



Ladino and Q'eqch'í Maya land use and land clearing in the Sierra de Lacandón National Park, Petén, Guatemala

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Abstract. This paper examines potential differences in land use between Q'eqch'í Maya and Ladino (Spanish speakers of mixed ancestry) farmers in a remote agricultural frontier in northern Petén, Guatemala. The research site, the Sierra de Lacandón National Park (SLNP), is a core conservation zone of Guatemala's Maya Biosphere Reserve (MBR). In recent years, much has been written about the dramatic process of colonization and deforestation in Petén, Guatemala's largest and northernmost department. Since the early 1980s a rapid rural transformation has occurred where once remote forested regions have been colonized by small farmers, and lands have been converted to maize fields and cattle pastures. Consequently, less than half of the original forest cover in the department remains. Although approximately half of Petén's rural settlers have been Q'eqch'í Maya, their land use, and its subsequent impact on Petenero forests, has been little studied. Results suggest that despite heterogeneous land use systems in migrant origin areas, given similar physical and socio-economic conditions following settlement in this remote frontier, Q'eqch'í and Ladino farmer land use is remarkably similar. Only a modest land use difference appears to exist between the two groups: Q'eqch'í Maya appear to have more extensive swidden maize rotations while Ladinos dedicate more land to pasture.

Key words: Agricultural frontier, Central America, Guatemala, Land use and land cover change (LUCC), Maya Biosphere Reserve, Petén, Q'eqch'í Maya, Rural migration, Tropical deforestation

Abbreviations: SLNP – Sierra de Lacandón National Park; MBR – Maya Biosphere Reserve; INTA – The National Institute for Agrarian Reform

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Introduction

This article examines potential land use differences between Q'eqch'í Maya and Ladino (Spanish speakers of mixed ancestry) colonist farmer land use in the Sierra de Lacandón National Park (SLNP), a core conservation zone of Guatemala's Maya Biosphere Reserve (MBR) (Figure 1). An ample literature describes the process of colonization and land use in Petén, the largest and northernmost department of Guatemala (Schwartz, 1995; Valenzuela, 1996; Grandia, 2000; Grunberg, 2000). Massive in-migra-

tion has swelled Petén's population from a few small rubber tapping colonies in the 1960s to well over half a million inhabitants by the late 1990s, while approximately half the forests in the region have been converted to agriculture. Nearly half of Petén's inhabitants are Q'eqch'í, yet we know relatively little about how this group's land use compares to Ladino land use and their respective contributions to deforestation in Petén. Examining land use differences between the two groups is necessary for understanding the relative importance of ethnicity and place in reference to frontier land use. This knowledge, in turn, may inform the



Figure 1. Guatemala's Sierra de Lacandón Natonal Park (SLNP) and Maya Biosphere Reserve (MBR). *Source:* David Carr and the Nature Conservancy.

development of methods for improving rural welfare and reducing the impact of colonist agriculture on the Petenero forests.

The Q'eqchí survived for centuries as semi-nomadic swidden farmers among the rich valleys of the Verapaces in Central Guatemala. But by the mid-19th century, virtually all of the best farmland in the region was seized – mostly by German expatriates – to invigorate the booming coffee export industry. The Q'eqchí were subsequently relegated to farm rugged mountain slopes and indentured into seasonal servitude on coffee plantations. The continued splintering of small farms due to continued land consolidation, the highest rural fertility in Central America, and inadequate seasonal labor on coffee and cardamom plantations, all conspired to spur a massive out-migration of families in search of land (Valenzuela, 1996; Carr, 2002). Consequently, in just the last two to three decades, the region of Q'eqchí monolingualism has extended widely – far northward into the forested regions of Petén, to the south into the department of Izabal, and westward into Belize. This diaspora meant that, even as the language remained the 8th most spoken Maya language in Guatemala little over a decade ago, by the mid 1980s, the geographical area inhabited by Q'eqchí speakers had exceeded that of all Guatemalan Maya groups. Continued high fertility and rural isolation

has increased the population of Q'eqchí speakers such that today only Quiché is spoken by more Guatemalan Maya.

