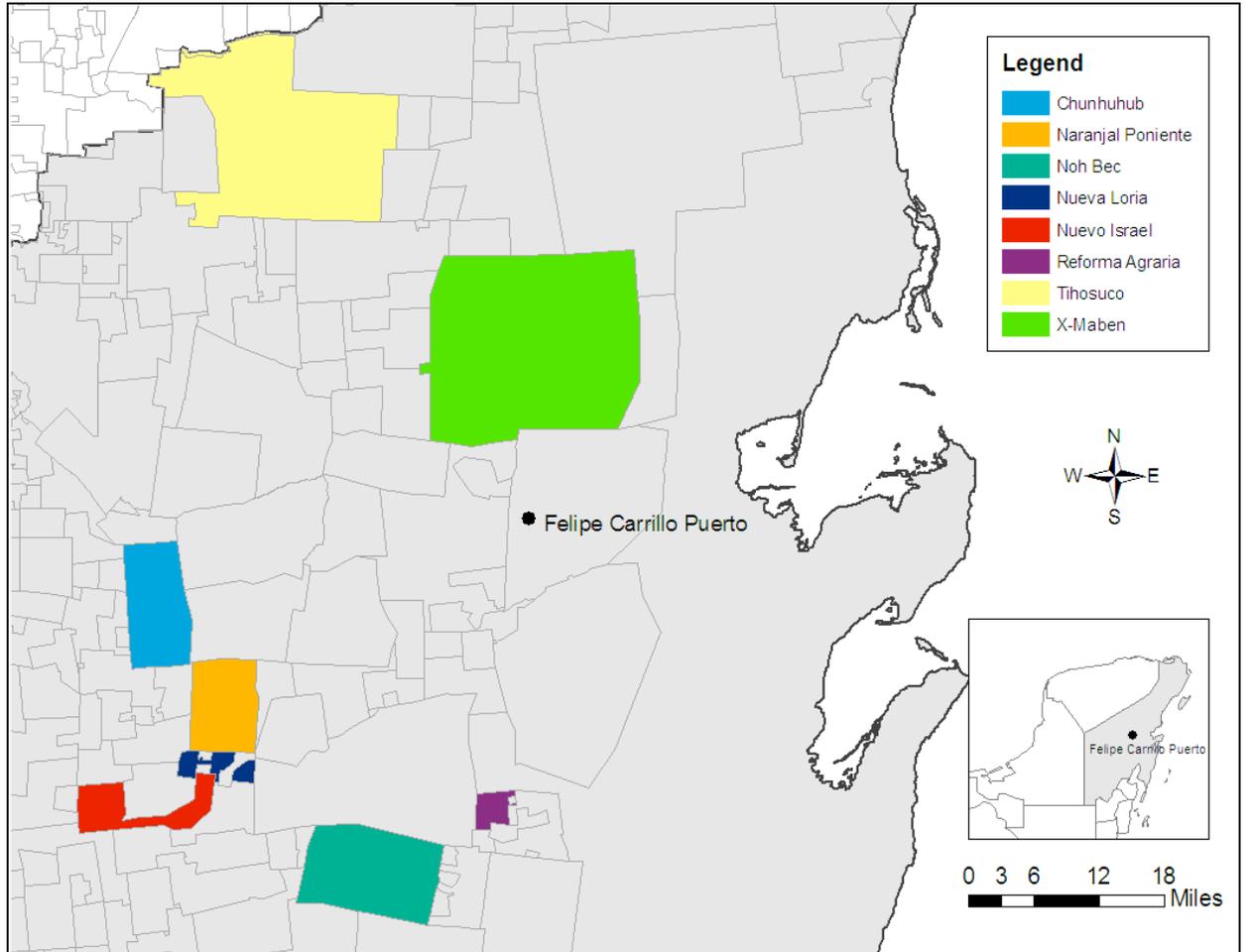


Figure 3-1. Map of the study site location in Quintana Roo, Mexico, with sample *ejidos*. Insert shows location of Quintana Roo in relation to the Yucatan peninsula.

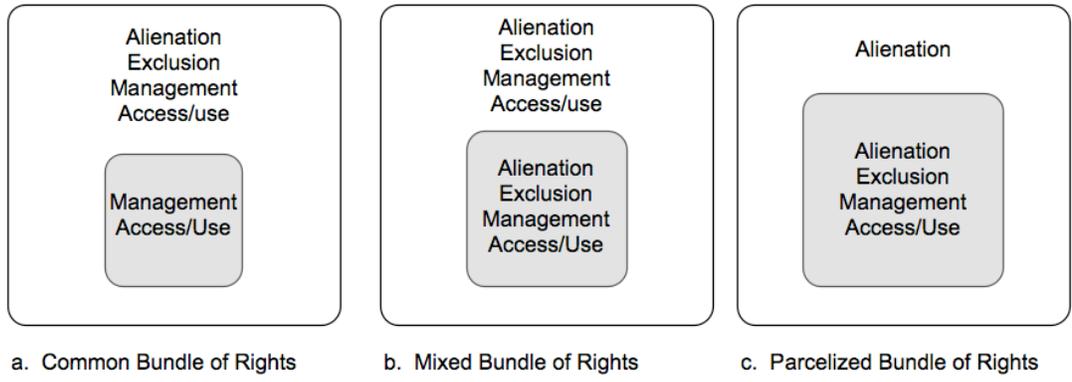


Figure 3-2. Typology of bundles of rights with sample *ejidos*. Individual bundle of rights are depicted in gray, nested within the collective bundles of rights, depicted by the white outer shell.

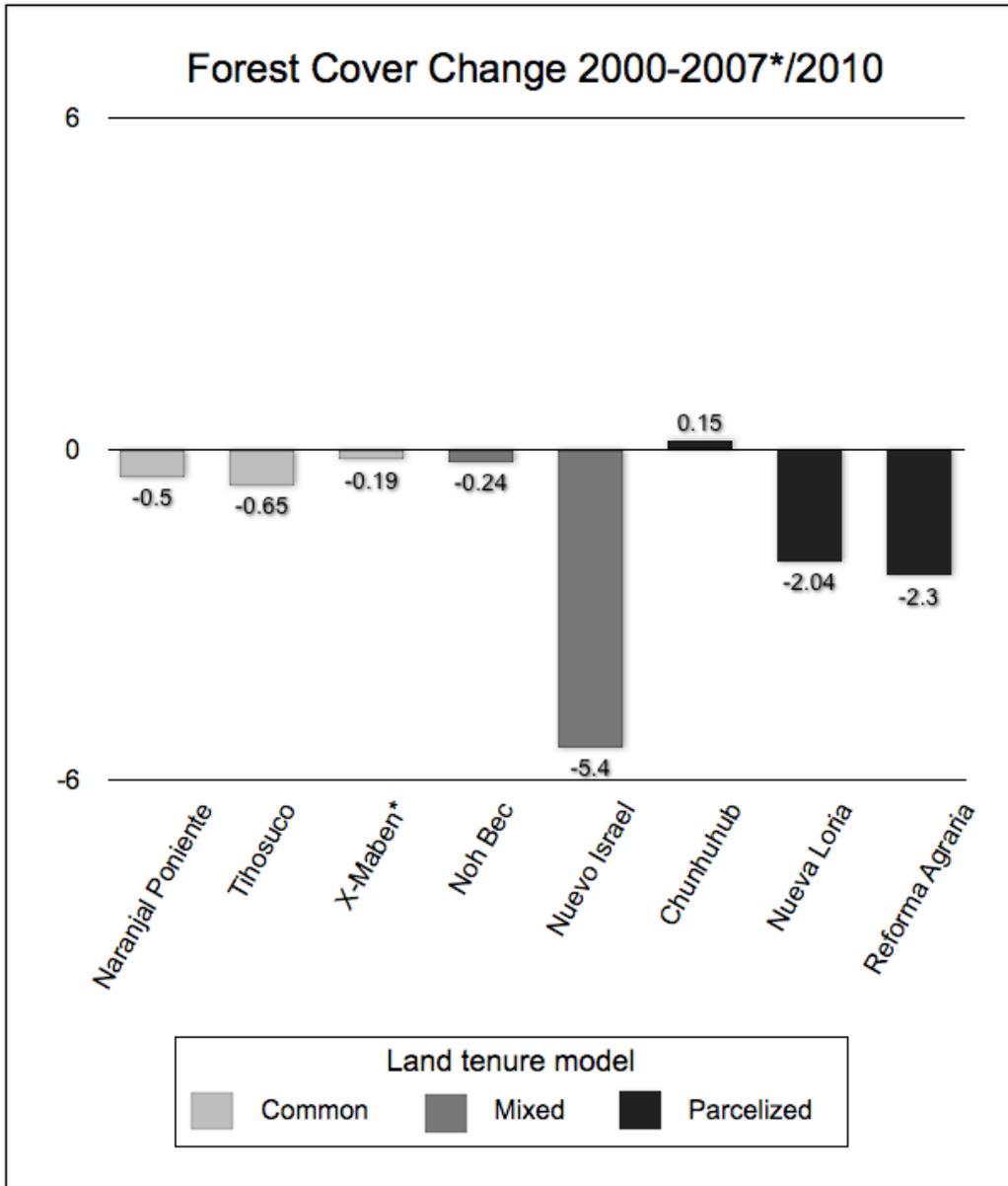


Figure 3-3. Annual forest cover change rates for the period 2000-2007*/2010 displayed by *ejido* and bundle of rights type.

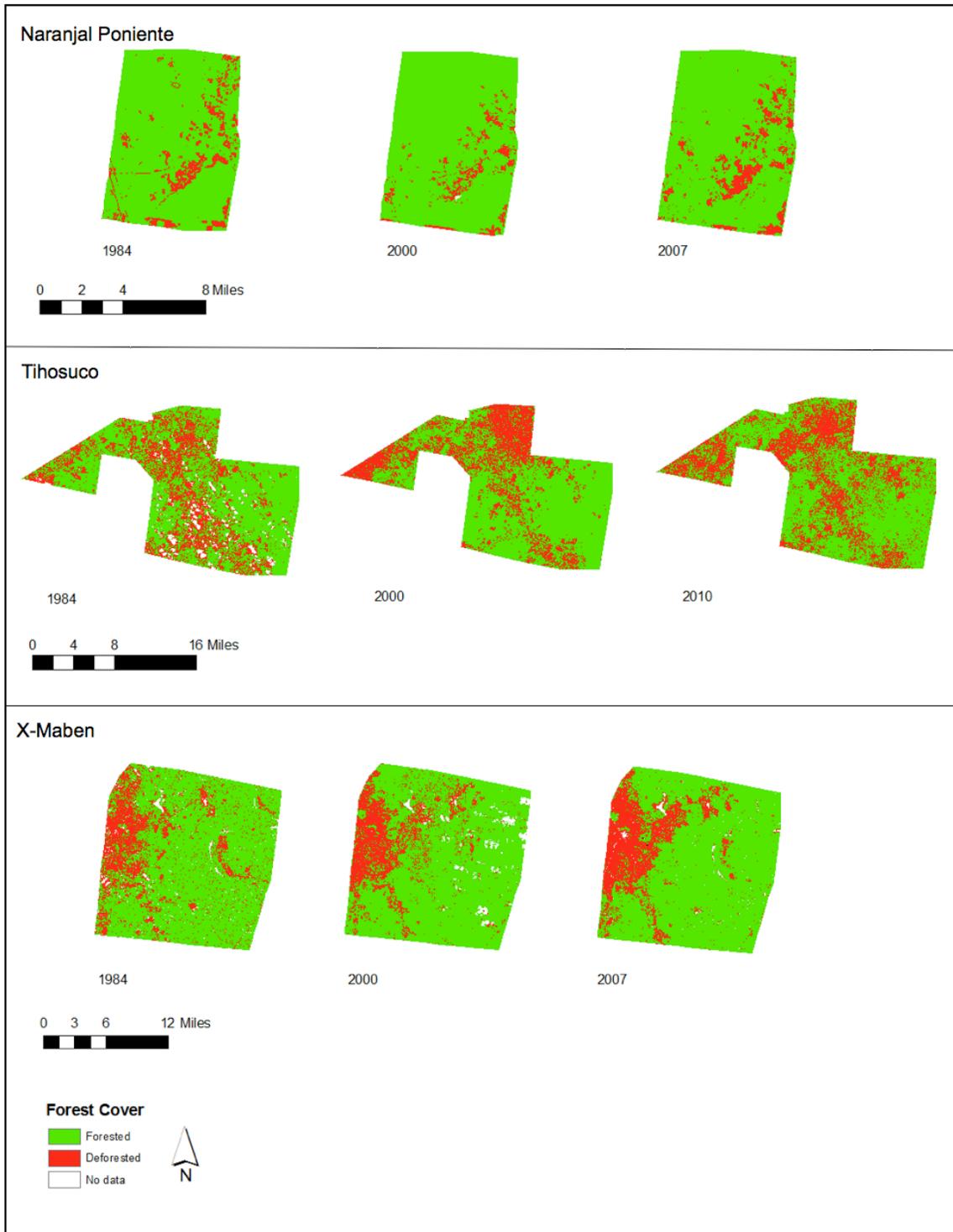


Figure 3-4. Forest cover within commonly-held *ejidos* (“common” bundle of rights) for the dates 1984, 2000, and 2007/2010.

