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Resource Conservation and Rural Neglect: An Example from Petén, Guatemala

Avrum Shriar
Department of Geography
University of Florida

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Background

The Petén region of northern Guatemala contains one of the largest remaining areas of tropical rainforest in Mesoamerica. But as is the case in other lowland frontiers of Latin America, Petén has been the focus of massive inmigration in recent decades. In less than 35 years its population, which is about 75% rural, has increased by 2,500 percent, from 25,000 in 1965 (Schwartz 1990) to perhaps more than 730,000 in 1999.[1] The impact on the forest has been severe because, as in most frontier regions, land use is extensive (Boserup 1965, 1981; Netting 1993; Southgate and Pearce 1988). As recently as 1970, approximately 70 to 80 percent of the administrative region or "department" of Petén was densely forested (Schwartz 1990), but satellite imagery reveals that only half the area now remains under forest (Sever 1999). The main proximate causes of forest clearing have been agricultural colonization and shifting cultivation by small farmers, mostly ladinos and Kekchi Maya from the highlands, and the establishment of cattle ranches by large, often absentee, landowners.

Deforestation has sparked great concern among both foreign and Guatemalan conservationists leading to the establishment in 1991 of the 16,000 km2 Maya Biosphere Reserve (MBR) in northern Petén (Figure 1). The MBR was designed to conserve a sizeable area of forest in the region and to protect a large number of Mayan archaeological sites, including Tikal. Along the southern edge of the reserve is a 5000 km2 buffer zone in which population growth and deforestation have been rapid. Clearing also has occurred within the reserve itself, particularly on the west side (Sader 1999), because most boundaries have been poorly demarcated, if at all, and only limited sections of the reserve are patrolled.

The establishment of reserves is an important element of biodiversity conservation in the tropics. However, reserves can be protected over the long term only through the satisfaction of human needs in surrounding areas that already are cleared of forest or otherwise significantly disturbed. Unfortunately, in Petén, as in most frontier regions (Collins 1986; Maos 1984; Jones 1991; Manshard and Morgan 1988), the colonization process has been poorly managed in that very little has been done to support inmigrant households and communities through agricultural and rural economic development. Farmers have had little incentive or ability to intensify production. Land use patterns therefore have been inefficient from a spatial perspective, resulting in severe impacts on the forests and habitats of the region.

According to political ecologists, the failure to meet basic human needs in tropical countries, and the pressure this generates on natural resources, are consequences of national and international political economic structures and relations (Utting 1991; Vandermeer 1996; Blaikie and Brookfield 1987; Schwartz 1990). And while it is true, as argued by Sundberg (1998) and Valenzuela de Pisano (1996) in relation to Petén, that forest conservation efforts must place greater emphasis on the underlying socioeconomic and political forces that drive colonization and deforestation, in practice addressing these forces is an extremely difficult challenge. This is especially true in a country as troubled as Guatemala (World Bank 1995a; Valenzuela de Pisano 1996), and particularly for foreign-based conservation organizations that have only limited influence on national and international politics.

Virtually all conservationists concede that the massive inmigration has its roots in the skewed distribution of land and wealth in southern Guatemala, the area from which people are moving to Petén. However, there is little recognition that much can be done within Petén to foster development patterns and land use systems that will meet basic human needs while simultaneously reducing pressure on remaining areas of forest. A priority objective for conservation organizations, and one that is attainable, should be to address the needs for a) sustainable forms of agricultural intensification in areas outside of reserves; and b) patterns of socioeconomic development that will foster such intensification and, more broadly, create a regional economic system that will allow basic human needs to be met.