The scant information published on Q'eqchí land use in Petén suggests that this group may have a relatively great impact on environmental degradation in the region. Atran (1993), for example, found that Q'eqchí farmers in the buffer zone of the MBR cleared more forest and engaged in fewer soil conservation techniques than their Maya Itzá neighbors. Recent research by Fagan (2000) in a core conservation zone of the MBR, the Laguna del Tigre National Park (LTNP), corroborates Atran's position. Fagan relates that the two largest Q'eqchí communities in the PNLT were settled in remote, thickly forested areas that have been rapidly deforested due to low intensity, expansive corn farming.

Similarly, to the south of Petén, in Guatemala's largest protected area, the Sierra de las Minas National Park (SMNP), Castellon (1996) reports that Q'eqchí settlement deep within the park and farmers' subsequent land management are a primary cause of the destruction of the park's forest canopy. Throughout the SMNP, households had adopted intensive cardamom production for export. Yet deforestation rates accelerated nonetheless as virtually all households simultaneously retained a multi-field

maize rotation, exacerbated by steep, degraded slopes – the only land available for many recent colonists.

In sum, the modest literature that exists on the subject generally agrees that Q'eqchí migrants tend to settle remote agricultural frontiers, clearing large plots of unoccupied forest land to engage in an extensive maize swidden.

However, some suggest that environmentally destructive Q'eqchí land use in Petén may be influenced by Ladino neighbors. Macz and Grunberg (1999), for example, note that there is a difference between more traditional Q'eqchí settlement – *agarradas comunales* directed by elders that look to reestablish the relationship with the *tz'uultaq'a*, or earth god – and the increasingly common Ladino pattern of *agarradas familiares*:

The [family agarrada] group does not respect the rules of good land use, which can be observed on plots that no longer have trees and they also have no interest in accepting advice on forest management, etc., offered by the representatives of organizations that work in Petén.

When referring to a more “traditional” Q'eqchí land use, Macz and Grunberg invoke a culture-land relationship portrayed in Wilson's *Maya Resurgence in Guatemala* (1995). Wilson discussed how among traditional Q'eqchí communities in Alta Verapaz, identity is intimately linked to the 13 mountains that form cardinal points ringing the Q'eqchí homeland. Land management in traditional Q'eqchí communities is governed by the local *tz'uul taq'as* to which farmers pay homage. Permission is requested to clear forest and to plant corn – which is “loaned” to the Q'eqchí farmer. Care is taken to minimize the human impact on the environment and to avoid clearing forest that covers the mountain home of the local deity. Wilson explains,

Traditional Q'eqchí say that the mountains are living (yo' yo). They have the quality of *wiinqilal* or “personhood,” a concept that applies only to mountains and people. The *tzuultaq'as* are spirits that have a human form and live in a “house” . . . inside the *mountain*. Yet the *mountain* is also the *physical body* of a *tzuultaq'a*. (p. 53)

One informant of Wilson's added,

A *tzuultaq'a* feels pain when we clear the brush with machetes and jab the planting sticks into the earth. (p. 54)

According to Wilson, among the Q'eqchí, such relations to mountain deities are highly localized.

Therefore, unlike the universal human-land relationship conceptualized by Inca descendants in the Andean cult of the *Pacha Mama*, within the Q'eqchí cosmovision, the bond between human and mountain spirit is sundered when humans move to another region.

What land use patterns arise then among Q'eqchí colonists dislocated from their traditional homeland in the forest fringes of Petén, and how might these patterns compare to Ladino land use? Are Q'eqchí colonist farmers, as some suggest, more destructive of the forest than Ladino farmers? Or, following frontier settlement, do they continue more conservative farming techniques consonant with origin land use traditions and the cult of the *tzuultaq'a*? This study compares farm and household characteristics to examine what, if any, are the differences in land use between the two groups in eight communities in the SLNP, and what factors may explain the patterns observed.