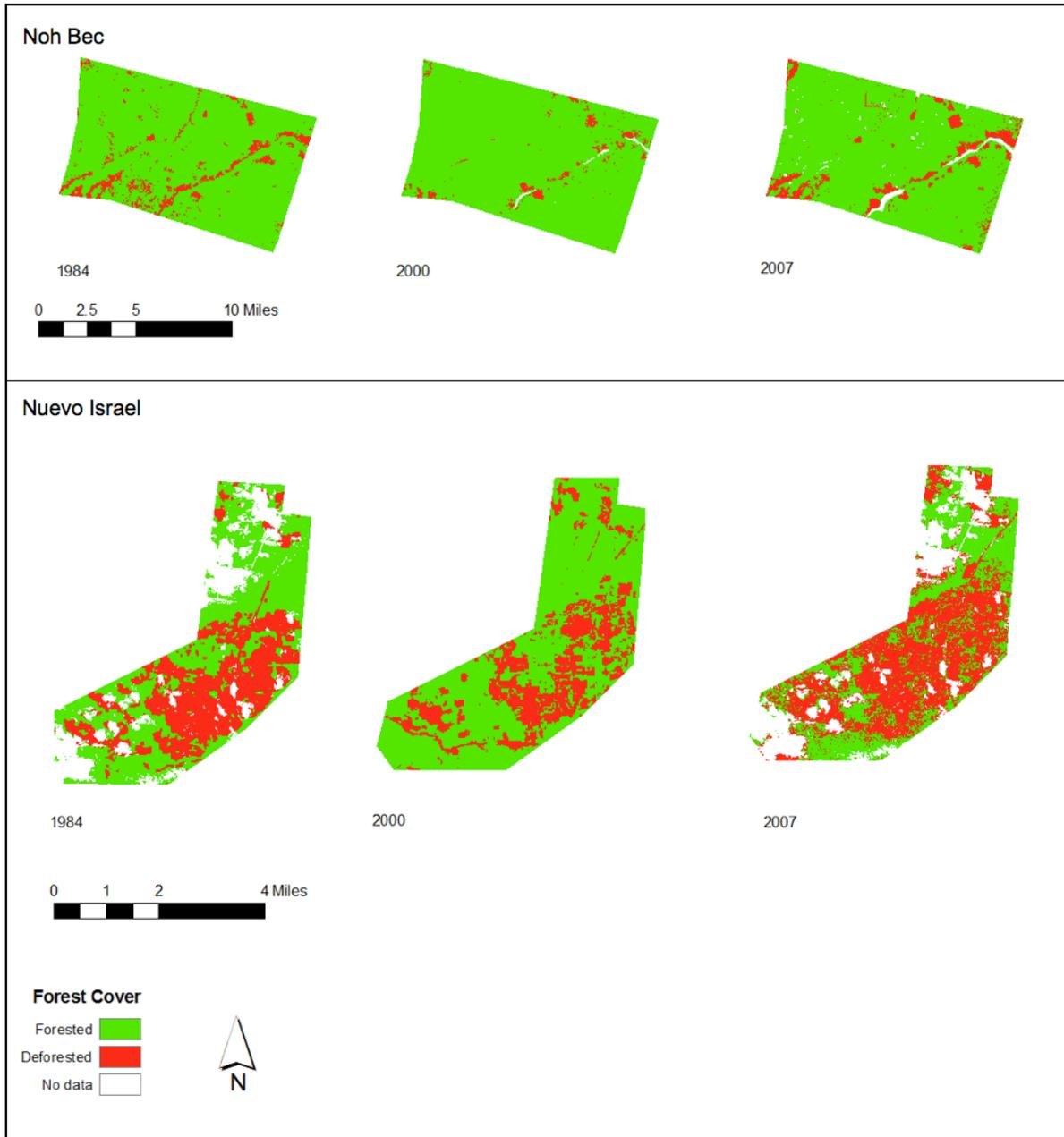


Figure 3-5. Forest cover within partially parcelized *ejidos* (“mixed” bundle of rights) for the dates 1984, 2000, and 2007.

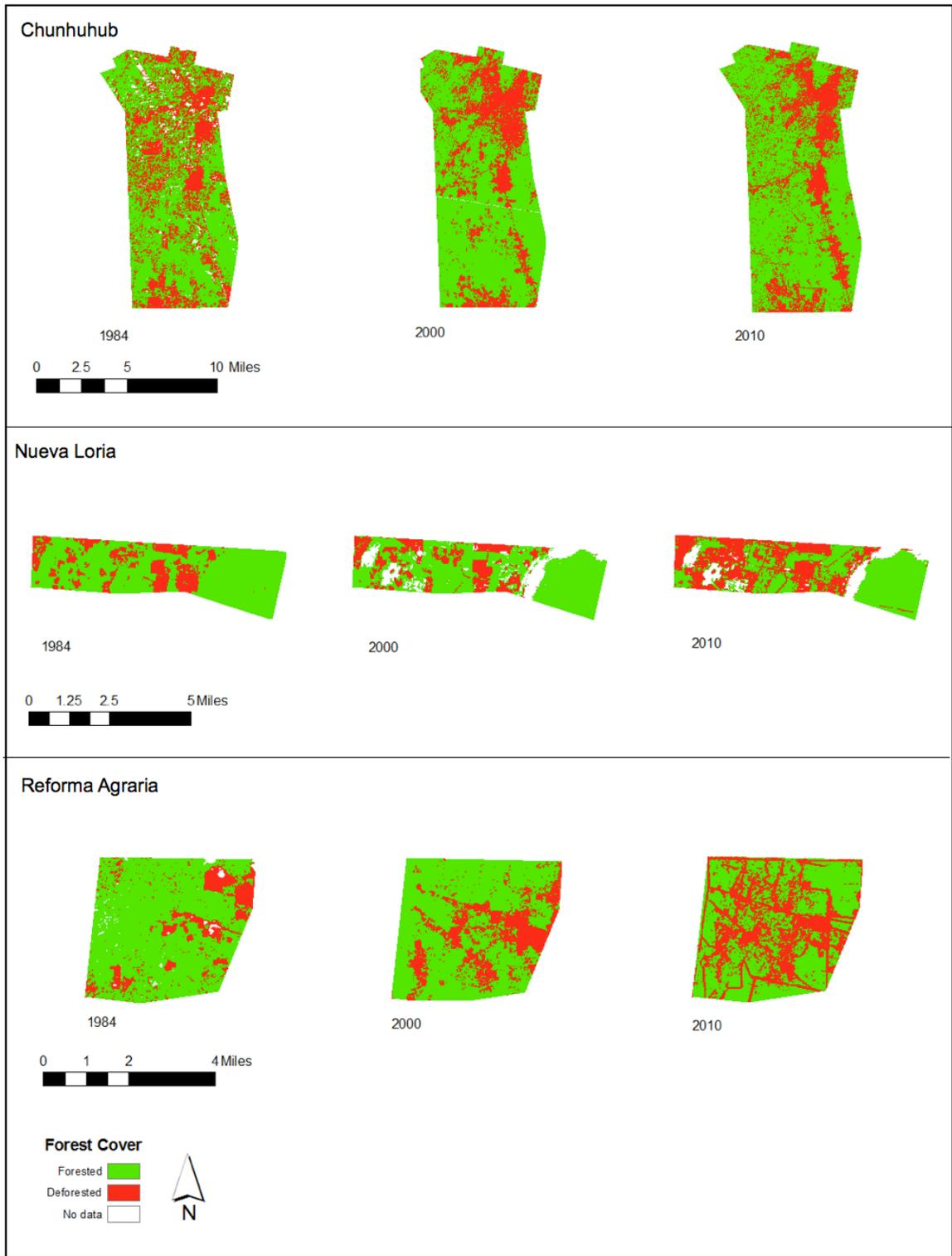


Figure 3-6. Forest cover within parcelized *ejidos* (“parcelized” bundle of rights) for the dates 1984, 2000, and 2010.

CHAPTER 4

ATTITUDES TOWARDS LAND PRIVATIZATION AND *EJIDO* MEMBERSHIP SALES AMONG COMMON PROPERTY REGIME RESIDENTS IN MEXICO

All times have their spaces through which ideologies are inscribed, codes embodied, histories redefined, and social relations reconfigured. Postrevolutionary Mexico's was the *ejido*. (Craib, 2004: 219).

Mexico's 1992 agrarian reforms not only altered the institutional foundation of the rural sector, but also changed how people think about land and rights to land through the transformation of the nation's common property regime, known as the *ejido*. The 1992 reforms opened up the possibility for privatization of collective *ejido* lands and legalized the sale of *ejido* land. Membership rights to the *ejido*, which guarantee access to land and participation in decision-making, were also liberalized following the reform, allowing individuals to identify a successor and even sell the membership right, a privilege that was previously retained by the *ejido* council. Research has shown a tepid response to the push to privatize and the opening up of *ejido* land to the market (De Ita, 2006). Localized and diverse outcomes of a macro-scale policy demonstrate the role of local actors and contexts in the interpretation, negotiation and redefinition of the 1992 reforms' agenda to privatize (Nuitjen, 2003; Stephen, 1998a).

This chapter investigates attitudes towards land privatization and *ejido* membership sales in order to explore the relationship between institutional change and ideological changes in actors' worldviews. In order to understand these complex relationships, we developed indices to measure and compare attitudes within eight *ejidos* in southeastern Mexico with distinct land tenure arrangements, ranging from predominately communally-held to informally privatized, as well as varying ethnic characteristics and livelihood strategies.

Our previous research on Mexico's 1992 reforms examined how *ejidos* have evolved as hybrid land tenure institutions, ranging on a continuum from communal to private property. Further research demonstrates that these land tenure institutions shape distinct land use and land cover patterns. This research moves beyond these material changes within the *ejido* sector following Mexico's 1992 reforms to examine changes within the ideological domain of attitudes and perceptions of land and *ejido* membership. Specifically, this research seeks to answer the following questions:

- How do different social groups perceive land privatization and *ejido* membership sales?
- Do attitudes vary according to land tenure arrangements?
- Do attitudes vary by demographic characteristics, including age, gender, origin, ethnicity, *ejido* membership status and wealth?

This research merges ideas from the study of common property regimes, which focuses on institutional change, with political ecological and anthropological inquiries into how property rights reforms are interpreted by actors at different scales and how new ideologies are shaped (Agrawal, 2005; Batterbury and Fernando, 2006; Cleaver, 2000; Mackenzie, 2005). At the intersection of these conceptual frameworks is the idea that property rights are essentially relationships between people, not between people and things (Macpherson, 1978). Property rights, or land tenure arrangements, embody complex social and economic relationships among actors.

Changes to property regimes, such as Mexico's 1992 reforms, therefore alter relationships between people, institutions and the environment, as well as shape new ideologies of resources and rights. Agrawal argues that institutional changes are "also accompanied by changes in the conception of the self" (2005: 220). He argues that changes in politics, institutions, knowledges and ideologies should be examined

holistically to understand how new knowledges, ideologies and institutions are produced. Agrawal cautions against a unidirectional relationship between institutional change and ideologies, stating that “institutions are not just the product of existing preferences- they are also in important ways the generators of new preferences” (2007: 128).

Research into the constructed knowledge of nature, and the “nature” of knowledge has contributed to political ecology’s inquiry into the ways in which humans experience and perceive environmental change differently (Bryant, 1991). Within political ecology, poststructuralist and discourse theory call for a critical examination of the social construction of nature, emphasizing the infusion of power relations in all aspects of knowledge, speech, actions and perception. This requires in-depth “political-ecological thick description” of mental models, institutions and ideologies through which human interpret the environment (Peet and Watts, 1996: 38). The poststructuralist political ecology approach has important ramifications for property rights, as it “demonstrates the political embeddedness of the relationship between people and land and recognizes that this relationship is bound up with not only material relations of production but also the frameworks of meaning through which land rights are negotiated” (Mackenzie, 2005: 108).

Studies have shown how perceptions, social norms, discourse and actor interests play an important role in defining land tenure institutions (Craib, 2004; Li, 1996; Meinzen-Dick and Mwangi, 2008). For example, Broegaard (2005) found that Nicaraguan landholders’ perceptions of land tenure security were molded by local social, economic and historical contexts, regardless of *de jure* protections of land titles.

The dominance of perceptions over *de jure* security may be more apparent in situations of institutional pluralism, where different *de jure* and *de facto* land tenure arrangements may co-exist. Further, he argued that landholders made decisions based on perceived, rather than actual, land tenure security. The findings from this study demonstrate that perceptions are pivotal in how local actors respond to institutional changes.