Notwithstanding the massive inmigration that has occurred in recent decades, it is worth noting that population densities in Petén remain very low, just a fraction of what they were at the height of the classic Maya civilization, over 1100 years ago.[2] Hence, the potential clearly exists to develop more land-efficient and productive agricultural systems that can support large numbers of people, and probably at a higher level of material well-being than that which exists at present. The need for such systems is compounded by the fact that population growth in Petén is unlikely to moderate in the near future, given its roots in the severe poverty and inequality that prevail in southern Guatemala (Valenzuela de Pisano 1996; World Bank 1995).[3]

Efforts to stimulate more intensive land use can benefit from a better understanding of the influences on agricultural practices and strategies, particularly those aimed at intensification. Intensification can be defined as higher production, per unit area, per unit time of desired outputs (e.g. protein, calories, animal feed, cash, and building materials). This paper, based on approximately 12 months of field work in the buffer zone of the MBR, identifies the socioeconomic and agronomic factors that influence farmer strategy. Its primary focus is on the adoption of practices and systems that provide a more intensive alternative to shifting cultivation.

Farmer Strategies and Influences

Shifting “slash and burn” cultivation, or swidden, is the dominant form of agriculture in Petén. Under this system a small patch is cleared from the forest, and subsequently burned and cropped for a few cycles before being abandoned due to weed invasion and fertility decline. The site is left fallow for a number of years while other patches are cleared and cultivated elsewhere. Re-growth of forest vegetation during this period leads to a restoration of the soil’s fertility, and hence the farmer eventually returns to the site for re-use as a cropping area.

Under low population densities, and when practiced by traditional swiddeners, shifting cultivation has minimal long-term impact on a tropical forest. Traditional swidden does not destroy the forest but rather replaces it with a successional series of regrowth that is more productive for farmers than the original forest (Warner 1991). However, with the rapid migration to Petén of newcomers with little or no experience farming in a lowland, tropical forest environment, large forest clearings have become more commonplace. These make it more difficult for vegetation to re-colonize the cleared area during the fallow stage because surrounding forest, the source of seed, is quite distant from the central area of the clearing. Also, because of the widespread tendency to plant only corn, land degradation has become more pronounced. The emphasis on corn production results largely from the fact that market conditions for other products are very weak or non-existent in most parts of Petén.

Corn, or maize, is the staff of life in Guatemala. It is used to make tortillas, which are eaten with virtually every meal. Maize is produced by almost every household I surveyed (98%), including those that generate all, or almost all, of their cash income through off-farm employment. It is both the principal food crop in the MBR buffer zone, and the most important cash crop. The reasons for this appear to be a) it has the most secure market in spite of major price fluctuations; b) it can be stored relatively easily in the event of weak prices or if there are problems transporting it from field storage facilities (trojas) to town for marketing; and c) it can always be eaten if it cannot be sold. Thus, food security objectives account for its primary role within Petén households.

While maize generally is grown as a sole crop, in some instances farmers may intercrop it with squashes (pepitoria

and ayote) or beans. The latter is the second most common crop, grown by 69% of the farmers surveyed. Most households also produce some fruit for home consumption, such as banana, plantain, citrus, avocado, and papaya, often within homegardens, or on a few trees planted on field plots. Although most farmers would like to raise cattle because of the food and income security it offers, few farmers in Petén actually own cattle. Only 22 of the118 households surveyed, or 19%, had any cows at all, and 15 of these had less than 10 head.

Within the MBR buffer zone a rotational forest- or bush-fallow system continues to be most widespread. But with population growth, land degradation, the creation of the MBR and hence, mounting land shortages, some alternative, more intensive practices and strategies have emerged. These include: intercropping; cultivation of perennials (e.g. fruit trees); use of green manure (Mucuna spp.); plowing with tractors; and the use of herbicide. Less common strategies include the cultivation of high value cash crops and the use of chemical fertilizer.

This research points to a number of factors operating at both the farm-household and regional levels that influence farmer strategy, and the adoption of these more intensive practices (Table 1). Consistent with findings elsewhere, these factors relate to the need to intensify, the perceived benefits or drawbacks of intensification and diversification, and available household resources.