The research site: the Sierra de Lacandón National Park

Much attention has been focused on the ecological devastation of the Brazilian Amazon. Yet from 1990 to 1995, although the absolute amount of forest cleared was much less than in Brazil, the rate of forest clearing in Central America outpaced Brazil's rate by almost six times. At 2% per annum, Guatemala ranked among the world's top twenty countries in percentage of forests cleared during the first half of the 1990s (World Bank, 2001). This is particularly significant given that only five of the other nations of greatest deforestation during this time period had any sizable forest cover (at least 10,000 km²) at the beginning of the 1990s (the others, nations such as El Salvador and Haiti, had only sparse vestiges of forest remaining).

Most of Guatemala's recent forest loss has occurred in the vast *departamento* (similar to a US state) of Petén, most of this at the hands of migrant farmers. Approximately half of this population is comprised of Q'eqchí Maya farmers and agricultural laborers. Deforestation has been particularly swift during recent years in the Maya Biosphere Reserve, an area covering 2,113 km², representing almost 60% of Petén and 20% of national territory. The research site for this study, the Sierra de Lacandón National Park (SLNP), is a core conservation zone of the MBR. The second largest national park in Guatemala, the SLNP boasts the richest biodiversity in the MBR and is the sole biological corridor linking the MBR and the Montes Azules Biosphere Reserve – the largest protected lowland tropical forest in Mexico (The Nature Conservancy, 1997). Despite its biological



Figure 2. Q'eqchí Maya waiting for the bus on the recently paved Ruta a Naranjo which runs adjacent to the SLNP.



Figure 3. A Ladino family with a cattle corral in the background.

importance and its designation as a core conservation zone, the SLNP experiences some of the highest rates of population growth, land invasions, and agricultural expansion in Petén (Sader et al., 2000). The rural economy revolves around subsistence maize production. Most of the settlers arrived in the Park since 1988. Following decades of high internal displacement due to a protracted civil war, Q'eqchí colonization of the park increased during the 1990s, and the Q'eqchí now represent an estimated 20% of the park's approximately 15,000 inhabitants (Carr, 2000).

Methods

Fieldwork was undertaken by the author in 1997 and 1998. The data is derived from surveys with 33 Q'eqchí household heads and 186 Ladino household heads in 8 communities (Figures 2 and 3 respectively). The eight communities selected represent a geographically stratified selection of the 28 communities with farmland in the park. Similarly, the ratio of Q'eqchí to Ladino households interviewed represents an approximation of this ethnic distribution among the park's inhabitants. Differences between the two groups are assessed with *t*-tests and chi-square tests based on a host of demographic, socio/political-economic, and ecological factors.

Farm and land use characteristics examined included farm size, and the number of hectares in forest, cleared land, fallow, maize, beans and other crops, and pasture. Several household characteristics are hypothesized to influence these land uses (Carr, 2004). These include household demographics (Cain, 1984; Perz, 2001; Carr and Pan, 2002), land tenure status (Schmink, 1992; Forster and Stanfield, 1993), education level of the head of household (Panayatou, 1994), contact with NGOs or GOs (Pichón, 1996), and distance to a road and duration on the farm (Rudel, 1983; Jones, 1990). Smaller (and older) household

size, secure land tenure, greater education level of the head of household, and greater contact with NGOs or GOs are hypothesized to have a negative relation to forest clearing. Distance to a road and duration on the farm are expected to have a positive effect on forest clearing.

Agricultural intensification is examined as a function of the following variables: the number of years cornfields are cropped, the distance between maize rows and stalks, and the use of fertilizers, pesticides, and the nitrogen-fixing legume, velvet bean (*mucuna pruriens*). Greater intensification is anticipated to be associated with less overall forest conversion (Boserup, 1965; Billsborrow, 1987). Farm soil quality and topography are used as measures of farm land quality. Good quality soil and flat terrain are hypothesized to contribute to enhanced and sustained yields and less erosion, all factors that should attenuate deforestation.

