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THE FOREST EJIDOS OF QUINTANA ROO, MEXICO

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*A Case Study for
Shifting the Power:
Decentralization and Biodiversity Conservation*

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Introduction

Since the early 1980s, a notable initiative in the state of Quintana Roo, Mexico has sought to manage the remainder of a once-rich mahogany resource for the benefit of local communities. Before that time, despite the existence of forest *ejidos*, part of a common property regime first established in Mexico in 1917, forestry operations were under the control of contractors and wood products concessionaires. Since 1983, the Quintana Roo forest ejidos have often been cited as being among the few examples of successful community-based forest management in the tropics (Argüelles and Armijo 1995; Zabin and Taylor 1997). Responsibility and management authority over these production forests in Quintana Roo is, at least in part, decentralized to local communities that derive real economic benefits from them.

This case study explores these forests' control and management and their relationship to decentralization and biodiversity conservation. Questions include how control over the resources has been decentralized, whether decentralization has led to greater control over the forest resources by the people in closest contact with them, whether local communities are effectively conserving the resources, and, if so, whether they have been motivated by the prospect of viable economic returns. To shed light on these questions, the author reviewed written materials and publications on these forest ejidos and conducted many interviews in Quintana Roo. This case study offers a brief description and history of the Quintana Roo forests, the forest ejidos and the threats they face, and describes the major actors involved with the forest ejidos and their interactions with each other. Then it examines the functioning of the forest ejidos in the context of biodiversity conservation and decentralization issues.

The Production Forests of Quintana Roo: Pre-1983

Before 1950

Located on the Yucatan Peninsula in extreme southeastern Mexico, Quintana Roo, which became a Mexican state only in 1974, has long been home to the indigenous Maya. Archaeological and other evidence strongly indicates that several centuries prior to the 1521

Spanish conquest, the Maya had cleared and cultivated vast areas of the Yucatan forest for settlement (Gómez-Pompa and Kaus 1990; Gómez-Pompa 1991). By the time the Spanish arrived, the Maya apparently had settled into a small-scale subsistence relationship with the forest, clearing patches to cultivate corn and other foods, and extracting products required to build homes and take care of other subsistence needs.

In post-conquest Mexico, Quintana Roo remained a frontier area, and by the late 19th century most of its land area was covered with secondary lowland moist forest. At that time, foreign entrepreneurs and Mexican colonists began to arrive in Quintana Roo to harvest some of its commercially valuable forest timbers, among which the most important economically are Spanish cedar (*Cedrela odorata*) and *Swietenia macrophylla*, a species of true mahogany. These new arrivals also began to clear forested lands for farming and, just as the Maya had been doing for centuries, to tap the abundant chico zapote (*Achras zapota*) tree for chicle, the natural substance used to make chewing gum.

1950s to 1982: MIQRO and Ejidos

In the early 1950s, the Mexican government granted a massive mahogany concession to *Maderas Industrializadas de Quintana Roo* (MIQRO) and, in 1959, the government actually took over ownership of this enterprise. This concession, covering about 500,000 hectares, had exclusive wood harvesting rights over both national and ejidal lands in the southern parts of Quintana Roo. Delivering the logs over land and by water to Merida, Chetumal and points beyond, the concessionaire had harvested about 400,000 cubic meters of valuable hardwoods by 1982 (Galletti 1989, 1992, 1993; Galletti and Argüelles 1987; Argüelles and Armijo 1995).

The ejido system was established in Mexico as a common property regime in 1917, by Article 27 of the Mexican Constitution, in response to the strong agrarian reformist presence in the Mexican Revolution. Before the Revolution had begun in 1910, 96% of heads of families in Mexico had no access to land, and 1% of the population held 97% of the land. The following description refers to ejidal structure prior to certain changes resulting from the 1992 amendment to Article 27 of the Mexican Constitution. Ongoing structural changes build on this system, rather than departing markedly from it.

Under the ejido system, groups of colonists were granted usufruct rights over commonly held extensions of land for which the Mexican federal government held title. The number of ejidatarios per ejido was deliberately restricted, with rights passed down through patrilineal family lines. Not even all males on a given ejido necessarily enjoyed ejidatario privileges. Generally, only male heads of household could be ejidatarios. Ejidatarios grouped together to form an ejidal assembly, to elect democratically a governing body known as the ejidal commissary, and to elect an oversight council to look after the ejidal lands and monitor commissary activities, especially those involving finances. By law, selected lands within an ejido were parceled out to individual ejidatarios for cultivation. Other lands, including forests, remained held in common. Though income derived from work on a designated plot accrued to an individual ejidatario, surplus income from production on communally-held lands was divided equally among all ejidatarios.

Much of Quintana Roo's land is assigned to the ejidal system. The oldest ejidos in Quintana Roo were established in the 1930s, primarily for chicle extraction (Argüelles and Armijo, 1995). The area allocated to each individual was based on the area necessary to harvest a given amount of chicle, which worked out to each ejidatario being granted about 400 hectares. This meant that ejidos in Quintana Roo were quite large in comparison to those in most other parts of Mexico (Galletti and Argüelles 1987).