Key findings from inquiries into the social construction of land and property demonstrate how actors perceive land differently, revealing material and ideological struggles over access and control of resources at the micro-level (Agrawal, 2005; Escobar, 1996; Mackenzie, 2005; Moore, 1993; Reddy, 2002; Robbins, 2000; Scott, 1998). Research has shown that interests, knowledge and perceptions may vary within seemingly homogeneous communities, revising the persuasive narrative of “community” as an “organic whole” with shared interests, norms and understandings (Agrawal and Gibson, 1999; Cleaver, 2000; Robbins, 1998; Singleton and Taylor, 1992). As we gain a greater understanding of the ways in which power and knowledge is unevenly distributed within communities, we may take a more critical look at the ways in which individual experiences vary under the same institutional arrangements.

Parcelization and *Ejido* Membership Sales following the 1992 Reforms

This study builds upon previous research exploring evolving land tenure institutions in the municipality of Felipe Carrillo Puerto, Quintana Roo, Mexico to explore the ideological underpinnings of privatization. In this section we identify and define two aspects of the 1992 reforms of interest for this study: parcelization and the sale of *ejido* membership rights. Findings from previous research demonstrate that while few *ejidos* have opted for legal privatization following the reforms, several *ejidos* have undergone informal privatization processes, often referred to as *parcelamiento* in Spanish, and

what we term parcelization. Parcelization entails the division of some or all of *ejido* lands into individual parcels, which are internally recognized as “private property” but lack legal title. In effect, the *ejido* maintains the *de jure* shell of communal property while informally adopting some aspects of private property. As a result, land tenure institutions may be characterized as common, mixed and parcelized, with varying bundles of collective and individual rights.

Land and membership sales within *ejidos* were occurring long before the 1992 reforms (Assies, 2008; Bouquet, 2009; Nuijten, 2003). Proponents of the 1992 reforms believed that legalizing land sales would regularize already occurring illegal practices (Assies, 2008); however, there is little evidence that the reforms succeeded in this respect (De Ita, 2006). While some *ejidos* have been quite resistant to the idea of land sales and strictly prohibit the sale of land or membership rights, other *ejidos* have been open to the sale of land and membership rights. The prevalence of *de facto* parcelization as the main mechanism for privatization in Quintana Roo, in lieu of obtaining legal title, is problematic for formal land sales since *de facto* landholders do not possess a legal title. As a result, our previous research in Quintana Roo found that the most common mechanism to buy and sell *ejido* land is through the sale of *ejido* membership rights, combining land and membership privileges in one package (Barsimantov, Racelis, et al., 2010). Selling membership rights to those outside of the *ejido* is legally allowed under the 1992 reforms. In selling the membership right, the *ejidatario* cedes all rights to use *ejido* lands, as well as all future benefits from the *ejido* and any participation in *ejido* level decision-making. In turn, the buyer claims these rights. In a previous study of 27 *ejidos* in the municipality of Felipe Carrillo Puerto, we

found that sale of rights or land had occurred within over half of the *ejidos*. In some cases, a decision to sell land or membership rights must first be ratified by the *ejido* council, which is usually granted. In other cases, more typically in the *ejidos* that are *de facto* privatized, individual *ejido* members can sell land or membership rights without negotiating with the *ejido* assembly and then simply notify the *ejido* council once the sale is complete.

Study Site and Methods

Based on our previous research in the municipality of Felipe Carrillo Puerto, Quintana Roo, we purposively sampled 8 *ejidos* in the study region to capture variations in land tenure arrangements, economic activities, origin, ethnicity and history. Table 4-1 describes key characteristics of the sample *ejidos*. *Ejidors* display a range of land tenure arrangements, which we characterize as:

- Common, meaning lands are collectively held with some individual access and use rights.
- Mixed, denoting a mix of collective and individual holdings.
- Parcelized, denoting informal privatization of at least 50% of *ejido* lands.

Within sample *ejidos*, livelihood activities were mostly forestry and agriculturally based, and for each *ejido*, we reported the most prominent livelihood activities. Based on census data as well as information from key informants, we noted the origin and ethnicity of *ejido* residents. Differences in origin, ethnicity and livelihood activities among sample *ejidos* were strongly influenced by two distinct periods of *ejido* establishment in Quintana Roo. Older *ejidos*, inhabited by Mayan people originating from the states of Quintana Roo or Yucatán, were established to promote collective

forest management, while more recently established *ejidos*, inhabited by Mestizo colonists from central Mexican states, were established as primarily agricultural *ejidos*.

In order to capture maximum variance in the total population of our study sites, we randomly sampled 10% of *ejido* members, using *ejidatario* lists from the National Agrarian Registry (*Registro Agrario Nacional*) as our sampling frame. For each *ejidatario* interviewed, we also interviewed another member of the household, usually the *ejido* member's wife or child older than 18 years. Participants were interviewed in Spanish or Maya with the help of bilingual (Spanish/ Maya) research assistants.

Between November 2008 and June 2009, we conducted 352 interviews with *ejido* members and non-*ejido* members in 8 different *ejidos*. Two survey instruments were designed, one for *ejido* members and one for non-*ejidatarios*. The *ejidatario* survey consisted of structured questions regarding demographic information, land use, economic activities, income and household assets, and participation in *ejido* governance. In order to measure wealth, we created a Household Assets Wealth Index (HAWI), which scored *ejido* members on whether or not they possessed 18 material items. Using SPSS, we ran scale reliability analyses and reduced the number of items to 12, achieving a Cronbach's alpha of .760 (n=192).

In addition, the survey included structured and semi-structured questions regarding knowledge and attitudes regarding the Program for the Certification of *Ejido* Land Rights and the Titling of Urban Housing Plots (PROCEDE, *Programa de Certificación de Derechos Ejidales*), land parcelization and the sale of *ejido* membership rights. The non-*ejidatario* survey was essentially a shortened version of the *ejidatario* survey, and solicited data on participants' demographic characteristics, economic

activities, as well as their knowledge and attitudes regarding PROCEDE, land parcelization and the sale of *ejido* rights.

We developed two indices to measure attitudes regarding parcelization (Parcelization Attitudes Index: PAI) and attitudes regarding the sale of *ejido* rights (Sale of *Ejido* Rights Attitude Index: SERAI). First, we conducted exploratory interviews and freelisting exercises with key informants in the study region to examine existing attitudes regarding parcelization and the sale of *ejido* rights and to generate a list of indicator statements for the two concepts. We collected 20 indicator statements regarding parcelization attitudes and 15 regarding attitudes towards the sale of *ejido* rights. The statements were translated from Spanish to Maya and included both positive and negative indicators. We chose to use a three point Likert-type scale, so that for each statement, respondents chose “Yes, I agree”, “No, I don’t agree” or “Don’t know/Neutral”.

A pilot test of the item pool for each of the two indices was conducted in October 2008 in three *ejidos* that were fairly representative of the variability in study site population. We conducted 76 pilot surveys with Spanish and Maya speaking research assistants. The responses were scored, and then reliability tests and factor analyses were conducted in SPSS to test index reliability and to reduce items for the final survey. We used Cronbach’s alpha and the inter-item correlation to test how well items were correlated and to delete items that were not correlated and therefore not measuring the same unidimensional concept (Bernard, 2002). We used the Cronbach’s alpha score of .7 or above to indicate scale reliability (DeVellis, 2003). After completing these analyses, the PAI was reduced to 8 items and the SERAI was reduced to 6 items.

We also conducted a factor analysis in SPSS to test the unidimensionality of the scales. Factor analysis is a means of “identifying and interpreting underlying variables” of a social phenomenon (Bernard, 2002: 642). It is also a way of reducing data to a few key variables. Our goal was to have each scale measure a single underlying factor of attitudes. First, we used SPSS to assess the factorability of the data sets, using Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The KMO index score ranges from 0 to 1, and a measure of .6 is the minimum value for a good factor analysis (From SPSS Survival Manual). KMO index scores for the PAI [.806] and SERAI [.734] indicated the dataset was appropriate for factor analysis.

Next, we used Principal Components Analysis in SPSS to extract the factors that explain the underlying relationships or dimensions in the scale. We used Kaiser’s criterion to retain items that contribute substantially to explaining the total variance of the scale with an eigen value of 1.0 or more (Pallant, 2005). The PAI had 2 factors with eigen values of 1.0 or more, meaning that two factors explained the majority of variance in the scale. The SERAI had just one factor with an eigen value of 1.0 or more, and one factor with an eigen value of .966, meaning that two components explained the variation of underlying relationships between scale items.

Next, we used the factor rotating function, Varimax, in SPSS to interpret the pattern and structure of the factor loading. For PAI, the results demonstrated that each variable loaded strongly on one component or factor, and each component had several strongly loading variables (Pallant, 2005). For the PAI, several variables representing the benefits of parcelization strongly loaded on one component. The other component was represented by one strongly loaded variable regarding inequalities associated with

parcelization. In this case, components were interpreted to represent positive (benefits) and negative (inequalities) aspects of parcelization. The initial factor analysis on SERAI showed 2 strongly loaded components. One had an eigen value of 2.32, the second had an eigen value of .966. We considered .966 to be a high enough eigen value to run the factor rotation Varimax test. We found that variables representing positive attitudes towards rights sales loaded strongly on one factor, while variables representing negative attitudes towards rights sales loaded strongly on the second factor.

The PAI and SERAI were administered as part of the questionnaires for *ejido* members and household members. Once data were collected, we ran the reliability tests once again in SPSS. The eight-item PAI achieved a Cronbach's alpha score of .734. For the SERAI, items that did not contribute to the scale reliability were deleted in order to improve the Cronbach's alpha score. The final index of 4 items produced a Cronbach's alpha score of above .687, within the range of acceptable reliability. Respondents scores for PAI and SERAI were then tallied and standardized to a scale from 0-10, using the formula: $[\text{SUM}(\text{respondents score}) - \text{min. possible score} / \text{max possible score} - \text{min. possible score} * 10]$. For both PAI and SERAI, lower scores indicated negative attitudes, while higher scores indicated more positive attitudes.

Results

First, we present results from our attitudinal indices, PAI and SERAI, for the total sample. We then characterize emergent themes in attitudes towards parcelization and the sale of *ejido* rights, based on an analysis of ethnographic data from surveys. Lastly, we present results from statistical tests of the relationships between attitudes and various factors.

The overall mean score for PAI was 5.51 (SD=2.35) and the overall mean score for SERAI was 5.5 (SD=2.35). Scale items and responses for PAI and SERAI are shown in Tables 4-2 and 4-3. There was a strong positive correlation between PAI and SERAI scores ($r=.495$, $n=350$, $p<.000$), meaning that those who held positive attitudes towards parcelization also held positive attitudes towards the sale of *ejido* membership rights.

Attitudes Regarding Parcelization (PAI)

Table 4-2 presents the Parcelization Attitude Index (PAI) with percent response for the eight scale items. Despite the fact that only half of our sample had undertaken some form of parcelization, many respondents agreed with certain benefits regarding parcelization. For example, the majority of respondents agreed that parcelization provides more security to *ejidatarios* (71.5%) and that parcelization assures future benefits from work (80%). Positive attitudes towards parcelization were linked to individual freedom, better resource management and greater security. Negative attitudes towards parcelization were related to inequity, discordance with the original collective intent of the *ejido*, and fear of increased land sales that would result in greater marginalization.

Several respondents asserted that parcelization allowed more individual decision-making, allowing *ejidatarios* more freedom in land use and participation in programs. Despite the fact that none of the *ejidos* in the study region have legal titles to the informally created parcels, respondents often invoked the idea of private property when discussing the freedoms concomitant with parcelization. One respondent said, "You can plant whatever you want because it is your property. *Puedes sembrar los que*

quieres porque es tu propiedad.” Individual freedom was also associated with elimination of freerider problems. One interviewee stated;

In every *ejido* there are two kinds of people: those who want to take advantage and take more, and those who want to conserve and take less. We eliminated this when we parcelized here. *En cada ejido hay dos tipos de personas, los que quieren aprovechar y toman mas, y los que quieren conservar y toman menos. Eliminamos esto parcelando aqui (Reforma Agraria).*

Negative attitudes towards parcelization were concurrent with three themes: inequity, marginalization, and the original intent of the *ejido*. Interviewees stated that collective, rather than individual rights, secured equal access to resources and their benefits. One stated: “‘Common’ means that everyone receives an equal share of the benefits of mahogany. *Global quiere decir que le tocan igual los beneficios de la caoba*” (*Noh Bec*). Another interviewee referred to shared benefits and shared dependence under a common regime, “Because if things are shared collectively it generates a common benefit. We all depend on everything. *Porque si uno tiene cosas globalmente se hace beneficio comun. Todos dependemos de todo.*” Some respondents expressed fears that parcelization would lead to decreased access to resources, especially with an uncertain future. In response to the statement that “parcelization gives more security to *ejidatarios*”, one interviewee stated, “On the contrary, with a one hectare parcel, what happens if the firewood runs out? There is nowhere else to go. *Al contrario, con una parcela de una ha, que pasa si termina la leña? No hay otro lugar para ir*” (*X-Maben*).