Results

Household characteristics

Virtually all the household heads in both Ladino and Q'eqchí communities cultivate maize, working over 50 hours a week on average to support large households (Table 1). Although approximately 80% of maize produced is sold to market, most farmers barely break even when even modest production and transportation costs are included (Carr, 2002). Some research has suggested that larger households may sow more land in crops in semi-subsistence economies than do smaller households (Schutjer and Stokes, 1982; Cain, 1984). However, with no variation between the two groups in household size, this relationship cannot be evaluated here. For both groups, the average household size of approximately 6.5 members is particularly high considering that colonist families tend to be younger

Table 1. Household characteristics.

	Ladino	Q'eqchí
Farms as primary job	97%	94%
Hours worked per week (head of hh)	56.5	58.0
Household size	6.5	6.5
Members of household/Caballería (unweighted)	8.3	9.3
All household members/males > 11	2.0	1.8
Average number of year schooling (head of hh)	2.1	1.8
Contact with GO or NGO (head of hh)	41%	39%
Duration on the farm*	9.5	6.9
	n = 186	n = 33

*Significant at the 0.05 level.

than families in longer settled regions; young people migrate more readily to the frontier than do the elderly (see, e.g., Sekhar, 1993). Guatemala has the highest rural fertility rate in Latin America, yet average family size at the national level for rural areas (5.6) is still one household member fewer than the average in this (relatively youthful) sample for the SLNP (Instituto Nacional de Estadística, 1999).

The population density of the households (defined as number of household members per one caballería of land) was modestly greater among the Q'eqchí than among Ladinos due to the slightly smaller size of Q'eqchí farms, and there are nearly two consumers to every producer among both groups. The National Institute for Agrarian Reform (INTA) established the caballería (45 hectares) as the standard for peasant settlement in the 1950s. Early colonists to the park seized a caballería or more and farmers still invoke it as the amount of land that is necessary for subsistence. Today, both groups possess slightly under one caballería per family, suggesting incipient plot fragmentation.

Most heads of household either never entered primary school or completed just a few years before dropping out. The education level of the heads of household is therefore lower than the national average in each of the two groups. In rural areas of Guatemala, nearly half of household heads interviewed by the National Institute for Statistics (INE) in 1998 had completed primary school (Instituto Nacional de Estadística, 1999). This may support a selection for lower educated migrants to rural areas as opposed to cities and international destinations as found by Carvajal in the Dominican Republic (Carvajal and Geithman, 1976). Lastly, it appears that institutions have thus far had little impact on most farmers' land

use. Despite millions of dollars invested on conservation and sustainable development in the MBR under the multinational Mayarema Project, more than half of both groups claimed never to have had contact with a GO or NGO worker. Lastly, of the household characteristics measured, the only significant difference between the two groups is their average duration on the farm. Ladinos have been on their farm an average of almost ten years compared to nearly seven years for Q'eqchí households.

In summary, despite great cultural and linguistic differences, the household characteristics of the two groups are strikingly similar. Indeed, the data suggest Ladinos and Q'eqchí share more features with one another than with their ethnic cohorts in their regions of origin. This finding highlights the importance of place and suggests that the relatively homogenous frontier environment of the SLNP may be a more influential determinant of household characteristics than ethnicity.

Land quality and land ownership

The two groups also share similar farm ecologies (Table 2). A slightly greater percentage of Ladinos reported degraded, unusable land. However, most farmers reported having slightly more mediocre and poor soil than very good soil, while a little more than half of the plots in both groups are situated on at least partially hilly terrain.

Land ownership status, however, does differ notably between the two groups. In the absence of legal titling within the core zone of the park, most of the park's inhabitants are squatters. But whereas only two-thirds of Ladinos are squatters, over 80% of Q'eqchí have no legal claim to their farm. This finding is consistent with the tendency of the Q'eqchí to settle remote, unoccupied forests, as noted by several scholars. The more remote settlement pattern of the Q'eqchí also helps explain the finding that, while nearly a quarter of the Ladinos rented land, only 4 of 33 Q'eqchí in the sample reported renting land. Land is rented only where there is a demand for it, almost exclusively in the longer settled, more population-dense, and predominantly Ladino fringes of the two principle access roads to the park.