In the 1940s, demand for chicle was on the rise in world markets and the first big wave of colonists migrating from nearby Mexican states began to arrive in Quintana Roo, encouraged by the Mexican government. As new colonists arrived, new ejidos continued to be established (Barrera de Jorgenson 1993). In the 1950s, chicle markets collapsed after the invention of a synthetic chicle substitute (Stedman-Edwards 1997), but the market rebounded somewhat in later years. By the 1960s, the national government had developed an official policy of populating this region by relocating settlers from more crowded regions in Mexico. The new colonists brought with them their agricultural and cattle ranching traditions, which involved land clearing and other practices destructive of forests. Forest ejidos for timber extraction were created in the 1960s, and in the 1970s and 1980s many small but densely populated agricultural ejidos were

established in the region. Ejidos in Quintana Roo today vary greatly in size, population and resource endowment. According to a 1990 census, there were 267 ejidos altogether in the state (INEGI, 1991).

Prior to 1983, ejidatarios were paid a minimal stumpage fee for timber extracted by MIQRO from ejido forests. Some ejidatarios were also employed as MIQRO laborers, but for all practical purposes, ejidos neither controlled nor benefited from timber harvesting on their lands. They were confined to harvesting only chicle during these decades.

When the MIQRO timbering concession expired in 1982, it was not renewed. As a holding of a state-owned finance company, MIQRO was never efficiently run, and years of corruption had taken their toll. Like most Mexican government entities, the finance company had borrowed heavily from the international banking community and the debt crisis of 1982 had left it unable to secure new funding, so MIQRO was bankrupt. Also, most of the mahogany in this concession had already been harvested. Significant amounts of mahogany did remain in many of the larger ejidos formerly dependent on chicle, perhaps having proven inaccessible to past harvests. Potential buyers still avidly sought commercial volumes of mahogany. To be able to offer a large enough volume of timber supply to interest buyers, the ejidos would have to group together.

The Forest Ejidos of Quintana Roo Since 1983

In 1983, a “propitiously aligned ‘constellation’ of stakeholders” brought about a fundamental change in the business of forestry in Quintana Roo, forming, effectively, collaboration among ejidos, the Mexican government and a bilateral aid program with Germany (Boege 1997). The political environment of Quintana Roo had evolved by 1983, and then-governor of Quintana Roo, Lic. Pedro Joaquín Coldwell, offered the ejidos both his personal support and that of Mexico’s state apparatus. Since 1983, the German overseas aid agency, *Deutsche Gesellschaft für Technische Zusammenarbeit* (GTZ—German Agency for Technological Cooperation), has provided the ejidos with support under a bilateral assistance agreement called the Acuerdo Mexico-Alemania (AMA).

With this technical and financial support from the AMA, in 1983 about 50 ejidos banded together as community enterprises dedicated to sustained-yield forest exploitation and joint sales, part of a new associative endeavor known as the *Plan Piloto Forestal* (PPF—Pilot Forestry Plan). In aggregate, these ejidos contained about 500,000 hectares (ha) of land, which were designated as permanent production forest called “*Areas Forestales Permanentes*” (Argüelles and Armijo 1995). Much of this land, it should be emphasized, consisted of highly fragmented or otherwise sub-par forest. These ejidos joined forces to sell mahogany and other timbers directly to sawmills, including the still-functioning MIQRO sawmill, now without its logging division, and to other buyers.

The key role of the AMA, in the PPF launch and in the development of community forestry in Quintana Roo until about 1996, cannot be overemphasized. AMA’s role was built on its unique mix of technical skills and access to high levels of political power; in the early years it was a crucial source of political support for the ejidos and a conduit for technical expertise. From 1983, the AMA worked to adjust and fine-tune the distribution of responsibility and control exercised by the various stakeholders concerned with Quintana Roo’s forest ejidos (Janka and Lobato 1994), in order to guarantee the survival of the initiative. For many years, it helped negotiate agreements made by ejidos with government agencies.

To manage their forests, the ejidos required access to technical skills in forestry, as well as skills associated with social and organizational development and policy reform. Mexican and non-national forestry professionals hired with financing from the AMA provided the forest ejidos with technical assistance to develop all these skills. In 1986, led and supported by the AMA, this technical team, then housed in the federal government’s forestry subsecretariat, sought to create an extra-governmental mechanism to institutionalize ejidal control over ejidal forests. Much of the impetus for this development came from the fact that a new governor of Quintana Roo, who most likely would not be particularly supportive of community forest management, would be sworn into office in 1987. Therefore, AMA and the federal forestry technical team created formal associations of ejidos known as “*sociedades civiles*,” (civil societies) utilizing an administrative structure sanctioned by the Mexican Civil Code. These sociedades are for-profit non-governmental organizations.

Each sociedad has a technical directorate staffed by professionally-trained Mexican foresters. The AMA designed this technical directorate to provide the technical forestry services and oversight that, in some countries, is the responsibility of a government-level forestry extension service. As it functioned for many years, the technical directorate worked with the ejidos to carry out forest inventories to determine the volumes of mahogany and other species found in each ejido. The data were aggregated at the level of the sociedad, and processed and analyzed by specialists contracted by the AMA. The results were used to produce management plans that were then discussed with and approved in each ejido by the ejidal assemblies. Following this, the sociedades were delegated responsibility by the ejidos for presenting the management plans for government, and obtaining the annual harvest permits for specific volumes of each group of species. At the same time, the sociedades took on the task of connecting ejido members with timber buyers and consumers, and most ejidos formed crews to harvest and transport timber. Those with significant endowments of mahogany also formed communal enterprises to saw roundwood and, in a few cases, manufacture rustic furniture and other value-added products, promoted and supported by the sociedades with assistance from the AMA.