Respondents expressed fear that parcelization would or had led to greater inequity. The overwhelming majority of respondents (79.6%) agreed that parcelization resulted in inequitable distribution of land, where some people get good land and others

get bad land. In the parcelized *ejido* of Chunhuhub, some interviewees claimed that the process of parcelization had not been fair. One stated:

Now (parcelization) is a problem because it was not equal. They didn't measure, the authorities did not come. Some don't have a parcel. It is a mess. The rich take advantage. *Ahorita (parcelamiento) es un problema porque no lo tocó igual. No midieron bien, no vinieron las autoridades, algunos no tienen (parcela). Está desordenado. Los ricos aprovechan.*

Further, some respondents feared that parcelization would lead to land and membership rights sales, resulting in the disenfranchisement of *ejidatarios* and greater marginalization. "(If parcelized) then they will sell their parcel, and only those who have money will buy (the land). *Así van a vender su parcela, y solo los que tienen dinero van a comprar*" (*Tihosuco*). In addition, many interviewees stated that they saw few options outside of the *ejido* due to their lack of formal education and training.

Respondents who held negative attitudes towards parcelization commented that parcelization went against the grain of the *ejido*'s original intent as a collective entity, designed to protect and benefit peasants. One informant mentioned that "The *ejido* was not created for parcelization. *El ejido no fue creado para parcelizar*".

Attitudes Regarding the Sale of *Ejido* Rights (SERAI)

Table 4-3 presents the Sale of *Ejido* Rights Attitude Index (SERAI) with percent response for the eight scale items. Positive attitudes towards the sale of *ejido* rights were linked to individual choice. Joint ownership, patrimony and fear of consequences of membership sales, including marginalization and the potential influx of outsiders into the *ejido*, were themes that emerged from those against the sale of *ejido* membership rights.

Those in favor of the sale of *ejido* rights (more positive scores on SERAI) stated that selling was a matter of individual choice. Rather than the *ejido* holding the final

decision-making power, it is the individual who is dominant; “The *ejido* cannot prohibit (the sale of *ejido* rights). If someone wants to go, how can the *ejido* say no? *No se puede (prohibir)- si uno quiere ir, como (el ejido) va a decir no?*” One interviewee stated, “If there is an opportunity to improve one’s life, better to sell the right. *Si tiene otra opción para mejor vida, mejor que se vende.*”

Some 70% of respondents agreed that the *ejido* should prohibit sale of rights. In commonly-held *ejidos*, interviewees often expressed the idea of joint ownership of the land, thereby complicating the use of membership rights as a commodity.

The right is a guarantee, nothing more. The land does not belong to any one person, it belongs to the people who live here. *El derecho es garantía no más. La tierra no es de nadie- es de los que viven (allí).*

Many interviewees linked permitting the sale of membership rights with negative consequences, including lack of access to resources, loss of patrimony, increasing sales to outsiders, poverty and even the potential disappearance of the *ejido*. Some older respondents recalled the struggles that they or their relatives faced when forming the *ejidos* and escaping the dominant forms of production in the region, such as haciendas and debt peonage. The sale of *ejido* membership rights was viewed as an affront to the cultural and symbolic value of the *ejido* as the hard won prize of peasant resistance. One key informant stated:

The ancestors broke the chains of slavery- what is happening now? They are entering once again into slavery. They are giving our patrimony away again to the tyrants. *Los antepasados rompieron las cadenas de esclavitud- que está pasando ahora? Están entrando otra vez en la esclavitud. Están regalando otra vez el patrimonio a los caciques (Chunhuhub).*

Many stated that it was better to sell the right internally than externally. Only 26.4% of respondents stated that it was acceptable to sell a membership right to

someone outside of the *ejido*. The majority expressed fear that outsiders would bring problems to the *ejido*.

Selling to bad people, like drug traffickers, that the *ejido* then cannot get rid of- that is a problem I see in the future. *Vender a gente mala, narcotraficantes, que el ejido ya no puede sacar- es un problema que veo en el futuro* (Nuevo Israel).

Despite concerns about the sale of *ejido* rights to outsiders, many interviewees stated that these sales were the most common, as people from outside of the *ejido* tended to offer more money for *ejido* rights. One interviewee lamented;

We don't know what kind of vice people bring from the outside. But they always sell to people from the outside. *(No sabemos) que vicio que trae de afuera. Pero siempre vende a la gente de afuera (Reforma Agraria)*.

Most respondents agreed that sale of *ejido* rights was acceptable if there was an emergency or illness (69.3%). One respondent stated: "One should not sell for pleasure. If there is a serious problem, then you have to solve it." Similarly, other respondents echoed that the sale of a membership right should only be "a last resort (*último recurso*)."

Differences in PAI and SERAI Scores among Groups

Correlation and multiple regression analyses were conducted to test relationships between attitudes (as measured by PAI and SERAI) and various potential predictors. Factors significantly affecting attitudes included respondents' *ejido* of residence, land tenure status of the *ejido*, origin, ethnicity, wealth, and years of residence in the *ejido*.

***Ejido* and land tenure status**

The *ejido* and land tenure status of the *ejido* had a significant effect on attitudes. A one-way ANOVA was conducted to compare PAI and SERAI scores among the eight sample *ejidos* (Table 4-4). Attitudes towards parcelization, as well as attitudes towards

the sale of *ejido* rights, differed significantly across the eight *ejidos*. Respondents within the *ejidos* of Tihosuco and Naranjal Poniente had the lowest mean scores on both PAI and SERAI, meaning they expressed less favorable attitudes towards parcelization and the sale of *ejido* membership rights. Conversely, respondents within the *ejidos* of Reforma Agraria, Nuevo Israel and Nueva Loria had the most favorable attitudes towards parcelization and the sale of *ejido* membership rights, with the highest mean scores for both PAI and SERAI.

A one-way ANOVA was conducted to explore the effect of land tenure status on attitudes towards parcelization and the sale of *ejido* rights, as measured by the two indices, PAI and SERAI (Table 4-5). We divided *ejidos* into three groups according to land tenure status, common, mixed and parcelized, in order to facilitate comparisons. There was a statistically significant difference in attitudes towards parcelization (PAI), such that residents of the “common” *ejidos* had significantly lower scores on the parcelization index than the residents of “mixed” *ejidos* and “parcelized” *ejidos*. Attitudes towards the sale of *ejido* rights (SERAI) were also statistically different for the three land tenure categories. Tukey post-hoc comparisons indicated that while residents of common *ejidos* held significantly different attitudes (more negative) towards the sale of *ejido* rights than the other two groups, comparisons between the “mixed” and “parcelized” groups were not statistically significant.

Demographic factors: origin, ethnicity, age, and gender

We also conducted a one-way ANOVA test to investigate the relationship between *ejido* residents’ place of origin, and PAI and SERAI attitude scores (Table 4-6). We divided subjects into three groups according to origin (Group 1: Quintana Roo; Group 2: Yucatán; Group 3: other). Results showed that place of origin had a significant effect on

PAI and SERAI scores. Post-hoc comparisons found a significant difference in PAI scores between all three groups, with significantly higher mean PAI scores for subjects in Group 3, the “other” category. In other words, respondents from outside the Yucatán peninsula were more favorable towards parcelization than those from Yucatán state and Quintana Roo. A closer examination of the SERAI scores using the Tukey HSD test indicated that there was no significant difference in SERAI mean scores for subjects from Quintana Roo and Yucatán; however, the results indicated that the mean score for the “other” group was significantly different (more positive) than Groups 1 and 2.

We used language spoken as a proxy to measure ethnicity and its impacts on attitudes. A one-way ANOVA was conducted to explore the relationship between language and attitudes. Subjects were divided into three groups according to self-reported language spoken (Group 1, Maya; Group 2, Bilingual Maya and Spanish; Group 3, Spanish). Results from the ANOVA indicate that language has a significant effect on both PAI and SERAI attitude scores, with statistically significant differences in mean scores for all three groups (Table 4-7). Maya speakers held less favorable attitudes towards parcelization and the sale of *ejidal* rights than bilingual and Spanish speaking respondents.

Results demonstrated little to no significant effect of age and gender on attitudes. Results from Independent t-tests to compare attitudes between men and women found no significant effect of gender on attitudes regarding parcelization or the sale of *ejido* rights (Table 4-8). The relationship between age and attitudes was investigated using Pearson’s correlation coefficient (Tables 4-9). There was a small negative correlation between attitudes regarding the sale of *ejido* rights (SERAI) and age, such that older

subjects had less favorable attitudes towards the sale of *ejido* rights than younger subjects. We did not find a significant correlation between attitudes towards parcelization (PAI) and age.

Wealth, time in the *ejido*, and *ejido* membership

We tested the correlation between wealth (as measured by a household assets wealth index, HAWI) and attitudes among *ejido* members using Pearson's correlation coefficients (Table 4-9). There was a small positive correlation between wealth and attitudes regarding parcelization and the sale of *ejido* rights, indicating that wealthier households had slightly more positive views than poorer households.

We also examined the relationship between attitudes and time living in the *ejido* using Pearson's correlation coefficient (Table 4-9). There was a moderate negative correlation between time in the *ejido* and attitudes regarding the sale of *ejido* rights. Similarly, we found a moderate negative correlation between attitudes regarding parcelization and time in the *ejido*. These results indicate that the longer respondents lived in the *ejido*, the less favorable they were towards parcelization and the sale of *ejido* rights.

We found no significant difference in attitudes regarding parcelization (PAI) and the sale of *ejido* rights (SERAI) between *ejido* members and non-*ejido* members (Table 4-10). Results from an Independent Samples Test indicated that PAI mean scores for *ejido* members and non-*ejido* members were not statistically significant. Similarly, we found no significant difference in SERAI mean scores for *ejido* members and non-*ejido* members.

Multiple regression models

We conducted multiple linear regression models to determine which factors could be used to predict attitudes towards parcelization and the sale of *ejido* rights. We chose to test variables identified in bivariate correlations as significantly affecting attitudes. These included: land tenure status, origin, language spoken, wealth, and time in the *ejido*. Since both PAI and SERAI attitude score were highly correlated, such that those with positive attitudes towards parcelization also had positive attitudes towards the sale of *ejido* rights, we decided to include them in the models. Since language spoken was correlated with origin ($r=.508$, $n=252$, $p<.001$), we excluded the variable language spoken in the model. Wealth was also identified as being positively correlated with attitudes; however, since data were available only for *ejido* members, we excluded this variable. We created dummy variables for land tenure status and origin, using as our base model the land tenure status of common and Quintana Roo for origin.

Initially, the correlations among factors were examined for both PAI and SERAI scores. All factors were correlated with the two outcomes. Collinearity diagnostics for both models produced VIF and tolerance scores within acceptable levels to undertake multiple linear regression.

The multiple regression model predicting attitudes towards parcelization (PAI) produced $R^2=.403$, $F(6, 342)=38.56$, $p<.001$. Results are shown in Table 4-11. This model accounted for 40% of the total variance in attitudes regarding parcelization. As expected, the strongest predictor was parcelized land tenure status ($\beta=.418$), which uniquely predicted 14% of the variance in attitudes towards parcelization. Mixed land tenure status also significantly affected PAI scores, uniquely explaining 6% of the

variance in PAI scores. SERAI score also significantly predicted PAI scores, but its unique contribution to explaining variance was small (4%).

The multiple regression model predicting attitudes towards the sale of *ejido* rights produced $R^2=.392$, $F(6, 343) =36.86$, $p<.001$. Results are shown in Table 4-12. The model accounted for 39% of the total variance in attitudes towards the sale of *ejido* membership rights. The strongest predictor was once again parcelized land tenure status, uniquely explaining 8% of the variance in SERAI scores. The second strongest predictor was mixed land tenure status. Time in the *ejido* and PAI attitude scores were also significant predictors.

Discussion

Along with material changes in land regularization, the 1992 reforms carried with it a neoliberal logic of land, favoring private holdings over collective entities, and individual decision-making over the *ejido* assembly (Wilshusen, 2010). To understand how this logic was transmitted to *ejido* members and residents, we examined different domains of attitudes regarding parcelization and the sale of *ejido* membership rights, as well as variations in attitudes among individuals and groups.

Our ethnographic findings suggest two models of land and rights grounded in two opposing logics, individual versus collective. The individual model favors parcelization and the sale of *ejido* rights, basing this claim in greater individual freedom and improved land management. Under this model, land and membership rights are seen as commodities with an economic value, and *ejidatarios* as those in control of those assets. In fact, interviewees referred to the membership rights as “your property (*tu propiedad*).” As Assies (2008) notes, the 1992 reforms, in essence, transformed the meaning of “Liberty” in the revolutionary slogan of “Land and Liberty”; liberty denotes

individual freedom rather than the enlightenment ideal of liberty associated with rights to land used to inspire landless peasants. He states: “‘Liberty’ now was to strengthen individual property rights over the *ejidatario*’s parcel and therefore to deconstruct collective decision-making, in line with neoliberal thinking...” (Assies, 2008: 49).