Farm characteristics and land allocation

Following the discussion above, the difference in the distance in kilometers to a year-round road between the two groups, 8.0 km. for the Q'eqchí and 5.6 km. for the Ladinos, is statistically significant at the 0.01 level (Table 3). Since most land within several kilometers of the principal roads was fully claimed by the early 1990s, settlers to the park have had to

Table 2. Land quality and land ownership.

	Ladino	Q'eqchí
Very fertile soils	39%	36%
Mediocre or poor soils	59%	48%
Hilly or partially hilly terrain	53%	55%
Unusable land	12%	9%
No legal claim to their farm**	67%	82%
Rents land*	24%	12%
Contact with GO or NGO (head of hh)	41%	39%
	<i>n</i> = 186	<i>n</i> = 33

*Significant at the 0.15 level.

**Significant at the 0.10 level.

Table 3. Farm characteristics and land allocation (ha.).

	Ladino	Q'eqchí
Farm distance to a primary road (km)*	5.6	8.0
Total land	48.9	43.8
Total land cleared 13.8	12.9	
Forest	35.1	30.9
Fallow	6.9	7.2
Corn	5.0	4.9
Beans or other crops	0.5	0.6
Percent with beans or other crops	33%	36%
Pasture*	1.4	0.2
Percent with cattle	24%	21%
	<i>n</i> = 186	<i>n</i> = 33

*Significant at the 0.05 level.

choose between renting land near the road or claiming unoccupied land further within the park. It appears that the Q'eqchí have tended to opt for the latter. Invariably, farmers claimed that higher transportation costs, coupled with abundant forestland characteristic of their remote locations, encouraged agricultural expansion. As one Q'eqchí farmer noted, "with such high costs to transport crops to the road and with prices so low, we have to expand our *milpas* [cropland, usually dominated by maize] in order to keep up with falling production." With substantial land, and scarce capital and surplus labor for investing in intensification, agricultural extensification is the logical choice for increasing maize production in the park. In this regard, Q'eqchí farmers in the SLNP are quite similar to frontier farmers in Amazon frontier regions (e.g., Hecht and Cockburn, 1989; Pichón, 1997).

Yet, they are also quite similar to their Ladino neighbors. There is no statistical difference between the two groups in any land use except pasture. The

typical farmer in both groups possesses between 40 and 50 hectares of land with 10 to 15 hectares of land cleared, the rest remaining in forest. The amount of land in corn (approximately 5 ha.), beans, and other crops (approximately 0.5 ha.) and fallow (approximately 7 ha.) remains almost identical between the two groups.

The average amount of land in corn for the entire sample is comparable to the estimated 5.5 hectares in two of the largest Q'eqchí villages in the Parque Nacional Laguna del Tigre where maize is also the only crop grown in any abundance. Yet SLNP farmers, both Q'eqchí and Ladino, are cultivating considerably more maize than the 2 to 4 hectares that Castellón observed for Q'eqchí farmers in the SMNP who were allocating a portion of their land to the cash crop cardamom. Further, the extensive fallows of the SLNP Q'eqchí sharply contrast with the land poverty of Alta Verapaz, where most households are landless or possess scarcely a hectare or two.

There are, however, two interesting potential differences in land use between the Q'eqchí and Ladino settlers. First, the data suggest *prima facie* that the Q'eqchí are clearing forest for milpa at a faster pace than Ladinos. If frontier farms evolve through a similar process of land use over time, then we would expect that farms settled earlier would be more likely to have completed the fallow rotation. Yet even though Q'eqchí farmers had an average duration on the farm of 2.6 years less than Ladino farmers, the difference in land cleared between the two groups was statistically insignificant. However, since forest clearing tends to be greater during the initial years of settlement, the difference in pace of forest clearing between the two groups may be less extreme than a temporally linear interpretation of the data would suggest (see, e.g., Mather, 1992; Brondizio et al., 2002). For example, (although the small sub-sample precludes any conclusive assertions), the average amount of land cleared by the 18 Ladino farmers in the sample with 7 years on the farm (to compare with the Q'eqchí mean of 6.9) was 12.8 hectares, virtually identical to the Q'eqchí mean (12.9). Yet Ladino farmers with seven years on the farm had only 5.7 hectares of fallow, approximately 30% less than the Q'eqchí mean, providing tentative support for a longer fallow swidden for maize production among the Q'eqchí. Nevertheless, given that most land remains in forest on the farms in the sample, both groups are in a position to clear significantly more forest than they have to date (and presumably will do so if secondary forest is considered insufficient or less desirable than primary forest).