Box 1. Forestry Ejidos: Structure and Management Plans

Typical forestry ejidos have a small village center where most of the ejidatarios reside, in most cases surrounded by agricultural lands parceled out to individuals. Beyond the village center and farming lands are the communally held forests. Despite evidence of infractions, ejidatarios are not legally permitted to clear any permanent production forests for agriculture. The ejido is obligated to manage the area for timber and other forest products and services, according to plans and environmental impact statements they must submit for approval to SEMARNAP, the federal natural resources management authority. The intended arrangements of these ejidal forestry harvests are sketched below, though the details of particular harvests are not necessarily in accord with these arrangements.

The management regime for the forest *ejidos* is designed around mahogany as the "guide" species. The overall permanent forestry area is supposed to be divided into five-year blocks, with these in turn divided into annual harvesting blocks. The intended size of the annual harvesting block within the five-year block can vary depending on the volume of mahogany authorized for that year. In a given year, ejidos are authorized to cut up to a specified approved volume, calculated on the basis of an inventory showing how much mahogany is already present by diameter size class. Almost all trees in the annual harvesting block over the minimum cutting diameter at breast height (dbh) of 55 centimeters are then supposed to be harvested. The plan may call for some especially well-formed individuals to be left standing as seed trees to provide for species regeneration.

On a cutting cycle based on species growth and yield projections (adjusted downward since they were first calculated), the ejidos are supposed to return to the same annual harvesting block twenty-five years later, to fell all individuals then measuring at least 55 centimeters dbh. With three cycles equaling one rotation in the forest ejidos, over a period of 75 years all original mahogany individuals would have been harvested. Meanwhile, new individuals would presumably have been recruited into the annual harvesting block through natural regeneration and ejidal reforestation efforts.

The two sociedades created in 1986 were the *Sociedad de Productores Forestales Ejidales de Quintana Roo, S.C.* (SPFEQR), in the southern part of the state, and the *Organización de Ejidos Productores Forestales de la Zona Maya S.C.* (OEPF) in the center of the state. Ejidos belonging to a given sociedad are not always physically contiguous. Each ejido designates two ejiditario representatives for the delegate assembly of the sociedad to which it belongs. This assembly in turn elects an executive body as well as an oversight entity, the Council of Honor and Justice.

Despite prior expectations, Dr. Miguel Borge Martin, sworn in as Quintana Roo governor in 1987, proved supportive of community-based forestry. In 1988, he promoted a statewide policy for forestry development, which resulted in the 1989 creation of the “Plan Estatal Forestal” (State Forestry Plan), under which the model developed under the Plan Piloto Forestal was extended to many additional ejidos in the state. In 1991, two new Quintana Roo forestry sociedades were formed, the *Sociedad de Pueblos Indígenas Forestales de Quintana Roo*, “*Tumben Cuxtal*”, S.C., and the *Organización de Ejidos Forestales de Quintana Roo*, “*Chaktemal*”, S.C.

Aside from Quintana Roo’s governors, a handful of Quintana Roo state government agencies have also exercised varying degrees of influence on post-1983 development of the forest ejidos. Other key players at the state level include the state forest department and, to a lesser extent, the state-level dependency of SEDESOL, the *Secretaría de Desarrollo Social* (Department of Social Development). SEDESOL is involved with Quintana Roo community forestry through its mission to promote employment. It does this through allocation of project funds. With forestry still an important part of the Quintana Roo economy, it is not surprising that SEDESOL has, in recent years, directed project funds to forestry-related activities of several ejidos in the state.

Beyond SEDESOL, the federal government has been consistently involved in Quintana Roo’s community forestry activities since 1983. The federal forest service has been most directly involved. At the outset of the community forestry initiative, the federal forest service was a dependency of the *Secretaría de Agricultura y Recursos Hidráulicos* (SARH—Department of Agriculture and Hydraulic Resources). After a major reorganization in 1995, activities related to agriculture were assigned to a new federal agency, the *Secretaría de Agricultura, Ganadería y Desarrollo Rural* (SAGAR—Department of Agriculture, Ranching and Rural Development). SAGAR’s direct role in the forestry ejidos of Quintana Roo has been minimal. A new environmental super-agency, called the *Secretaría del Medio Ambiente, Recursos Naturales y Pesca* (SEMARNAP—Department of Environment, Natural Resources, and Fisheries) was formed in 1995 to oversee natural resource management and conservation. In contrast to that of SARH, the mission of SEMARNAP is much more explicitly focused on natural resource

management and conservation. Nonetheless, it took a few years for SEMARNAP to become fully organized and able to operationalize its new authority.

Under the federal Forestry Law, SEMARNAP's Forestry Directorate is now responsible for approving management plans and environmental impact studies, as well as for issuing harvesting permits. However, SEMARNAP's influence was curtailed by regulations issued under the 1992 Forestry Law, which transferred considerable authority over forestry operations in the field to the private sector. Over the past several years, the combined effect has meant a lessened control over forestry in the state at the federal level and, consequently, greater freedom of movement on the part of producers.

Illegal and excessive harvesting of mahogany and other species has increased over the years (Zabin and Taylor 1997) and SEMARNAP is now in the process of promoting reform and issuing new regulations to regain control over forest resource management. Also within SEMARNAP is the *Procuraduría Federal de Protección al Ambiente* (PROFEPA—Federal Environmental Protection Office), charged with monitoring and enforcing compliance with all laws to do with forest resources; any infractions reported to SEMARNAP are investigated and, if necessary, prosecuted by PROFEPA.