Table 1 - Factors Influencing Agricultural Strategy and Intensification in Northern Petén

Farm Household Scale Factors	Community and Regional Scale Factors
-property size -amount of remaining forest on property -amount of land in fallow -amount of degraded land on property -tenure -plot locations -soil quality -wealth -labor supply -extent of off-farm employment -farmer experience and knowledge	-land quality and micro-climate -market conditions -physiologic density (number of people per unit of arable land) -land distribution -availability of off-farm employment -settler origins and number of years since the area was colonized

Both theory and empirical evidence from other regions suggest that farmers do not intensify production except under population pressure, or unless they see some market-related or other benefit in doing so. (Brookfield 1962, 1972; Boserup 1965, 1981; Rawski 1972; Smith 1975; Pingali and Binswanger 1988; Goldman 1993; Netting 1993; Turner and Ali 1996). This is because agricultural intensification generally provides lower returns to labor (Boserup 1965). Moreover, even when farmers see a need for, or benefit to, intensifying production or otherwise altering management practices on their farms, they may not have the resources required to do so (Berry 1980; Brookfield 1984; Hildebrand 1986).

Because of inter-household and intra-regional differences in the factors listed in Table 1, there is considerable variation in the degree to which the aforementioned intensification strategies are used, both among farmers within a given community, and among communities or areas. For example, only in the Ruta Bethel study area, which has some of the best and deepest soils in Petén (AHT-APESA 1992), do a substantial number of farmers pay tractor operators to plow their fields. Elsewhere, soils generally are too thin and rocky to permit plowing. Similarly, Ruta Bethel is the only area in which farmers, at least the wealthier ones, grow high value cash crops, in particular peanut, sesame, and watermelon. Poorer farmers cannot afford the economic costs and risks associated with the requisite labor and cash investment, perishability, and crop failure. Location also is important in that farmers are reluctant to raise high value crops such as tomatoes, watermelon, or pineapple, on plots that are far from their homes, due to the risk of crop theft. Judging from the high frequency with which it was cited as a problem, the latter is an important concern in this frontier region.

The intensification strategy that is receiving the most attention in Petén, at least among extension organizations, is the green manure system based on Mucuna spp., a nitrogen-fixing legume. This system most commonly involves the development of an abonera, a plot on which mucuna, also known as velvet bean or frijol abono, is planted and tended until it becomes well established (Buckles et al. 1998; Lal 1994; Smyth et al. 1991). Once a dense mat of mucuna is well established, it is used as a maize production plot during the second, drier cropping season, which begins in November or December.

With the incorporation of the abonera or mucuna plot into the farming system, only one crop per year, rather than two, must be grown on a swidden plot, thereby reducing nutrient depletion on the soil. Thus the swidden site can be

used longer, reducing the need to clear forest. Furthermore, production rates obtained on a well-established abonera are double the normal yield obtained during la segunda, the second cropping season, and at a time when prices fetched for corn are considerably higher than during the first season's harvest.

However, the establishment of an abonera requires considerable labor input, making it unattractive to some farmers, especially those with little household labor. Also, landless farmers who rent plots will not invest the time or money to develop an abonera because they generally are not in a position to reap the long-term benefits. In addition, there is a risk of losing the investment if site conditions are inappropriate for mucuna production or because of fire.

Some farmers also cite their fear of snakes as a key reason for avoiding or discontinuing use of the green manure. They claim that the relatively cool and humid conditions found in a well developed abonera provide attractive habitat for dangerous snakes. Although no systematic study has been conducted, their fears may be well founded. During a two-hour period in November 1997 while I was helping two farmers slash an abonera in preparation for planting, we came across three dangerous snakes, including two deadly barba amarilla (Bothrops asper).

These costs and risks help explain several important findings: first, the highest rate of mucuna use is found in the Ruta Naranjo study area where 68% of the farmers surveyed had established aboneras already in use for maize production. In contrast, only 20% and 7% of the farmers in Ruta Tikal and Ruta Bethel, respectively, were relying on the system. In Ruta Naranjo, the combination of rugged terrain, minimal tractor usage, and few alternative income sources, impose significant population pressure on the arable land base. Thus farmers are turning to mucuna out of need. This notion is further supported by the fact that mucuna use is more prevalent among farmers with less remaining forest and fallow land on their properties. Another factor is that a much larger number of farmers in this area have had personal experience with, or exposure to, mucuna and its production benefits in regions where they lived previously, often the southeastern part of Petén or Izabal department. Thus they are less reluctant to invest time or money establishing an abonera. In the other study areas, few farmers have lived in regions where mucuna is used. Moreover, they have other options available to them, such as plowing in Ruta Bethel and off-farm employment in Ruta Tikal, and thereby feel less need to turn to the mucuna system.