Secondly, although approximately one quarter of each group reported owning cattle, Ladinos with live-

stock had several times more land in pasture than did Q'eqchí farmers with cattle. As observed in Brazil and in other parts of Latin America, the extent to which land-demanding livestock is embraced by frontier farmers may have greater implications on future deforestation than differences in crop management (e.g., Nations, 1992; Hecht, 1993).

In summary, the two groups appear to be allocating farmland almost identically, with several hectares in maize, several more in fallow, and most remaining in forest. The land use is comparably extensive relative to other frontier environments in Guatemala and much more so relative to migrant areas of origin in longer-settled regions of the country (Carr, 2002). That the Q'eqchí had cleared as much land as the Ladinos in less time suggests a slightly faster pace of forest clearing within the *milpa* fallow rotation. But the greater amount of land allocated to pasture among the Ladinos suggests future deforestation could be greater among Ladinos if differences between the two groups in pasture conversion continue to widen.

Farm management and intensification

Consistent with the abundance of forest reserves remaining on their farms and their extensive fallow rotations, both the Q'eqchí and Ladino households employed relatively little agricultural intensification on their farms. Both groups appear to have minimal variability in cropping intervals and in crop density (Table 4). On average, both Q'eqchí and Ladinos tend to grow crops for two years and leave one to two meters of distance between rows and stalks. Consonant with a frontier environment of land abundance, this cropping pattern is much less dense than in colonist's origin areas where farmers tend to plant at 1 meter distance or less (Carr, 2002).

One type of intensification was popular in the region; velvet bean (*mucuna pruriens*) was cropped by approximately one-third of the farmers in each group. *Mucuna* is a nitrogen-fixing legume that has been known to double corn production during the second annual harvest when farmers can fetch higher prices (Mausolff and Ferber, 1995). Because the *mucuna* maize field is spatially fixed, only the field used for the first maize harvest is part of the swidden system, compressing the crop rotation, and mitigating forest clearing.

Little variation is apparent between the two groups in terms of fertilizer, herbicide, and insecticide use. Nearly half of all farmers apply herbicides, but fertilizers are costly and unnecessary in the multi-field swidden practiced by most farmers. The difference between the two groups in terms of insecticide use

Table 4. Farm management and intensification.

	Ladino	Q'eqchí
Years land is cropped	2.0	2.2
Space between rows and stalks	1.7	1.6
Velvet bean	37%	36%
Fertilizers	7%	6%
Herbicides	43%	36%
Insecticides*	3%	0%
	n = 186	n = 33

*Significant at the 0.05 level.

was statistically significant, but this finding must be interpreted in the context of very scant overall use (five Ladinos and zero Q'eqchí in the sample).

Summary and discussion

Some research has suggested that the Q'eqchí are more destructive of the forest environment than other ethnic groups farming in Petén. However, the data presented here suggest that, given similar physical and socio-economic conditions, Q'eqchí farmers are quite similar to their Ladino counterparts. Most of the farmers are squatting illegally on park land. Despite the fact that more Q'eqchí are squatters, they do not clear significantly more forest as some of the rural land title literature would suggest (Deacon, 1999; Thiesenhusen, 1991). Rather, the greater level of land titling among Ladinos facilitates the adoption of cattle; land title is necessary for bank credit, which many farmers invest in cattle. Virtually all cropland is sown in maize – both groups crop approximately 5 hectares – and, with an average of 7 hectares in fallow, both groups manage a “bush fallow” swidden (Boserup, 1965). Households are uniformly large and farm plots appear to be similar in their ecological characteristics.