In recent years, diminished funding and internal disagreement over the optimal future configuration of Quintana Roo's forestry ejidos has led to a smaller staff and a weakened role for the Acuerdo Mexico-Alemania. In 1993, Great Britain's Department for International Development (DFID) began to support efforts in selected ejidos to improve road building and timber harvesting practices. Support from DFID has helped some ejidos to cover the costs of developing improved forest management practices. The activities of the AMA ceased entirely in 1998, so DFID had become the primary bilateral donor in Quintana Roo, and its influence now extends beyond the ejidos originally involved with it in 1993. A more expanded role for DFID in Quintana Roo's forest ejidos was envisioned as of 1997, though at the time the details of the next phase of this involvement were still under discussion.

Membership in the *Unión Nacional de Organizaciones de Forestería Comunal* (UNOFOC—National Union of Communal Forestry Organizations) is composed of sociedades from across Mexico. The Quintana Roo sociedad, SPFEQR, is a member of UNOFOC, which set up an office in Quintana Roo's capital city, Chetumal, in 1996. UNOFOC is attempting to broaden markets to improve forestry's competitiveness as a land-use choice. UNOFOC's increased influence in the southern third of the state is in part a direct result of the AMA's reduced role. Former AMA staff members have joined UNOFOC, which has obtained funding from donors to provide technical assistance to ejidos, especially in the marketing of lesser-known timber species.

Comparable to UNOFOC, though perhaps weaker, the *Unión Nacional de Organizaciones Regionales Campesinas Autónomas* (UNORCA—National Union of Autonomous Regional Campesino Organizations) was formed in 1985. Two hundred and eighty peasant groups from throughout Mexico belong to UNORCA, including the Quintana Roo sociedad, OEPP. UNORCA and UNOFOC are sometimes perceived as rivals. Both of these national-level organizations certainly can exhibit their power at the regional and state levels when they choose.

Some international foundations and conservation organizations have provided limited funding to the sociedades to help them improve forest management and market competitiveness. These include the MacArthur Foundation, the InterAmerican Foundation and the World Wide Fund for Nature. Additionally, four of the Quintana Roo ejidos have been certified as "well-managed" by two certifiers accredited under the Forest Stewardship Council (FSC), an international membership organization based in Oaxaca, Mexico.

Political Economy of the Quintana Roo Forest Ejidos

Control and Power

Control and power over the forest ejidos of Quintana Roo are distributed among the actors in an ongoing process of give-and-take. Of all stakeholders, ejidos exercise the most direct control. Formal and established control processes are prescribed in the ejido structure, with decisions affecting the resource taken by democratic vote under majority rule. Generally, ejidatarios want

to use the land and its resources to improve the standards of living and increase income in the short term. Within an ejido itself, decisions based on strictly impartial considerations do not always prevail. Voting can occur along family lines, allowing family alliances to control ejido decision-making processes (Boege and Gonzalez 1997). Therefore, within an ejido, small groups and individual families with a wide range of motives and abilities may hold power.

Government actors are motivated by responsibilities vested in them by the state, including socioeconomic development and biodiversity conservation. Laws and regulations provide both the national and state governments with control mechanisms, including processes for the permitting, monitoring and enforcement of extractive activity. These alone, however, do not ensure control over the resource, nor can they guarantee that extraction will be carried out as required or prescribed. Private stakeholder interests can affect the execution of these responsibilities. Buyers are motivated by the profit-generating opportunities that processing and commercialization of selected forest resources can provide. The many consumers of timber and other forest products (including chicle) are located both inside and outside of Quintana Roo and buy directly from the ejidos or through the sociedades. When ejidos or buyers engage in illegal logging or purchasing activities, they exercise power over the control of government agencies.

Like government, bilateral and international donor agency motives are aligned with socioeconomic development and biodiversity conservation, though perhaps in a way less accessible to vested interests. Unlike governments, donor agencies have no explicit control mechanism at their disposal. Though they can sometimes “pull strings” to influence the outcome of events, degree of power seems to be related to the level of financial support an agency can provide to key stakeholders. In the early days, political and financial influence made the role of the AMA more important than later. Mexican government power may have declined, too.

As intermediaries in the permitting process, the sociedades sit between the ejidos and government agencies. In some cases, sociedad staff members seek secure employment. Sometimes they seek to influence higher levels of political and economic activity. Sociedad negotiation with government over individual harvesting quotas for each member ejido confers power and control on a sociedad and its staff. As sociedades grew in strength and stature, the

role they played in centralizing information and obtaining approval for management plans and harvesting permits became correspondingly important. Meanwhile, the sociedades and their foresters became increasingly political. In one case, the head of a technical directorate ran into trouble when he positioned himself for office against the incumbent leader of a municipal government.

Like that of governments and donors, the importance of the sociedades today seems to be declining (Zabin and Taylor 1997). As their importance grew politically, sociedades became less responsive about providing technical services to ejidos. Paradoxically, as the original foresters have gradually been replaced by ejidatarios with formal forestry training, the technical directorates may be losing direct contact with work in the ejidos. Some ejidos now question the value of belonging to a sociedad, and one has even dropped out. Some close to the forest ejido movement believe that ejidos would not pay for the technical services of sociedades if they were not required to do so.