The analysis also showed that in Ruta Naranjo mucuna use is more common among poorer households, particularly those with a good labor supply, as measured by the ratio of producers to consumers. For poorer households land productivity is a matter of survival, thus they are more likely to allocate labor, if they have it, to mucuna development. With fewer options, especially in the remote Ruta Naranjo study area, households are doing what they must to sustain their survival through farming.

Slowing or halting deforestation in Petén is important from an ecological as well as a utilitarian perspective. However, it requires that more attention be paid to the factors that affect farmers' livelihoods and production strategies. Attention to these factors would help farmers meet their food and cash needs by relying on less area, thereby exerting less pressure on remaining areas of forest.

Contrary to popular opinion, Petén farmers are well aware of, and concerned about, the decline of the region's forest. They feel the impacts of the change in land cover much more directly than do urban dwellers or foreign conservationists. They lament the drier climate, the greater frequency of crop failure, the greater cost or distances required to obtain fuelwood or building materials, the worsening shortages of surface and ground water, and in some areas, the decline in seasonal freshwater fisheries that formed in intermittent streams that no longer flow. But for the most part, they are not in a position to do much about it.

Market conditions are very unstable and only a few products can be sold with any certainty. At certain times of the year, prices barely cover production costs if they do at all. Some products such as maize, can be stored until prices improve, but this is not an option for most farmers, given their lack of savings and their regular need for cash. Credit is very expensive (18% per annum) and beyond the reach of the vast majority of the area's farmers. Current programs to legalize parcels in Petén should have little effect here, because even farmers with secure titles find existing credit sources unaffordable or too risky, given the poor returns to agriculture.

Agencies working with farmers in the MBR buffer zone appear to be having little fundamental impact. The buffer zone has an estimated population of over 48,000, according to the National Protected Areas Council (CONAP), but in 1998 there were fewer than 30 active extension agents working in the area. A more important factor, perhaps, is that technical options, such as mucuna, are being offered in a vacuum, that is, without providing low cost credit that might help farmers get the system established. Similarly, fruits and other alternative crops are being promoted, but very little attention is paid to market development. Better market conditions could foster greater interest in agroforestry and other, more sustainable, land use systems. While arranging for credit and marketing may not be appropriate responsibilities for extension agencies, the problem remains that to date very little has been done to

develop markets for crops grown in Petén or to improve prices. The only public agency in Petén engaged in agricultural marketing, Profruta, a division of the Ministry of Agriculture, has a total annual budget of less than US$50,000 (Q300,000) (Martinez 1998).

The Need For A Broader Perspective

As in most regions of Latin America, "conservation" work in Petén is being defined very narrowly. Little or no emphasis is placed on the facts that: 1) the vast majority of people in Petén live entirely or in part through agriculture;[4] and 2) it is possible to influence agricultural patterns and practices, and more broadly, the relationship between communities and the land, to reduce pressure on remaining areas of forest. In general the issue of agricultural land use has been, and continues to be, neglected, particularly among conservationists. As an example, a recent collection of articles about the MBR (Nations 1999), published by Conservation International, and entitled "Thirteen Ways of Looking at a Tropical Forest: Guatemala's Maya Biosphere Reserve," contains not one article that focuses in any significant way on agriculture or on how it can be made more compatible with long-term conservation and development objectives in the region.