We found that the pervasiveness of the individual model resulted in tensions between individual rights and the traditional role of the *ejido* as a collective decision-making body and enforcer of rules. Interviewees stated that once the *ejido* was parcelized, individuals were more likely to assume the role of private property owners and that rules prohibiting land and membership sales were more difficult to enforce. One key informant in Chunhuhub, which parcelized in 2005, stated that: “Parcelization gave them wings to do whatever they want. The authorities cannot stop them. *El parcelamiento les dió alas para hacer lo que quieren. Los autoridades no pueden frenarlo.*” Because informal parcelization and land sales were happening parallel to the legal system established by the 1992 reforms, it was difficult to monitor and enforce rules or ensure that the process was fair.

Studies from Mexico and Honduras echo similar findings of new cognitive models of land and rights. Bouquet’s (2009) study of land tenure security in Tlaxcala touches upon a newly emerging individualistic approach to land following the reforms, where interviewees claimed that *ejidatarios* now thought of land as private property and were bypassing local authorities when making decisions about land sales. Hayes (2010) examined the response of Miskito indigenous people to colonist intrusion on common property regimes. Her main finding was that as colonization pressure increased, rather

than strengthen common property regime in response, residents adopted a private property model, creating private forest reserves, constructing fences and selling land.

Within the collective model of land and rights, parcelization and the sale of *ejido* rights was viewed as problematic. Respondents emphasized joint ownership over the land. Further, within forestry *ejidos* parcelization was seen as detrimental to collective management and shared economic benefits of communal forest areas. Adherents to this model often invoked the cultural and symbolic value of land and membership rights revolving around ideas of patrimony and prior collective struggles to attain access to land and resources. Findings from other studies of the 1992 reforms have found that such attachments to the land, based in culture and resistance, do not readily mesh with the economic rationale of privatization (Cornelius and Myhre, 1998b; De Ita, 2006). Simply put, land is “much more than a simple commodity” (Assies, 2008: 55).

Our study suggests that in response to the 1992 reforms, *ejidatarios* in commonly-held *ejidos* may invoke this model of collective logic to bolster common property regimes and strengthen rules against selling membership rights to outsiders. This response implies agency of *ejidatarios* in selectively choosing which aspects of the reform to adopt, what Wilshusen (2010) terms “selective accommodation.” Wilshusen demonstrated how community forestry *ejidos* navigated the tension between collective traditions and individualistic neoliberal model proposed by the 1992 reforms through selective accommodation, such that they embraced the entrepreneurial spirit of reforms, while maintaining collective tenure security. Findings from our previous research and others (Haenn, 2006; Nuijten, 2003; Wilshusen, 2010) also demonstrated that

ejidatarios have been active in shaping the reforms to their needs, invoking collective logic when beneficial, while adopting some aspects of the neoliberal model.

Tension between the individual and collective cognitive models was expressed in respondents' ambiguity towards the sale of *ejido* rights. Despite the fact that some viewed land and rights more as a commodity, there was still resistance towards the sale, and often times the sale of a membership right was seen only as a last resort. According to Bouquet (2009), even the state, while simultaneously pushing a neoliberal model of property via the 1992 reforms, was ambiguous towards the commodification of *ejido* lands. He reports that the National Agrarian Registry (RAN) ran a series of public TV announcements about the 1992 reforms featuring *ejidatarios* stating: "This is our land and we will never sell it" (Bouquet, 2009: 1396).

We used statistical tests to understand what factors or respondent characteristics influence attitudes and the adoption of the cognitive models described above. Results of the multiple regression models demonstrated that tenure status of the respondent's *ejido* was the most important variable explaining variance in both PAI and SERAI scores. Origin and ethnicity were also found to have a significant effect, while individual characteristics, including age, gender and membership status had little to no effect on attitudes.

Our findings demonstrate how newly emerging institutional arrangements for privatization within *ejidos* were correlated with more favorable attitudes towards privatization and land sales, while residents in commonly-held *ejidos* expressed negative or ambivalent attitudes towards privatization and land sales. The importance of land tenure status in predicting attitudes (as measured by PAI and SERAI) relates to

previous research examining the role of institutional arrangements in shaping ideas and preferences (Agrawal, 2005; Agrawal, 2007). While our results attest to the existence of varying attitudes among different institutional arrangements, they do not explain the complex process by which these ideas and mental models emerge.

Statistical results, supported by ethnographic data, point to the importance of ethnicity and origin in respondents attitudes towards privatization and the sale of *ejido* membership rights. Indigenous respondents from Quintana Roo and Yucatán had less favorable attitudes towards parcelization and *ejido* membership sales than Mestizo respondents from Central Mexico. Three factors may inform these attitudes. First, the predominately Mayan *ejidos*, with residents from Quintana Roo and Yucatán, were part of the first wave *ejidos* in Quintana Roo established by the Cárdenas administration to support collective ownership and management of *chicle* production. It is not surprising then that residents of *ejidos* founded upon “a logic of collectivism” (Wilshusen, 2010: 776) would maintain an ideology against parcelization. Secondly, Mayan reliance on the traditional *milpa* system predicates flexible collective land tenure arrangements allowing varying spatial and temporal access to land and resources (Alcorn, 1998). A third critical factor in shaping negative attitudes towards parcelization and membership sales among indigenous respondents is a long history of struggle against the state to protect access to land and resources (Patch, 1991). The *ejido*, as a common property regime, serves an important function as a “multipurpose institution that reproduces socio-cultural aspects of indigenous communities, thereby contributing to its identity formation and survival” (Valdez, 2008: 109). Given the centrality of the *ejido* in rural

Mexican life, we would argue that the *ejido* serves a similar function of cultural reproduction for non-indigenous groups as well.

With the study of property rights, much attention has been paid to important divisions by gender, race, class and age that shape access to resources within seeming homogenous communities (Clever, 2000; Mackenzie, 2005). Therefore, we expected to find differing attitudes regarding land and rights based on age, gender and *ejido* membership; however, our results demonstrated that individual characteristics, such as age, gender and an *ejido* membership, had little to no significant affect on attitudes towards parcelization and *ejido* membership sales. We expected to see differences in attitudes among men and women and among younger and older generations. The lack of a gender effect may be attributed to the fact that the main focus on land rights in Mexico and among indigenous groups has been a collective demand for land, rather than individual (Suárez, 2006). We also expected that younger respondents would have more favorable attitudes towards parcelization and the sale of membership rights, since they did not directly experience struggle to gain access to land. Our results showed that younger respondents were only moderately more positive.

These findings suggest that group, rather than individual, characteristics, may play a dominant role in shaping attitudes. As Shipton (1994: 348) asserts, “people relate to land not just as individuals, but also members of groups, networks and categories.” The dominance of collective over individual traits is not entirely surprising, since the decision to parcelize or sell *ejido* rights is one that must first be made collectively. Further, these results emphasize the continuing strength of the *ejido* as a site for the reproduction of culture and may indicate cultural continuity across generations.

Limitations of Study and Future Directions

This study makes an important contribution to the study of common property institutions by responding to a noted criticism that common property studies are often overly focused on institutions, with scant attention to diverse forms of knowledge and perceptions that girder institutions (Agrawal, 2005). That said, the insights gained from this study raises additional questions. For example, we cannot discern from our study the direction of the causal relationships between attitudes and institutional change, leading us to ask: Which comes first, the attitude or the institutional arrangement? Additional questions of interest and future research directions include: How does the level of consensus within *ejidos* regarding attitudes towards parcelization and the sale of *ejido* rights impact decision-making about institutional arrangements? Future research should also include other community actors, such as non-*ejido* members who are not part of *ejido* member households, to assess what role they play in local decisions regarding institutions and land use.

Policy Implications

This close examination of the ideological impacts of the 1992 reforms may have important policy implications in Mexico and elsewhere. While much research has cited the tepid response of Mexico's *ejido* sector to the 1992 reforms, few studies have systematically examined how *ejidatarios* and *ejido* residents conceptualize privatization, to reveal the rationale behind their response. The range of attitudes regarding parcelization and the sale of *ejido* membership rights found among our study sites implies that there is little consensus regarding the benefits of privatization. Ambiguity towards the sale of *ejido* land and membership rights suggests tension between *ejidatarios'* connection to the land and the neoliberal model of land as a commodity.

Further, our findings confirm that land and membership sales are one of the few mechanisms available to *ejidatarios* to resolve household crises. This suggests that the 1992 reforms, coupled with a reduction in state sponsored social programs, have placed rural peasants in a precarious situation.

This chapter explored the interface between policy reform, institutions and subjectivities through the study of perceptions of privatization among common property residents in the wake of Mexico's 1992 agrarian reforms. Our findings highlight a high degree of pluralism regarding attitudes towards privatization, and emphasize friction between collective logic of the *ejido* and neoliberal logics of individual property facilitated by the 1992 reforms. By examining in ethnographic detail these differences and frictions, we aimed to show how hegemonic ideas, such as privatization, and the policies designed to transmit them, such as the 1992 reforms, do not have a homogenous affect. Rather, local actors interact with ideas and policies to shape them into something entirely different. Continued exploration of current attitudes regarding privatization and tension between collective traditions and neoliberal logic within and among *ejidos* will help elucidate dynamic ideological landscapes that inform the endurance or breakdown of common property regimes in Mexico.

Table 4-1. Description of eight sample *ejidos* by area, number of *ejidatarios*, date established, origin of inhabitants, ethnicity, livelihood activities, land tenure status, and presence/absence of the sale of *ejido* rights.

<i>Ejido</i>	Total area (HA)	Number of <i>ejidatarios</i>	Date established	Origin	Ethnicity and Speakers of an Indigenous Language (%)	Livelihood Activities	Land tenure	Sale of <i>ejido</i> rights
X-Maben	73,400	544	1936	QRoo Yucatán	Maya 97.5	Agriculture Forest Management Off-farm employment	Common	No
Naranjal Poniente	13,230	147	1942	QRoo Yucatán	Maya 98.8	Forest Management Agriculture	Common	No
Tihosuco	56,686	809	1943	QRoo Yucatán	Maya 81.2	Agriculture Cattle Off-farm employment	Common	No
Noh Bec	24,123	219	1937	Central Mexico	Mestizo 20.6	Forest Management Small business Cattle	Mixed	Yes
Nuevo Israel	8726	104	1966	Yucatán	Maya 78.5	Agriculture Cattle Off-farm employment	Mixed	Yes
Reforma Agraria	2457	34	1978	Central Mexico	Mestizo 1.9	Forest management Agriculture	Parcelized	Yes
Nueva Loria	3147	33	1979	Central Mexico	Mestizo 30.0	Cattle Agriculture Off-farm employment	Parcelized	Yes
Chunhuhub	15,819	333	1964	QRoo Yucatán	Mixed Maya and Mestizo 53.5	Agriculture Cattle State employment	Parcelized	Yes

Table 4-2. Parcelization Attitude Index (PAI) with percent response for eight items.

Attitudes towards parcelization (PAI)	Agree	Don't Know	Disagree
Parcelization is a problem for the <i>ejido</i> .	49.1%	8.2%	42.7%
Parcelization gives more security to <i>ejidatarios</i> .	71.5%	6.5%	22.0%
Parcelization allows people to get ahead.	68.1%	15.0%	16.9%
Parcelization makes it difficult to pass between individual parcels.	76.6%	4.2%	19.2%
Parcelization motives people to plant trees.	84.7%	5.7%	9.6%
Parcelization assures that you and your family will benefit from your work in the future.	80.0%	10.2%	12.8%
Parcelization means that some <i>ejidatarios</i> get good land and other get bad land.	79.6%	4.8%	15.6%
There are less problems when the <i>ejido</i> is commonly-held (not parcelized).	62.9%	5.9%	31.2%

Table 4-3. Sale of *Ejido* Rights Attitude Index (SERAI) with percent response for four items.

Attitudes towards the sale of <i>ejido</i> rights (SERAI)	Agree	Don't Know	Disagree
The <i>ejido</i> should allow <i>ejidatarios</i> to sell their rights if they want to.	52.6%	5.4%	42.0%
It is not acceptable for an <i>ejidatario</i> to sell their right to someone outside of the <i>ejido</i> .	70.2%	3.4%	26.4%
The sale of <i>ejido</i> rights is acceptable in cases of emergency, such as health problems.	69.3%	4.0%	26.7%
The <i>ejido</i> should prohibit the sale of <i>ejido</i> rights.	69.9%	4.8%	25.3%

Table 4-4. One-way ANOVA comparing PAI and SERAI mean scores based on respondents' *ejido* of residence.

Attitudes	<i>Ejido</i>								F	df
	Chunhuhub	Naranja Poniente	Noh Bec	Nueva Loria	Nuevo Israel	Reforma Agraria	Tihousuco	X-Maben		
PAI	6.92 _{c,d} (1.66)	4.33 _a (1.54)	6.07 _{b,c} (1.96)	7.73 _{d,e} (1.32)	7.14 _{c,d,e} (1.11)	8.39 _e (1.51)	3.82 _a (1.92)	5.01 _{a,b} (2.13)	42.14 ^{***}	295.06
SERAI	5.86 _{b,c} (2.13)	2.63 _a (2.72)	5.43 _b (2.87)	8.69 _d (1.91)	7.98 _d (2.11)	7.45 _{c,d} (2.32)	2.83 _a (2.43)	3.17 _a (2.93)	35.26 ^{***}	257.88

Note: * = $p < .05$, ** = $p < .001$, + indicates Brown-Forsythe F ratio when assumption of homogeneity of variance was violated. Standard deviations appear in parentheses below means. Means with different subscripts within rows are significantly different at $p \leq .01$ based on Tukey HSD post hoc comparisons.