Increasingly then, control and power lie at the level of the ejido and below. As the next section describes, nothing can effectively stop an ejido from cutting down forest in an ejido—management plan or not—if the economic returns of doing so are perceived to be more advantageous than long-term conservation of that forest, even if only in the short term.

Accountability and Conflict Resolution

Formal mechanisms of accountability are intended to ensure transparency of decision-making and provide for timely resolution of conflicts. Within the forestry ejidos of Quintana Roo, the ejidatarios and others who carry out forest management and extraction are accountable for their actions to that ejido's assembly. On-the-ground forest management activities and results are reviewed regularly in assembly meetings. When detected, deviations from planned or approved activities must be justified. With regard to forest management and conservation, ejidos are also accountable to the government and—theoretically at least—to society at large.

The relationship between ejido and sociedad is one of mutual accountability. The ejido is accountable to the sociedad in the observance of its approved harvesting volumes. The sociedad

is accountable to the ejido in the provision of quality technical assistance, as well as in the negotiation and processing of harvesting quotas and permits. The sociedad is governed by its delegate assembly, though this body meets only twice per year. The quality of governance is only as good as the body of delegates, and many of these may not be the most qualified representatives the ejido had to offer. It is possible, then, for small groups from the ejidos to exercise significant control over both the ejido and the sociedad.

When conflicts over resource use arise, they may be resolved either by the ejido or the sociedad, depending on the nature of the problem. A complaint that originates at the level of production is usually dealt with in the affected ejido. A complaint regarding harvesting permits or compliance that has not been resolved by the ejido can be taken to the sociedad, either to its executive body or its Council of Honor and Justice. In Quintana Roo as elsewhere, NGOs, bilaterals and even other ejidos sometimes play a watchdog role, monitoring activities and developments in local resource use and reporting overharvesting or mismanagement to state and federal government agencies.

Like the ejidos, the government is accountable to the Mexican society at large to protect and conserve Quintana Roo's forest resource. To achieve this, the government should also be accountable to ejidos for providing a stable and predictable policy and institutional framework in which to operate, a situation made impossible by the shifting political environment of Quintana Roo. Though government should also monitor and prevent illegal harvesting by non-ejidatarios, such activity remains very common in the state.

Effects of Post-1983 Institutional Functioning on Biodiversity Conservation

Forest clearing for farming and logging, and the activities of chicle producers has resulted in today's Quintana Roo landscape, variably-sized blocks of forest interspersed with land used for agricultural and other purposes. A 1995 assessment of biodiversity conservation priorities for Latin America described the remaining forests of the Yucatan as being of moderate conservation priority at the regional scale, i.e., in the context of Latin America as a whole. It also identified these forests as important staging sites for neotropical bird migration (Dinerstein et al. 1995: 87; Olson and Dinerstein 1998). Two large Biosphere Reserves, Sian Ka'an (designated in 1986) and

Calakmul (established in 1989, designated in 1993), located in Quintana Roo and Campeche States, respectively, do protect some of the Yucatan region's forest habitat. Many once-common larger mammal species and bird species are nonetheless now rare, threatened or in danger of extinction across the entire Yucatan Peninsula (SEMARNAP 1995). Quintana Roo's mahogany species, *Swietenia macrophylla*, may be facing commercial extinction throughout its range, as reflected by several recent proposals, endorsed by Mexico in 1997, to list it in an Appendix to CITES, the Convention on International Trade in Endangered Species of Wild Flora and Fauna. Principal threats to the remaining Quintana Roo forests include agricultural conversion, overharvesting of timber and other plant species, and periodic devastation from hurricanes and forest fires (SEMARNAP 1997).

How has the post-1983 development of the forest ejidos of Quintana Roo had a bearing on threats to the forest resource, and specifically on biodiversity conservation? In addressing this question it is useful to keep in mind that biodiversity conservation is not an explicit or primary objective of many of the key players in these activities. Has biodiversity conservation resulted as an indirect by-product of these players' activities?

Threats to Quintana Roo's forests have environmental or social origins. Environmental threats include natural disturbances like non-human induced fire and periodic blow-down from hurricanes, both essential processes for forest ecosystems. While little can be done to reduce the threat from hurricanes or the damage they cause, organized firefighting has been well advanced in recent years by SEMARNAP. Wildfires now tend to occur more on the public lands or non-forestry ejidos of the northern part of the state. In the south, ejidatarios serve as vigilant rangers over their production forests.

Social threats are more common and complex. Poaching and overharvesting are the most easily observed of the social threats. In Quintana Roo today, the most productive forests commercially are still those forests with significant mahogany resources (Argüelles and Armijo 1995). Mahogany is a valuable resource worth stealing, and most ejidos with mahogany have suffered from poaching by outsiders. Poaching of wildlife is also a problem. Though the production forests are large and often distant from settlements, ejidos have designated patrols year-round.

During the rainy season, chicle tappers circulate throughout some of the ejidos, and any unauthorized hunting, logging or tapping may be quickly reported. When caught, poachers are usually quickly turned over to authorities for prosecution. Highly selective and of relatively low intensity, poaching probably has minimal impact on biodiversity conservation.

Overharvesting of flora can be quite detrimental. In the Quintana Roo forest ejidos, overharvesting of some species has been systematic and even approved under official harvesting permits. Systematic removal of a tree species from the forest can result in significant though poorly understood impact on other linked or dependent components of the ecosystem. The threat of overharvesting in these ejidos has mainly been addressed through serial adjustments in authorized harvesting volumes.