Most of the research and activity in Petén conducted under the guise of "conservation" consists of biological and ecological studies, planning and management of protected areas, and the use of cutting edge GIS and remote sensing technology to monitor deforestation. Some work has also been done to develop sustainable economic alternatives, such as ecotourism and woodworking, for a handful of small communities. These efforts are important, but they do nothing to address the underlying forces that will continue to generate rapid destruction of habitat and life support systems. Many of these forces can be addressed through initiatives taken at the community and regional level within Petén. The main focus must shift to the underlying factors and circumstances that influence the behavior of the hundreds of thousands of people in Petén who live primarily through agriculture.

Endnotes

1 This figure is an extrapolation based on the 1990 estimate of 311,000 and the assumption that the estimated growth rate of 9.5% per annum that prevailed in the 1980s (AHT-APESA 1992:65) has remained constant in the 1990s. Return to reading.

2 If we assume that the population of the region (36,000 km^2) stands at about 700,000 currently, this amounts to less than 20 people per km^2. Population densities in the Central Maya Lowlands at the height of the Classic Maya civilization have been estimated at 117 to 151 people per km^2 (Whitmore et al. 1990), but other estimates are much higher (Rice 1991; Turner 1990). Return to reading.

3 It is estimated that in the country overall, 57% of the population lives below the poverty line while 58% live below the extreme poverty line (World Bank 1995). Return to reading.

4 Over 60% of Peteneros claim agriculture as their primary occupation (AHT-APESA 1992), but many other people farm to meet subsistence requirements. Return to reading.

References

AHT-APESA. 1992. Plan de Desarrollo Integrado del Petén, Vol. I: Diagnostico General del Petén. February 1992

Berry, Sara S. 1980. "Decision Making and Policymaking in Rural Development" Chapter 13 (pp. 321-335) in Agricultural Decision Making: Anthropological Contributions to Rural Development. New York: Academic Press.

Blaikie, Piers and Brookfield, Harry. eds. 1987. Land Degradation and Society. London: Methuen.

Boserup, Esther. 1965. The Conditions of Agricultural Growth. Aldine: Chicago.

Boserup, Esther. 1981. Population and Technology. Oxford: Blackwell.

Brookfield, Harold C. 1962. "Local Study and Comparative Method: An Example From Central New Guinea." Annals of the Association of American Geographers 52: 242-254.

Brookfield, Harold C. 1972. "Intensification and Disintensification in Pacific Agriculture: A Theoretical Approach." Pacific Viewpoint 25(1): 15-44.

Brookfield, Harold C. 1984. "Intensification Revisited." Pacific Viewpoint 25(1): 15-44.

Buckles, D.; Triomphe, B; and Sain, G. 1998. Cover Crops in Hillside Agriculture: Farmer Innovation with Mucuna. Ottawa: International Development Research Centre.

Goldman, Abraham C. 1993. "Agricultural Innovation in Three Areas of Kenya: Neo Boserupian Theories and

Regional Characterization." Economic Geography 69(1): 44-71.

Collins, Jane L. 1986. "Smallholder Settlement of Tropical South America: The Social Causes of Ecological Destruction." Human Organization 45(1): 1-10.

Hildebrand, Peter E. ed. 1986. Perspectives on Farming Systems Research and Extension. Boulder: Lynne Rienner.

Jones, Jeffrey. 1990. Colonization and Environment: Land Settlement Projects in Central America. Tokyo: United Nations University Press.

Lal, R. 1994. "Agronomic Sustainability of Different Farming Systems on Alfisols in Southwestern Nigeria." Journal of Sustainable Agriculture 4(2): 33-51.

Maos, Jacob O. 1984. The Spatial Organization of New Land Settlement in Latin America. Boulder: Westview Press.

Martinez Torres, Ivan. 1998. Internal Coordinator, Profruta, Santa Elena, Petén, Guatemala. Personal communication, 20 July 1998.

Manshard, Walther and Morgan, William B. eds. 1988. Agricultural Expansion and Pioneer Settlements in the Humid Tropics. Tokyo: The United Nations University.

Nations, James D. ed. 1999. Thirteen Ways of Looking at a Tropical Forest: Guatemala's Maya Biosphere Reserve. Washington, D.C.: Conservation International.