Table 4-5. One-way ANOVA comparing PAI and SERAI mean scores based on land tenure status of respondents' *ejido* of residence.

Attitudes	Tenure			F	df
	Common	Mixed	Parcelized		
PAI	4.32 _a (2.02)	6.43 _b (1.79)	7.50 _c (1.65)	108.573 ^{***}	235.96
SERAI	2.92 _a (2.65)	6.29 _b (2.89)	6.96 _b (2.42)	89.531 ^{**}	349

Note: * = $p < .05$, ** = $p < .001$. Standard deviations appear in parentheses below means. Means with different subscripts within rows are significantly different at $p \leq .01$ based on Tukey HSD post hoc comparisons.

Table 4-6. One-way ANOVA comparing PAI and SERAI mean scores for respondents originating from Quintana Roo, Yucatán and Other states.

Attitudes	Origin			F	df
	Quintana Roo	Yucatan	Other		
PAI	5.01 _a (2.24)	5.92 _b (2.11)	7.80 _c (1.78)	32.24 ^{**}	349
SERAI	3.94 _a (3.02)	5.13 _a (3.37)	7.27 _b (2.69)	23.60 ^{**}	349

Note: * = $p < .05$, ** = $p < .001$. Standard deviations appear in parentheses below means. Means with different subscripts within rows are significantly different at $p \leq .01$ based on Tukey HSD post hoc comparisons.

Table 4-7. One-way ANOVA comparing PAI and SERAI mean scores for Maya, Bilingual and Spanish speakers.

Attitudes	Language			F	df
	Maya	Bilingual	Spanish		
PAI	4.27 (1.70)	5.23 (2.60)	7.18 (2.18)	36.92***+	181.64
SERAI	2.98 (2.51)	4.57 (3.05)	6.68 (2.93)	37.52**	245

Note: * = $p < .05$, ** = $p < .001$, + indicates Brown-Forsythe F ratio when assumption of homogeneity of variance was violated. Standard deviations appear in parentheses below means. Means with different subscripts within rows are significantly different at $p \leq .01$ based on Tukey HSD post hoc comparisons.

Table 4-8. PAI and SERAI mean scores for females and males.

	Gender		t	df
	Females	Males		
PAI	5.36 (2.24)	5.65 (2.45)	1.130	350
SERAI	4.36 (3.12)	4.73 (3.33)	1.068	350

Note. * = $p < .05$, ** = $p < .001$. Standard Deviations appear in parentheses below means.

Table 4-9. Pearson's Correlations for PAI and SERAI scores with Age, Wealth, Time in the *Ejido*, PAI and SERAI scores.

	Attitudes		n
	PAI	SERAI	
Age	.011	-.104*	352
Wealth	.230**	.221*	188 (PAI) 189 (SERAI)
Time in the <i>Ejido</i>	-.298**	-.243**	352
PAI		.495**	350
SERAI	.495**		350

Note. * = $p < .05$, ** = $p < .001$.

Table 4-10. PAI and SERAI mean scores for *ejido* members and non-*ejido* members.

	<i>Ejido</i> Membership		t	df
	Member	Non-member		
PAI	5.60 (2.49)	5.41 (2.18)	.748	350
SERAI	4.62 (3.32)	4.49 (3.14)	.360	350

Note. * = $p < .05$, ** = $p < .001$. Standard Deviations appear in parentheses below means.

Table 4-11. Results from multiple regression model predicting PAI score

Predictors	b	SE b	β
Land Tenure			
Mixed	1.42	.299	.231***
Parcelized	2.25	.305	.418***
Origin			
Yucatán	.312	.270	.050
Other	.691	.365	.097
Time in the <i>Ejido</i>	-.006	.007	-.040
SERAI score	.151	.038	.208***

Note. $R^2=.403$ * $p<.05$, ** $p<.01$, *** $p<.001$

Table 4-12. Results from multiple regression model predicting SERAI score

Predictors	b	SE b	β
Land Tenure			
Mixed	2.516	.407	.296***
Parcelized	2.821	.429	.380***
Origin			
Yucatán	.188	.375	.022
Other	.131	.510	.013
Time in the <i>Ejido</i>	-.029	.009	-.137*
SERAI score	.291	.073	.212***

Note. $R^2=.392$ * $p<.05$, ** $p<.01$, *** $p<.001$

CHAPTER 5 CONCLUSIONS

Mexico's 1992 agrarian reforms opened up the country's vast network of common property regimes to the possibility of privatization. While many proclaimed that the 1992 reforms would lead to the disappearance of the *ejidos*, now, almost 20 years later, the *ejidos* are still fundamental to Mexico's rural landscape. However, this enduring property regime has undergone many changes since the 1992 reforms. This dissertation investigates land tenure arrangements, land use, forest cover change and ideologies surrounding privatization and *ejido* membership sales in the wake of Mexico's 1992 reforms in the southeastern state of Quintana Roo. By focusing on one region in Mexico, the dissertation does not intend for these results to be generalized to the rest of the country. The nation's network of *ejidos* encompasses an astounding diversity of landscapes, cultures and histories, such that one region's experience with agrarian reform is difficult to parallel to another. The three chapters presented (Chapters 2- 4) together provide an understanding of both material and ideological changes to Mexico's rural sector in one particular region, and elucidates how national policies are interpreted in locally specific ways. Further, this dissertation seeks to provide insights to those interested in property rights reform and its implication for rural people and landscapes.

Chapter 2 highlighted varying responses to the push to privatize within 27 *ejidos* in the municipality of Felipe Carrillo Puerto, Quintana Roo. We found that the majority of *ejidos* in our study maintained collective property rights, and that none undertook the formal privatization process. In lieu of privatization, we examined the emergence of hybrid and informal property arrangements that merge some aspects of private property

while maintaining the shell of collective property. Our ethnographic data and Qualitative Comparative Analysis point to the importance of ethnicity in conditioning *ejido* responses to privatization, with Mayan *ejidos* remaining collectively-held and Mestizo *ejidos* adopting, albeit informally, privatization schemes. We argue that, within our study site, ethnicity is bound to specific land histories, resource management strategies, and relations between local actors and the state that shape land tenure outcomes.

Chapter 3 demonstrated that land tenure arrangements, with varying bundles of individual rights, relate to specific land use and forest cover change patterns. In our analysis of forest cover change between 1984-2010, we found that commonly-held *ejidos* had lower rates of deforestation than *ejidos* that had informally privatized. Further, we demonstrated that land use patterns varied greatly among commonly-held, mixed and parcelized *ejidos*. Our findings showed that members of parcelized *ejidos* had larger landholdings, engaged in diverse livelihood activities, and invested more in their landholdings. We expected that *ejidos* with high levels of forest dependency would have lower rates of deforestation, but we did not find that to be the case, as evidenced by low deforestation rates among agricultural-based commonly-held *ejidos*.

Chapter 4 illustrated varying attitudes towards privatization and the sale of *ejido* membership rights among common property residents. Through the use of ethnographic data and the development of two indices to measure attitudes, we analyzed two prevailing models of land and rights, one individual and one collective. Our findings highlighted the ways in which land tenure institutions shape attitudes, and the dominance of collective characteristics over individual traits in differentiating attitudes within our study site. We argue that the socially constructed meanings

attached to land and rights plays an important role in how policy, such as the 1992 reforms, are interpreted and implemented at the local level.

Together these studies make important contributions to the study of Mexico's 1992 reforms and common property studies in general. This work demonstrates both resistance to, and the selective adoption of, privatization and the neoliberal model of land and land rights offered by the 1992 reforms. We show how, on the one hand, privatization offers new possibilities in terms of land use, perceived tenure security, and potential benefits from the sale of land and membership rights. However, we also demonstrate that privatization may be related to increased forest cover change, as well as new potential for marginalization. We caution against the interpretation of this work as an argument in favor of maintaining *ejidos* as common property regimes, as our results suggest that, while there may be certain conservation benefits associated with common property regimes, the trade-offs in terms of economic well-being have yet to be fully assessed.

Rather than integrating the rural sector into the emerging global market, privatization presents the risk of further marginalizing rural producers in Quintana Roo via displacement and exclusion. Further, informally and legally "invisible" property arrangements may place *ejidatarios* further on the margins, as the paucity of legal titles inhibits the ability of *campesinos* to leverage better selling prices. As one key informant stated, "Private property is nice if I am a capitalist, if I have money- but if not...? The problem is that I am worker, the poorest and most backward." As a worker, he stated, even armed with private property, he will still remain at the margin of those who are more powerful. He stated: "What we want is a humane capitalism." Through our

detailed examination of informal and hybrid land tenure arrangements, we seek to make property regimes visible in the study of the impacts of policy reform. Further, by making these regimes legible and by examining their ideological underpinnings, we illustrate how macro-level ideas and policies are interpreted and re-configured by local actors to produce distinct and sometimes unexpected outcomes.

APPENDIX A
QUESTIONNAIRE FOR EJIDATARIOS

ENCUESTA NO. _____	EJIDO _____
fecha _____	casa _____
entrevistador _____	IDIOMA _____

Parte 1: Datos demográficos

1. edad _____ (años)

2. sexo
- hombre
- mujer

3. De donde es Ud.? Donde nació?

<input type="checkbox"/> Q Roo	<input type="checkbox"/> Yucatán	<input type="checkbox"/> Campeche
<input type="checkbox"/> Tabasco	<input type="checkbox"/> Veracruz	<input type="checkbox"/> Michoacán
<input type="checkbox"/> Chiapas	<input type="checkbox"/> Otro _____	<input type="checkbox"/>

4. Hace cuantos años Ud. ha vivido en el *ejido*? _____ (años)

5. Cual es su religión?
- católico
- evangélico
- protestante
- otro _____

6. Cual es su nivel de educación (cual grado alcanzó) ? _____

7. Hace cuanto tiempo que Ud. es *ejidatario*? _____ (años)

8. Como se convirtió en *ejidatario*? (Como se adquirió los derechos ejidales)

- heredó de su esposo
- heredó de sus padres
- es fundador del *ejido*
- fue aprobado por la asamblea
- compró un derecho
- otro: _____

Parte 2: Uso de tierra en el ejido

9. Ud. tiene algunas áreas de trabajo en el *ejido* para su uso?

- Si
 No [si responde NO, pase a #13]

10. Cuantas áreas? _____(numero de parcelas) y AREA total que le corresponde _____(ha)

11. Para cada parcela, haga las siguientes preguntas:

	PARCELA	1	2	3	4
a. Es una parcela temporal o permanente?					
temporal					
permanente					
b. Cuantas HA (mecate?) tiene la parcela? [marca si usa mecate o ha]					
c. En que parte del <i>ejido</i> esta la parcela?					
area de uso común					
area parcelada					
area permanente forestal					
zona urbana					
otro _____					
d. Hace cuanto tiempo Ud. esta usando la parcela?					
años					
e. Como Ud. adquirió derecho de usar la parcela?					
rentada del <i>ejido</i>					
permiso del <i>ejido</i> , pero no paga					
derecho de uso como <i>ejidatario</i>					
derecho de uso a través de miembro de la familia/ <i>ejidatario</i>					
reconocida por el <i>ejido</i> , pero no titulada					
titulada					
otro _____					
f. Cual es la actividad principal Ud. hace en la parcela?					
agricultura					
ganadería					
agroforestería					
apicultura					
cítrico					
hortalizas					
reforestación [marca si es de ProArbol con "Pro"]					
turismo					
otro					

12. En 2008, cuantas HA tenía de

a. milpa _____ HA			
b. potrero: _____ HA	c. cabeza de ganado _____	d. cabeza de borrego _____	
e. reforestación: _____ HA	f. agroforesteria (citrico): _____ HA		

13. Ud. piensa que hay tierra suficiente para trabajar en el *ejido*?

- Si
 No

14. Comentario: Porque Ud. piensa que si (o no)?

Parte 3: Actividades Económicas

15. Cual es su ocupación principal?

<input type="checkbox"/> agricultor	<input type="checkbox"/> ama de casa	<input type="checkbox"/> apicultor
<input type="checkbox"/> comerciante	<input type="checkbox"/> estudiante	<input type="checkbox"/> profesor
<input type="checkbox"/> trabajador- dentro del <i>ejido</i>	<input type="checkbox"/> trabajador- fuera del <i>ejido</i> - turismo	<input type="checkbox"/> trabajador- fuera del <i>ejido</i> - otro
<input type="checkbox"/> otro _____		