At the height of the MIQRO concession, over 20,000 cubic meters of mahogany were harvested annually from the forests of Quintana Roo. By the mid-1980s, forest inventories were taken in a joint effort by the ejidos, the sociedades, the government and the AMA. These documented, for the first time, tree species volume and composition in the ejidos. When the data were used to calculate a rotation and cutting cycle aimed at ensuring mahogany regeneration, the annual authorized volume for the entire state was lowered considerably. Ejidos were at first reluctant to accept the lower harvest level, since it meant leaving trees standing in the forest which to them appeared ready for harvest. A series of local and regional meetings served to educate ejidatario decision-makers about the principles of forest management, including allowable annual cut and growth increment, stocking, rotation and cutting cycle, and the importance of safeguarding the future harvest. These messages were eventually accepted by ejidos and less mahogany was harvested. Staff of the sociedades and the AMA played a key role in these meetings. Also key was the role of the government authorization and permitting process.

In later years, as additional information became available on both the standing volumes of mahogany and the ecology of the species, annual authorized volumes were again adjusted downward, to about 5,000 cubic meters. As before, this occurred only after considerable discussion and exchange of information with ejidatarios. Again, the sociedades, the AMA and the government played key roles in persuading ejidatarios to accept the change. Some believe the

authorized volumes for mahogany are still too high to provide for commercial survival of the species. Though perhaps true, there is likely a practical limit on how much more of a decrease in authorized volumes ejidos will actually accept. The threshold probably depends on each ejido's relative mahogany endowment. In a recent case, one ejido was caught exceeding its annual harvesting quota for mahogany. The situation was reported to SEMARNAP by the technical directorate of the pertinent sociedad, and corrective action was taken by PROFEPA.

Mahogany is not the only overharvested timber species in Quintana Roo. In member ejidos of the OEPPF sociedad that have little or no mahogany, the harvest has mainly focused on the half-dozen or so lesser known species used for railroad ties. Each ejido receives a quota, expressed only in terms of total cubic meters, and the harvest proceeds throughout the forest until the quota is filled, regardless of which compartments of the forest have been slated for harvest that year under the ejidal management plan. No cap on the volume of individual species is observed, even though the forest inventories have specified allowable harvest volumes for each species. On the positive side, residual damage to the forest tends to be minimal, since extraction is carried out manually. Virtually no heavy machinery is used in the forest.

Little has been done to address the problem of overharvesting species for railroad ties within the institutional arrangements of Quintana Roo's forestry ejidos. This may be due to the lack of viable economic alternatives in the part of the state that depends heavily on this activity for employment; up to 8,000 people in 60 ejidos depend on it. Increasingly, the Mexican government is using concrete ties in its railroads. Volumes of railroad tie species harvested fell from 29,000 cubic meters in 1989 to only 5,000 cubic meters in 1995. It is likely that harvesting for railroad ties will soon become obsolete, though the impact that this will have on biodiversity conservation is less predictable. While it may eliminate the pressure on certain overharvested species, it may cause ejidatarios to convert the forest to other uses, soil conditions permitting.

In another example of overharvesting, a few overseas buyers have recently placed orders for two of the lesser-known species that are especially attractive for use in flooring or fine woodwork. Until recently, harvesting permits from SEMARNAP were granted by group of species, providing for a cubic meter limit on the harvest for that group as a whole, but with a sub-limit for

individual species within the group. The total volume authorized was the sum of the annual allowable cut for all of the species in the group, as determined by the forest inventories. In practice, overharvesting the two or three species with the strongest markets filled the entire volume authorized for the group.

Given the low levels at which many of these species occur naturally in the forest, especially sought-after species could conceivably be eliminated from the forests, at least commercially, in just a few years. The problem has been recognized by SEMARNAP. Starting in 1997, ejidos seeking a harvest permit for two particular species have been required to carry out population studies to ensure that they are not in danger of being overharvested. Specific volumes are authorized for each species listed in the harvest permits. While apparently addressing the problem, success of the measure will depend on effective monitoring by SEMARNAP and, when necessary, enforcement by PROFEPA. Currently, both agencies are seriously understaffed and generally unable to perform all of their responsibilities effectively.

At the heart of the problem of overharvesting is the vexing question of the economic competitiveness of forest industries as viable land-use in Quintana Roo. Sometimes stakeholders have worked together to forge a new “constellation” of relationships that can work to increase the value of forest resources and provide new incentives for their conservation. The modern production of chicle in Quintana Roo may offer a case in point. Until recently, the *Federación Chicleros* monopolized Quintana Roo’s chicle production and distribution in a system characterized by bureaucracy, inefficiency, corruption and mismanagement (Aldrete and Galletti 1994). Below-potential production of chicle resulted, at least in part because not enough of the value generated was accruing to chicle-tapping ejidatarios. With direct assistance from the AMA, the SPFEQR designed and promoted a new system of production and distribution modeled after the Plan Piloto Forestal. In 1994, several cooperatives were regrouped into a new organization called the *Plan Piloto Chiclero* (PPC). Benefiting from a fund created with government financing, by the end of the first year chicle tappers participating in the new system had increased production and obtained higher returns per unit volume and higher net profits than before.