Netting, Robert McC. 1993. Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture. Stanford, California: Stanford University Press.

Pingali, Prabhu and Binswanger, Hans P. 1988. "Population Density and Farming Systems: The Changing Locus of Innovations and Technical Change" in Lee, Robert et al. eds. Population, Food, and Rural Development. Oxford: Clarendon Press.

Rawski, Evelyn Sakaida. 1972. Agricultural Change and the Peasant Economy of South China. Cambridge: Harvard University Press.

Rice, Don S. 1991. "Roots: The Maya Rediscovered." Natural History, February 1991: 10; 12-14.

Sader, Steve A. 1999. Deforestation Trends in Northern Guatemala: A View From Space." Chapter 4 (pp. 26-30) in Nations, James D. ed. Thirteen Ways of Looking at a Tropical Forest: Guatemala's Maya Biosphere Reserve. Washington, D.C.: Conservation International.

Schwartz, Norman B. 1990. Forest Society: A Social History of Petén, Guatemala. Philadelphia: University of Pennsylvania Press.

Sever, Thomas L. 1999. "The Ancient Maya Landscape From Space." Chapter 3 (pp. 20-25) in Nations, James D. ed. Thirteen Ways of Looking at a Tropical Forest: Guatemala's Maya Biosphere Reserve. Washington, D.C.: Conservation International.

Smith, Carol A. 1975. "Production in Western Guatemala: A Test of Von Thunen and Boserup." pp. 5-37 in Plattner, S. ed. Formal Methods in Economic Anthropology. Washington, D.C.: American Anthropological Association.

Smyth, T.J.; Cravo, M.S.; and Melgar, R.J. 1991. "Nitrogen Supplied to Corn by Legumes in a Central Amazon Oxisol." Tropical Agriculture 68(4): 366-372.

Southgate, Douglas and Pearce, David. 1988. Agricultural Colonization and Environmental Degradation in Frontier Developing Economies. Environment Department Working Paper No.9. Washington: The World Bank.

Sundberg, Juanita. 1998. "NGO Landscapes in the Maya Biosphere Reserve, Guatemala." The Geographical Review 88(3): 388-412.

Turner, B.L. II. 1990. "The Rise and Fall of Population and Agriculture in the Central Maya Lowlands: 300 BC to Present." Chapter 7 in Newman, Lucile F. ed. Hunger in History: Food Shortage, Poverty, and Deprivation. Cambridge, USA and Oxford, UK: Basil Blackwell.

Turner, B.L. II and Ali, A.M. Shajaat. 1996. “Induced Intensification: Agricultural Change in Bangladesh With Implications for Malthus and Boserup.” Proceedings of the National Academy of Sciences USA 93: 14984-14991.

Utting, Peter. 1991. The Social Origins and Impact of Deforestation in Central America. Discussion Paper 24. Geneva: United Nations Research Institute for Social Development.

Valenzuela de Pisano, Ileana. 1996. Agricultura y Bosque en Guatemala: Estudio de Caso en Petén y Sierra de las Minas. Guatemala City: Universidad Rafael Landivar/UNRISD/WWF.

Vandermeer, John. 1996. “The Human Niche and Rain Forest Preservation in Southern Central America.” Chapter 9 (pp. 216-229) in Sponsel, Leslie E.; Robert C. Bailey; and Thomas N. Headland. eds. Tropical Deforestation: The Human Dimension. New York: Columbia University Press.

Warner, Katherine. 1991. Shifting Cultivators: Local Technical Knowledge and Natural Resource Management in the Humid Tropics. Rome: FAO.

Whitmore, Thomas M.; Turner, B.L. II; Johnson, Douglas L.; Kates, Robert W.; Gottschang, Thomas R. 1990. “Long-Term Population Change.” Chapter 2 (pp.25-54) in Turner, B.L. et al. eds. The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere over the Past 300 Years. Cambridge: Cambridge University Press.

World Bank. 1995. Guatemala: An Assessment of Poverty. Report No. 12313-GU, April 17, 1995. Washington, D.C.: The World Bank.