16. Cual es su fuente principal de ingresos (**MARQUE 1 solo**) ?

<input type="checkbox"/> agricultura (milpa)	<input type="checkbox"/> agricultura (hortalizas)	<input type="checkbox"/> agricultura (otro)
<input type="checkbox"/> venta de animales (borrego, cerdo, gallina)	<input type="checkbox"/> apicultura	<input type="checkbox"/> ganadería
<input type="checkbox"/> utilidad de la venta de la madera	<input type="checkbox"/> venta de palizada	<input type="checkbox"/> venta de guano
<input type="checkbox"/> comercio (tienda, ventas)	<input type="checkbox"/> trabajo del estado	<input type="checkbox"/> artesanías
<input type="checkbox"/> trabajo fuera del <i>ejido</i> - turismo	<input type="checkbox"/> trabajo fuera del <i>ejido</i> - otro	<input type="checkbox"/> trabajo dentro del <i>ejido</i>
<input type="checkbox"/> ayuda del estado (\$ para viejitos, oportunidades)	<input type="checkbox"/> remesas (turismo/ EU)	<input type="checkbox"/> no tiene ingresos
<input type="checkbox"/> otro _____		

17. Tiene otros fuente de ingresos (aparte del principal) (**PUEDE MARCAR mas de 1**)?

<input type="checkbox"/> agricultura (milpa)	<input type="checkbox"/> agricultura (hortalizas)	<input type="checkbox"/> agricultura (otro)
<input type="checkbox"/> venta de animales (borrego, cerdo, gallina)	<input type="checkbox"/> apicultura	<input type="checkbox"/> ganadería
<input type="checkbox"/> utilidad de la venta de la madera	<input type="checkbox"/> venta de palizada	<input type="checkbox"/> venta de guano
<input type="checkbox"/> comercio (tienda, ventas)	<input type="checkbox"/> trabajo del estado	<input type="checkbox"/> artesanías
<input type="checkbox"/> trabajo fuera del <i>ejido</i> - turismo	<input type="checkbox"/> trabajo fuera del <i>ejido</i> - otro	<input type="checkbox"/> trabajo dentro del <i>ejido</i>
<input type="checkbox"/> ayuda del estado (\$ para viejitos, oportunidades)	<input type="checkbox"/> remesas (turismo/ EU)	<input type="checkbox"/> no tiene ingresos
<input type="checkbox"/> otro _____		

18. Aproximadamente, cuanto Ud. gana por mes (o por año)? _____(mes) (años) [marca uno]

19. Cuales de estos posesiones tiene Ud?

<input type="checkbox"/> casa de material	<input type="checkbox"/> casa de palizada/madera	<input type="checkbox"/> coche
<input type="checkbox"/> motocicleta	<input type="checkbox"/> triciclo	<input type="checkbox"/> bicicleta
<input type="checkbox"/> refrigerador	<input type="checkbox"/> cocina de gas	<input type="checkbox"/> radio/ estereo
<input type="checkbox"/> lavadora	<input type="checkbox"/> televisión	<input type="checkbox"/> tractor
<input type="checkbox"/> motosierra	<input type="checkbox"/> pala	<input type="checkbox"/> teléfono (línea baja)
<input type="checkbox"/> celular	<input type="checkbox"/> joyería de oro	<input type="checkbox"/> computador

20. Ud. trabaja en turismo?

- Si
- No

21. (Si responde "si") En que lugar?

<input type="checkbox"/> Cancún	<input type="checkbox"/> Playa	<input type="checkbox"/> Tulum
<input type="checkbox"/> Mahajual	<input type="checkbox"/> otro	

22. (Si responde "si") Ud. tiene un trabajo fijo o es temporal?

- fijo
- temporal

23. (Si responde "si") Cuanto Ud. ganó de este trabajo en 2008? _____ (pesos)

24. Hay alguien en la familia que trabaja en turismo?

- Si
- No

25. (si responde SI a #24) Recibe remesas de alguien que trabaja en turismo?

- Si
- No

26. En que lugar?

<input type="checkbox"/> Cancún	<input type="checkbox"/> Playa	<input type="checkbox"/> Tulum
<input type="checkbox"/> Mahajual	<input type="checkbox"/> otro	

27. Hay alguien en la familia que trabaja en los EEUU?

- Si
- No

28. (si responde SI a #27) Recibe remesas?

- Si
- No

29. Ud. pertenece al programa de ProCampo?

- Si
- No

30. Ud. pertenece a otros programas del gobierno que no he mencionado (Oportunidades, ProGAN, pago de servicios ambientales)? Haga la lista abajo:

Parte 4: ACTIVIDADES FORESTALES

31. Ud. participa de alguna forma en el manejo forestal del *ejido*?

- Si
- No

32. Tiene Ud. algún empleo en la operación forestal del *ejido* (aserradero, vivero, inventario)?

- Si
- No

33. Recibió Ud. una utilidad de la venta de la madera en 2008?

- Si
- No

34. (Si respondió "si") Aproximadamente, cuanto recibió Ud. como utilidad de la venta de la madera en 2008?

_____ (pesos)

35. Recibió Ud. utilidad de la venta de palizada en 2008?

- Si
- No

36. Aproximadamente, cuanto fue?

_____ (pesos)

37. Ud. es parte del programa ProArbol?

- Si
- No

38. Cuantas HA ha reforestado como parte del programa ProArbol?

_____ (HA)

Parte 5: Manejo del *Ejido*

39. Ud. asiste a las asambleas ejidales?

- Si
- No

40. (si responde SI) Describe su participación:

- todas las asambleas
- mas de la mitad
- no muy regularmente

41. Ud. es o era un miembro del consejo de vigilancia o comisión directiva del *ejido*?

- Si
- No

42. Ud. participa en la toma decisiones en el *ejido*?

- Si, todas las decisiones
- Si, algunas de las decisiones
- No

43. Ud. participa en las fajinas del *ejido*?

- si
- no

44. Ud. piensa que surgen conflictos entre los *ejidatarios* o entre miembros de la comunidad muchas veces, de vez en cuando o casi nunca?

- Si, muchas veces
- De vez en cuando
- Casi nunca

45. Cuando surgen problemas, como se resuelve?

- en las asambleas
- fuera de las asambleas
- hablando con el delegado
- otro _____

46. El *ejido* tiene un reglamento interno?

- Si [pasa a # 46, 47, 48, después 52]
- No [pasa a # 50]
- No sabe [pasa a # 50]

47. (si responde Si) Se usa el reglamento interno para sancionar los miembros de la comunidad?

- Si
- NO

48. (si responde Si) En su opinión, el reglamento interno ayuda a disminuir los problemas del *ejido*?

- Si
- NO

49. Porque?

50. (si responde NO) En su opinión, el *ejido* necesita un reglamento interno?

- Si
- No
- No sabe

51. Porque? _____

52. En este *ejido*, es permitido la venta de terreno (aparte del derecho)?

- Si
- No
- No sabe

53. En este *ejido*, es permitido la venta de los derechos ejidales?

- Si
- NO
- No sabe

54. Ud. conoce a alguien de aquí que ha vendido su derecho ejidal?

- Si
- NO

55. (si responde SI) Aproximadamente, por cuanto lo vendió? _____ (pesos)

56. En algún momento, Ud. ha pensado en vender su derecho ejidal?

- Si
- NO

57. (si responde SI a #55) Porque? _____

58. Ud. ha vendido parte de su terreno aquí?

- Si
- No

59. (si responde SI a #57)

- a. Cuantas HA? _____
- b. En que parte del *ejido*? _____
- c. A quien le vendió (miembro de la comunidad, persona de afuera)? _____
- d. Aproximadamente, por cuanto lo vendió? _____
- e. Porque lo vendió? Cual fue el motivo? _____

60. En algún momento, Ud. ha pensado en vender parte de su terreno?

- Si
- No

61. (si responde SI a #58) Porque, que pasó? _____

Parte 6: PROCEDE

62. Ud. conoce el programa PROCEDE (programa para certificar y titular el *ejido*)?

- Si
- No [pasa # 64]

63. Como fue el proceso para tomar la decisión de entrar (o no) a PROCEDE?

- todos estaban de acuerdo- fue facil
- mucha discusión, todos no estaban de acuerdo- fue dificil
- no sabe

64. (si responde SI) En su opinión, cuales son las ventajas y desventajas que trae PROCEDE?

ventajas (marca toda lo que menciona)	desventajas (marca toda lo que menciona)
<input type="checkbox"/> no hay ventajas	<input type="checkbox"/> no hay desventajas
<input type="checkbox"/> no sabe	<input type="checkbox"/> no sabe
<input type="checkbox"/> más seguridad	<input type="checkbox"/> paga de impuesto prediales
<input type="checkbox"/> se puede vender	<input type="checkbox"/> peligro que el gobierno quita la tierra
<input type="checkbox"/> documentos tiene validez antes de cualquier autoridad	<input type="checkbox"/> riesgo que empieza a vender el <i>ejido</i>
<input type="checkbox"/> mayor acceso a programas/ ayuda del gobierno	<input type="checkbox"/> mas conflictos entre <i>ejidatarios</i>
<input type="checkbox"/> menos conflictos entre <i>ejidos</i>	<input type="checkbox"/> otro _____
<input type="checkbox"/> otro _____	

comentarios: _____

65. Ud. piensa que cambiará el reparto de las tierras en el *ejido* en el futuro? Por ejemplo, piensa que decidirán parcelar, titular, o seguirán igual?

- Si cambiará
- NO, seguirá igual
- no sabe

66. En su opinión, por que decidirán a cambiar el reparto de las tierras en el *ejido*, o no?

(PREGUNTA solo 1 de las 2 preguntas que siguen (#67 o #68), según si esta parcelada o no.)

67. (si el ejido no está parcelado) Ud. cree que se debe parcelar el ejido (aparte de los solares) y porque?

Si

NO

Porque? _____

68. (si el ejido esta parcelado, pero no titulado) Ud. cree que se debe titular las parcelas dentro del ejido (aparte de los solares) y porque?

Si

No

Porque? _____

Parte 7: Frases: Ahora, voy a leer algunas frases. Para cada frase, por favor dígame si:

1. Si, está de acuerdo

2. No sabe

3. No está de acuerdo

Voy a dar un ejemplo de un frase:

“La comida preferida de Ud. es tamales”, así, Ud. me puede decir si esta de acuerdo, no sabe, o no esta de acuerdo” Entiende?

Frases sobre los recursos forestales.	SI, estoy de acuerdo	No Se	No estoy de acuerdo
69. Depende Ud. del bosque para vivir bien. <i>Tu yo'osal le k'áaxo' ma'alob in kuxtal.</i>			
70. No trabaja Ud. regularmente en el bosque. <i>Ma'ach a jach meyajtik le k'áaxo'</i>			
71. Las ganancias ejidales de la venta de madera representa la mayoría de los ingresos de su familia. <i>O tu láakal u táak'iinil u kuxtal in wotoche' ku taal tu tojol u koonlil le che'o'</i>			
72. El bosque no garantiza la economía de su familia. <i>Le k'axo' mun garantizartik u kúuktal familia.</i>			
73. El manejo forestal es lo más importante para la economía del ejido. <i>U ti'al u yantal tak'iin tin kaajale' jach k'a'ana'an u kana'anta'al le ejidoo'.</i>			
74. La agricultura deja más ganancias para su familia que la venta de la madera. <i>U meyajta'al le koolo' más ku p'atik tak'iin ket le konche'o'.</i>			
75. Recibe Ud. beneficios de los recursos forestales, como de la venta de madera, la palizada, o el guano. <i>K'uchul tin k'ab u tojol le k'áaxo', je'exe' te konche'o', tu koche'i najo' o te xa'ano'.</i>			
76. Trabaja en las operaciones forestales del ejido <i>Ka meyaj yeetel le ejido' le ken xolotok le che'o, ken kola'ak le che'o.</i>			

Frasas sobre el parcelamiento	Si, estoy de acuerdo	No Se	No estoy de acuerdo
77.El parcelamiento es un problema para el <i>ejido</i> . <i>U t'o'oxol le k'áaxo' ku ts'aik ba'atel te kaajtalo'</i>			
78.El parcelamiento da más seguridad al <i>ejidatario</i> . <i>U t'o'oxol le k'áaxao' ku jets'kunsik u yóol le ejidatario.</i>			
79.El parcelamiento permite progresar a la gente que desea salir adelante. <i>U t'o'oxol le k'áaxo' ku yaantik ka jook'ok taanil le máako'ob u k'aato'.</i>			
80.El parcelamiento hace difícil pasar o entrar por las parcelas particulares. <i>U t'o'oxol le k'áaxo' ku talamkunsik u máan máak ichil e k'áaxo'ob ma' u ti'ilo'ob.</i>			
81.El parcelamiento motiva más a la gente a plantar árboles. <i>U t'o'oxol le k'áaxo' ku metik u paak'al che'ob tumen la máako'obo'.</i>			
82.El parcelamiento asegura que Ud. y su familia tenga beneficios de su trabajo en el futuro. <i>U t'o'oxel le k'áaxo' ku chiikbejsik teen yéetel in láako'ob biin u p'at to'on u tojol ak meyaj.</i>			
83.El parcelamiento significa que algún <i>ejidatario</i> le toque pura tierra, y otro le toque pura piedra. <i>U t'o'oxol le k'áaxo' je meetik uts'aabal ti máak chen lu'um wa chen túunich.</i>			
84.Hay menos problemas cuando el <i>ejido</i> es en global (no parcelado). <i>Wa múuch' u meyajta'al le k'áaxo' ma' ya'ab u k'uuxili.</i>			