Promotion of value-added processing by ejidos also reflects an attempt to increase the competitiveness of forestry as a land-use in Quintana Roo. When the PPF first began, ejidos mainly sold roundwood, carrying out little or no value-added timber processing. Soon, perhaps bowing to pressure from local buyers who were losing control over supply and price, the state government threatened to prohibit export of roundwood from Quintana Roo. The ejidos would have been forced to sell their timber to a small group of local buyers who could once again dictate the terms of sale. The sociedades and the AMA quickly mobilized to help the ejidos prepare for this by installing processing capacity within the larger ejidos (Argüelles and Armijo 1995). Though clearly a response to an imminent threat, it was also recognized that successful value-added processing by ejidos would increase economic returns from the forest, leading to stronger ejido commitment to conserve the resource. In another initiative designed to increase the net value of the forest per hectare, the sociedades, AMA, and UNOFOC are today trying to help the ejidos develop the capacity to process and market a wider range of timber species.

Unfortunately, opening new markets is a slow process. Moreover, it is not always financially viable for ejidos to engage in value-added processing. To the extent that these factors hold down the value of the forest per hectare, other land uses, like agriculture, can appear more attractive by comparison. Though perhaps less sustainable in the long term, alternative land uses can provide returns in the same year, as opposed to the ten or twenty year returns that characterize forestry. Herein lies the importance of an endowment. An ejido with little or no mahogany, facing poor markets for the species it does have, can be expected to overharvest timber in the short run and convert production forest to other land uses, regardless of the law. This is currently a problem in the Quintana Roo forestry ejidos, where small, poorly endowed ejidos are increasingly dropping out of the forestry business. An inevitable result of economies of scale and prevailing markets, such conversions highlight the role that government should play in promoting and enforcing conservation on decentralized holdings when this is determined to be in the best interest of the public at large.

Some threats to biodiversity conservation in the Quintana Roo forestry ejidos have resulted from the local-level impacts of new legislation at the national level. These policy reforms are best understood in the light of macro-level structural adjustment in the Mexican economy. In this

sense, decentralization and privatization are by-products of the "modernization" of Mexico, necessary enhancements to national competitiveness in the context of the North American Free Trade Agreement (NAFTA) and other trade arrangements.

For example, while the 1992 amendment to Article 27 of the Mexican Constitution helped further decentralize control over forest resources, its privatization of ejido lands also resulted in an increased threat to biodiversity conservation in some ejidos. Ejidatarios can now receive individual title to their agricultural parcels located within the ejido. With title held individually, an ejidatario can choose to use the land as he pleases, and can even sell the parcel on the free market to a non-ejidatario. Though located outside of the production forests, many of these parcels are partially forested. To manage these forests, parcel owners are required to submit management plans and environmental impact studies to SEMARNAP, involving a cost that many cannot bear. Sometimes instead they may choose to cut down the forest and convert the entire parcel to agricultural use.

A new Forestry Law was also passed in 1992. Its 1994 regulations provided for much reduced oversight over forestry-related activity. Marking of trees by technicians prior to harvest and permits for roundwood transport were no longer required. Several persons interviewed indicated that those changes to the forestry law resulted in a considerable increase in the volume and occurrence of illegal harvesting. Today, the illegal harvest of mahogany in Quintana Roo is estimated to be at least equal to the annual authorized volume of 8,000 cubic meters. Though many buyers and sellers may actually prefer lessened control, other stakeholders do not. Watchdog stakeholders and other concerned parties can play some role in bringing pressure to strengthen controls; at least on paper, these regulations were tightened by a new forestry law in 1997, after proposals from such entities.

Several cultural factors affect the functioning of Quintana Roo's forestry ejidos, including the type and level of available skills, the tendency toward formation of work groups, and the shift over time in intergenerational values. Ejidatarios have long been skilled in the procedures of governing an ejido, and these skills were easily transferred to governance of the sociedades. Perhaps this accounts in part for the early successes of the sociedades in the regional and state-

level political arenas. Over time, the sociedades have not become stronger or better managed, though their leaders have become more politically adept. Unfortunately, this combination has provoked something of an identity crisis for the sociedad as a unit of authority.

On the purely technical side, ejidatarios once had only limited skills and experience in forestry. Lack of knowledge about forestry was addressed through awareness and training, provided first directly by the AMA, and later by the sociedades. External foresters were gradually replaced by ejidatarios trained in forestry, though the quality of forest management has not necessarily improved. Poor forestry practices could result from the necessity of having to combine technical forestry with a more explicitly social dimension. Meanwhile, the current model of the communal forest enterprise is increasingly recognized as inadequate. More business management skills and a new, more innovative approach to communal management are urgently needed if forestry is to be competitive in Quintana Roo.

One example of such adaptation is the formation of work groups, containing both ejidatarios and non-ejidatarios, to carry out harvesting in the permanent forested areas. Often formed along family lines, work groups constitute a direct response to dissatisfaction with how the communal forestry enterprise has been operating. Individual work groups contract with an ejido to harvest an agreed-upon volume. Initial indications are that the net returns to work group participants are probably higher than the likely earnings from harvest by the communal enterprise. In some ejidos, work groups are now distinct stakeholders and their appearance illustrates a further decentralization of control to a level below that of the ejido. The degree to which work groups represent a continuing trend in Quintana Roo's forestry ejidos is not yet clear and opinion is divided on whether their ultimate impact, socially and in terms of biodiversity conservation, will be positive or negative. For the moment, key stakeholders, including the sociedades, the bilaterals and NGOs, are closely monitoring this development.