There are some differences between the two groups worth noting. First, the significantly greater distance to a year-round road among Q'eqchí farmers supports the notion that this group tends to settle remote forested regions. The greater proportion of Q'eqchí plots that are squatter farms, and the significantly smaller percentage of Q'eqchí that rent land, are consistent with this finding; only remote areas of the park offer access to unclaimed land and there is little need to rent farm plots in remote areas of land abundance. Second, a slightly greater portion of Q'eqchí farms were deforested at the time of the data collection even though they tended to have settled their plots an average of nearly three years later than Ladino farmers. Thus, there is

some evidence to support that the Q'eqchí are clearing forest at a greater rate than Ladinos for crops and that their forest clearing is disproportionately located in areas of relatively intact, old-growth forest. However, since forest clearing tends to be greater during the initial years of settlement, the difference in pace of forest clearing between the two groups appears insignificant. More importantly, the fact that most land remains in forest on both Q'eqchí and Ladino farms signals the potential for substantial forest clearing among both groups.

As in the LTNP and the SMNP, in the SLNP Q'eqchí farmers have tended to settle remote regions and cleared forest at a rapid pace to open up land for *milpa* agriculture. This land use contrasts with traditional Q'eqchí conceptions of land and farming in their homeland and supports Wilson's assertion of the importance of locale-based identification – and of a sundered symbiosis with the local environment among those who colonize other lands. Conversely, the Ladino proclivity to raise cattle in their regions of origin is evident in the more vigorous pasture expansion in the SLNP among Ladinos and augurs a potential acceleration in forest clearing among farmers in this group.

Conclusion

Over half of Petén's forests have been eliminated during the past forty years. Most of the forest elimination was caused by Ladino and Q'eqchí small farmers, the two main groups inhabiting the Petén. Differences between Q'eqchí and Ladino colonists merit recognition by researchers and conservation and development organizations. Most remaining forested land in the region is located in the MBR. With an average of greater than 30 hectares of forest remaining on the farms studied in the SLNP, a core zone of the MBR, as well as unclaimed forested areas deeper within the park, the potential for continued deforestation is great among both groups.

In future years, human land use in the SLNP may impact the environment in several ways. On the eve of the new millennium, a paved road had just been completed, linking the SLNP to Campeche state in Mexico, Belize, and Guatemala City to the south. Similar to many colonization frontiers in the Amazon, the primary road to the SLNP was initially constructed for oil exploration. The discovery of new petroleum deposits could prompt further road building, opening up new frontiers for colonist agriculture. Improved road access, and thus increased land rents, could encourage land consolidation, meaning cattle ranching on the one hand or more intensive perennials for

market on the other could become the main drivers of land cover change in the area. Or road access could accelerate colonization, expanding the *milpa* frontier further into the park. The data suggest that Ladinos may be more likely to be involved in the former, Q'eqchí in the latter outcome. At the time of data collection, however, it appeared that place – characterized by great land availability, lack of market access and rural underdevelopment – had a greater impact on land use than did ethnicity. Q'eqchí and Ladino land use was much more similar to each other than to their own land use before migrating to the SLNP. Few of the Q'eqchí or Ladino farmers cleared more than a hectare or two of forest before settling the forest margins of the SLNP (Carr, 1999). Indeed, colonization of the SLNP was largely a response to acute land scarcity (Carr, 2002).

Limiting access to forest land, discouraging the adoption of livestock, particularly in consonance with land titling programs, encouraging more diverse and intensive agricultural practices, and promoting rural development such as improved education, health care (including reproductive health), and alternative employment may be effective policies to help temper forest clearing among both Ladinos and Q'eqchí. The successful implementation of such policies will respect the cultural mores and land use ecologies particular to each. But policy makers must recognize that sometimes land use differences may be better understood by factors inherent in the shared conditions of place more than differences in the people inhabiting that place. Lastly, recognizing that most agricultural expansion is caused by recent colonists to agricultural frontiers, land use policies in Petén aimed at forest conservation and sustainable development may be doomed to failure without the reconciliation of resource inequities in colonist's communities of origin – whether Ladino or Q'eqchí.

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