Frasas sobre la venta de derechos ejidales	Si, estoy de acuerdo	No Se	No estoy de acuerdo
85.Los que venden sus derechos ejidales invierten sus ganancias en otras actividades económicas. <i>Le ku konko'ob u derecho'obo' ku ts'aako'ob u tak'iino'ob tu la meyaj ka ya'ablak.</i>			
86.El <i>ejido</i> debe permitir a los <i>ejidatarios</i> vender sus derechos si así lo desean. <i>Le ejidatario'obo' k'a'ana'an u cha'ako'ob u konko'ob u derecho'ob.</i>			
87.No es aceptable si algún <i>ejidatario</i> decide vender su derecho a una persona ajena del <i>ejido</i> . <i>Ma' k'áam béeni ka'a uko'on u derecho juntu ejidatario ti u la' maak ma' u yeet kajnalilí.</i>			
88.La venta de derechos ejidales es aceptable en casos de emergencia, como enfermedades. <i>U ko'onol le derecho k'aan been wa yo'osal junp'eel talamil je'ex k'oja'ani.</i>			
89.Los <i>ejidatarios</i> que quieren vender sus derechos ejidales son aquellos que no quieren trabajar. <i>Le máako'ob ku kooniko'ob u derecho'obo' leti'obe ma' u k'aato'ob meyajoj'</i>			
90.El <i>ejido</i> debería prohibir la venta de los derechos ejidales. <i>Le ejidatario'obo' ma' k'a'ana'an u cha'ako'ob u ko'onol u derecho'ob.</i>			

APPENDIX B
QUESTIONNAIRE FOR NON-EJIDO MEMBERS

ENCUESTA NO. _____	EJIDO _____
fecha _____	casa _____
entrevistador _____	IDIOMA _____

Parte 1: Datos demográficos

91. edad _____ (años)

92. sexo
 hombre
 mujer

93. De donde es Ud.? Donde nació?

<input type="checkbox"/> Q Roo	<input type="checkbox"/> Yucatán	<input type="checkbox"/> Campeche
<input type="checkbox"/> Tabasco	<input type="checkbox"/> Veracruz	<input type="checkbox"/> Michoacán
<input type="checkbox"/> Chiapas	<input type="checkbox"/> Otro _____	<input type="checkbox"/>

94. Hace cuantos años Ud. ha vivido en el *ejido*? _____ (años)

95. Cual es su religión?
 católico
 evangélico
 protestante
 otro _____

96. Cual es su nivel de educación (cual grado alcanzó) ? _____

97. Cual es su posición en el *ejido*?
 vecindado
 esposa de *ejidatario*
 hijo/hija de *ejidatario*
 repoblador
 otro _____

Parte 2: Actividades Económicas

98. Cual es su ocupación principal?

<input type="checkbox"/> agricultor	<input type="checkbox"/> ama de casa	<input type="checkbox"/> apicultor
<input type="checkbox"/> comerciante	<input type="checkbox"/> estudiante	<input type="checkbox"/> profesor
<input type="checkbox"/> trabajador- dentro del <i>ejido</i>	<input type="checkbox"/> trabajador- fuera del <i>ejido</i> - turismo	<input type="checkbox"/> trabajador- fuera del <i>ejido</i> - otro
<input type="checkbox"/> otro _____		

99. Cual es su fuente principal de ingresos?

<input type="checkbox"/> agricultura (milpa)	<input type="checkbox"/> agricultura (hortalizas)	<input type="checkbox"/> agricultura (otro)
<input type="checkbox"/> venta de animales (borrego, cerdo, gallina)	<input type="checkbox"/> apicultura	<input type="checkbox"/> ganadería
<input type="checkbox"/> utilidad de la venta de la madera	<input type="checkbox"/> venta de palizada	<input type="checkbox"/> venta de guano
<input type="checkbox"/> comercio (tienda, ventas)	<input type="checkbox"/> trabajo del estado	<input type="checkbox"/> artesanías
<input type="checkbox"/> trabajo fuera del <i>ejido</i> - turismo	<input type="checkbox"/> trabajo fuera del <i>ejido</i> - otro	<input type="checkbox"/> trabajo dentro del <i>ejido</i>
<input type="checkbox"/> ayuda del estado (\$ para viejitos, oportunidades)	<input type="checkbox"/> remesas (turismo/ EU)	<input type="checkbox"/> no tiene ingresos
<input type="checkbox"/> otro _____		

100. Ud. participa de alguna forma en el manejo forestal del *ejido*?

- Si
- No

101. Tiene Ud. algún empleo en la operación forestal del *ejido* (aserradero, vivero, inventario)?

- Si
- No

Parte 3: Manejo del *Ejido* y PROCEDE

102. Ud. asiste a las asambleas ejidales?

- Si
- No

103. (si responde SI) Describe su participación:

- todas las asambleas
- mas de la mitad
- no muy regularmente

104. Ud. conoce el programa PROCEDE (programa para certificar y titular el *ejido*)?

- Si
- No [pasa # 17]

105. Como fue el proceso para tomar la decisión de entrar (o no) a PROCEDE?

- todos estaban de acuerdo- fue fácil
- mucha discusión, todos no estaban de acuerdo- fue difícil

no sabe

106. (si responde SI) En su opinión, cuales son las ventajas y desventajas que trae PROCEDE?

ventajas (marca toda lo que menciona)	desventajas (marca toda lo que menciona)
<input type="checkbox"/> no hay ventajas	<input type="checkbox"/> no hay desventajas
<input type="checkbox"/> no sabe	<input type="checkbox"/> no sabe
<input type="checkbox"/> más seguridad	<input type="checkbox"/> paga de impuesto prediales
<input type="checkbox"/> se puede vender	<input type="checkbox"/> peligro que el gobierno quita la tierra
<input type="checkbox"/> documentos tiene validez antes de cualquier autoridad	<input type="checkbox"/> riesgo que empieza a vender el <i>ejido</i>
<input type="checkbox"/> mayor acceso a programas/ ayuda del gobierno	<input type="checkbox"/> mas conflictos entre <i>ejidatarios</i>
<input type="checkbox"/> menos conflictos entre <i>ejidos</i>	<input type="checkbox"/> otro _____
<input type="checkbox"/> otro _____	

comentarios: _____

107. Ud. piensa que cambiará el reparto de las tierras en el *ejido* en el futuro? Por ejemplo, piensa que decidirán parcelar, titular, o seguirán igual?

- Si cambiará
- NO, seguirá igual
- no sabe

108. Porque SI cambiará, o porque no?

109. (si el *ejido* no está parcelado) Ud. cree que se debe parcelar el *ejido* (aparte de los solares) y porque?

- Si
 - NO
- Porque? _____

110. (si el *ejido* no esta parcelado, pero no titulado) Ud. cree que se debe titular las parcelas dentro del *ejido* (aparte de los solares) y porque?

- Si
- No

Porque? _____

Parte 4: Frases: Ahora, voy a leer algunas frases. Para cada frase, por favor dígame si:

4. **Si, está de acuerdo**
5. **No sabe**
6. **No está de acuerdo**

Voy a dar un ejemplo de un frase:

“La comida preferida de Ud. es tamales”, así, Ud. me puede decir si esta de acuerdo, no sabe, o no esta de acuerdo” Entiende?

Frases sobre los recursos forestales.	Si, estoy de acuerdo	No Se	No estoy de acuerdo
111. Depende Ud. del bosque para vivir bien. <i>Tu yo'osal le k'áaxo' ma'alob in kuxtal.</i>			
112. No trabaja Ud. regularmente en el bosque. <i>Ma'ach a jach meyajtik le k'áaxo'</i>			
113. Las ganancias ejidales de la venta de madera representa la mayoría de los ingresos de su familia. <i>O tu láakal u táak'iinil u kuxtal in wotoche' ku taal tu tojol u koonlil le che'o'</i>			
114. El bosque no garantiza la economía de su familia. <i>Le k'axo' mun garantizartik u kúuktal familia.</i>			
115. El manejo forestal es lo más importante para la economía del <i>ejido</i> . <i>U ti'al u yantal tak'iin tin kaajale' jach k'a'ana'an u kana'anta'al le ejidoo'.</i>			
116. La agricultura deja más ganancias para su familia que la venta de la madera. <i>U meyajta'al le koolo' más ku p'atik tak'iin ket le konche'o'.</i>			
117. Recibe Ud. beneficios de los recursos forestales, como de la venta de madera, la palizada, o el guano. <i>K'uchul tin k'ab u tojol le k'áaxo', je'exe' te konche'o', tu koche'i najo' o te xa'ano'.</i>			
118. Trabaja en las operaciones forestales del <i>ejido</i> <i>Ka meyaj yeetel le ejido' le ken xolotok le che'o, ken kola'ak le che'o.</i>			

Frases sobre el parcelamiento	Si, estoy de acuerdo	No Se	No estoy de acuerdo
119. El parcelamiento es un problema para el <i>ejido</i> . <i>U t'o'oxol le k'áaxo' ku ts'aik ba'atel te kaajtalo'</i>			
120. El parcelamiento da más seguridad al <i>ejidatario</i> . <i>U t'o'oxol le k'áaxao' ku jets'kunsik u yóol le ejidatario.</i>			
121. El parcelamiento permite progresar a la gente que desea salir adelante. <i>U t'o'oxol le k'áaxo' ku yaantik ka jook'ok taanil le máako'ob u k'aato'.</i>			

122. El parcelamiento hace difícil pasar o entrar por las parcelas particulares. <i>U t'o'oxol le k'áaxo' ku talamkunsik u máan máak ichil e k'áaxo'ob ma' u ti'ilo'ob.</i>			
123. El parcelamiento motiva más a la gente a plantar árboles. <i>U t'o'oxol le k'áaxo' ku metik u paak'al che'ob tumen la máako'obo'.</i>			
124. El parcelamiento asegura que Ud. y su familia tenga beneficios de su trabajo en el futuro. <i>U t'o'oxel le k'áaxo' ku chiikbejsik teen yéetel in láako'ob biin u p'at to'on u tojol ak meyaj.</i>			
125. El parcelamiento significa que algún <i>ejidatario</i> le toque pura tierra, y otro le toque pura piedra. <i>U t'o'oxol le k'áaxo' je meetik uts'aabal ti máak chen lu'um wa chen túunich.</i>			
126. Hay menos problemas cuando el <i>ejido</i> es en global (no parcelado). <i>Wa múuch' u meyajta'al le k'áaxo' ma' ya'ab u k'uuxili.</i>			

Frases sobre la venta de derechos ejidales	Si, estoy de acuerdo	No Se	No estoy de acuerdo
127. Los que venden sus derechos ejidales invierten sus ganancias en otras actividades económicas. <i>Le ku konko'ob u derecho'obo' ku ts'aako'ob u tak'iino'ob tu la meyaj ka ya'ablak.</i>			
128. El <i>ejido</i> debe permitir a los <i>ejidatarios</i> vender sus derechos si así lo desean. <i>Le ejidatario'obo' k'a'ana'an u cha'ako'ob u konko'ob u derecho'ob.</i>			
129. No es aceptable si algún <i>ejidatario</i> decide vender su derecho a una persona ajena del <i>ejido</i> . <i>Ma' k'áam béeni ka'a uko'on u derecho juntu ejidatario ti u la' maak ma' u yeet kajnalilí.</i>			
130. La venta de derechos ejidales es aceptable en casos de emergencia, como enfermedades. <i>U ko'onol le derecho k'aan been wa yo'osal junp'eel talamil je'ex k'oja'ani.</i>			
131. Los <i>ejidatarios</i> que quieren vender sus derechos ejidales son aquellos que no quieren trabajar. <i>Le máako'ob ku kooniko'ob u derecho'obo' leti'obe ma' u k'aato'ob meyajó'</i>			
132. El <i>ejido</i> debería prohibir la venta de los derechos ejidales. <i>Le ejidatario'obo' ma' k'a'ana'an u cha'ako'ob u ko'onol u derecho'ob.</i>			

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BIOGRAPHICAL SKETCH

Maria DiGiano received her PhD at the University of Florida in the spring of 2011. Her research focused on the interface between policy reform, land tenure institutions and the environment. Her dissertation examined the both material and ideological impacts of Mexico's 1992 Agrarian Reform on common property regimes in southeastern Mexico. This research investigated changes in land tenure arrangements, forest cover and cognitive models of land and rights.

Her previous research examined land tenure arrangements and community forestry outcomes in Mexico and Guatemala and resilience among forest-dependent communities in the wake of natural disaster. For her master's research at the University of Florida, Maria examined the potential impacts on forests and smallholder incomes of a Payments for Environmental Services pilot program in the Brazilian Amazon. Prior to graduate school, Maria worked with small farmers in Paraguay as a Peace Corps volunteer. She holds an undergraduate degree in history from the University of North Carolina.