According to several of those interviewed, yet another cultural factor affecting Quintana Roo's forestry ejidos is the coming-of-age of a new generation of ejidatarios characterized by a lower environmental consciousness. Long-term activists note that ten years ago, efforts to train and raise environmental awareness were targeted to the adult population only. These were not

complemented by efforts aimed at children. Those children are today the young adults who exercise ejidatario voting rights and privileges, and they are placing higher demands on ejido lands to generate economic returns at the expense of other values.

Forestry activities at the field level, including expenses of the communal forestry enterprise, are generally paid for and covered by an ejido from the sale of mahogany and other timbers. Though net income from forestry has been used to improve the standard of living and infrastructure of many ejidos, the practice most places is to distribute all net income among ejidatarios, with little or no investment in forestry-related plant and equipment. Coupled with the inadequacy of entrepreneurial practices noted above, the viability of forestry as a land use could be further compromised in the future.

Irregular and inadequate funding of the sociedades is also a constant threat to the stability of Quintana Roo's forestry ejidos. With responsibility for forestry delegated to the technical directorate of sociedades, state and federal governments have essentially washed their hands of the responsibility for providing regular and adequate funding to this decentralized "forest service." In theory, full financial support was to come from the bottom-up, as payments from the ejidos to the sociedad in exchange for technical services. Some believe that ejidos would not purchase technical services from the sociedad if they were not required to do so. In any case, amounts paid have been insufficient to cover operating expenses, causing sociedades to scramble for support from other sources. Such support is often tied to donor-driven objectives, leading the Technical Directorates to take on activities that can draw energy away from improving forest management (Argüelles and Armijo 1995).

Despite the size and importance of Quintana Roo's forestry ejido initiative, its real impact on biodiversity conservation is yet undocumented. Analysis of trends in forest cover in the state may yield some information on this impact. Resource management may indeed have improved; at least now there is more recent baseline data available on the resource, and harvesting practices are more controlled. Economic options for ejidatarios vary widely. Some local populations are certainly receiving higher financial benefits from the local natural resources, but these may not

be enough to guarantee survival of all of Quintana Roo's forests, when compared with the economic returns from other uses.

Conclusions

Decentralization does seem to have given greater power to local people in the case of the Quintana Roo forestry ejidos. With the cessation of the MIQRO concession in 1982, ejidos were no longer subject to timber extraction beyond their control. Since then, they have exercised increasing control over forest resources in the state. The creation of the sociedades in the early years allowed the ejidos to consolidate control through formal interactions with agencies of the state and federal governments. In recent years, macro-level reform in forestry and agriculture laws has resulted in even greater ejido-level control. Forest management activities are now so decentralized that some ejidos are questioning the value of belonging to a sociedad. Also, ejidatarios can now sell individual plots to non-ejidatarios, even if they contain patches of forest. Harvesting rights in some ejidos are now contracted out to small crews of ejidatarios who act independently of each other in different sectors of the forest. Recently, government and other actors have sought to counterbalance this increasingly decentralized control through reform of the laws and regulations governing forest management activity.

However, in the case of Quintana Roo's forestry ejidos, the image of a downward transfer of power from central government to lower levels of control only reflects part of the story. Loss of central government control over forests resulted from a prevailing fiscal crisis for the federal government, which led to collapse of the financial support system under which a state-owned company availed itself of forest resources. Devolution of power also reflected a coming of age politically in Quintana Roo, both for the state government and the local population. Transfer of control, then, was not so much a concession to lower levels from above, as it was an appropriation from below.

Experience from Quintana Roo's forestry ejidos suggests that local empowerment over natural resources management, combined with economically viable alternatives to overuse, can sometimes help promote conservation and reduce threats to biodiversity, at least in the shorter term. This is evidenced by the differential treatment that production forests receive depending on the particular

ejido's short-term economic options. The decision to either manage or convert forest in Quintana Roo's forestry ejidos is a function of the contemporary economic viability of forestry as a land-use alternative for that ejido. When forestry is economically viable, the forest is conserved. When it is not, the forest is either mismanaged or converted to other uses. Increasingly, many of the smaller ejidos are either overharvesting valuable species from their production forests or they are converting them to agricultural use. 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. Argüelles and Armijo (1995) have described a typology of ejidos based on stability of the permanent forestry area, concluding that only about 20% of the total aggregate area has been stabilized.

Viability of forest management depends on several factors including: (1) an ejido's relative endowment of mahogany and other species, (2) the degree to which needs in a given ejido are satisfied from a portfolio of other incoming generating activities, and (3) the ejidatario's time horizon for required return on investment. Ejidatarios compare projected returns from forestry with those of other land uses in the context of a given time frame and income-producing strategy. Returns from forestry tend to be longer-term. If income is sorely needed today, conversion to agriculture is appealing in the short term, even though it may be both ecologically and economically less viable than forestry in the long run. Unless other values, such as cultural ones, have significant countervailing influence, alternatives that promise the quickest and highest economic returns will generally be chosen.

Management of a production forest implies the willingness to forego the income that can be realized from a resource kept out of production today, and which accrues interest (through physical growth) that can be used at some time in the future. In this sense, a production forest is similar to a savings account. If saving is only feasible when current needs, as determined by biophysical and cultural factors, are fully satisfied, then ejidatarios can only be expected to keep valuable forest resources out of production as long as their current subsistence needs are fully met. The current economic value of the production forest endowment must be great enough to satisfy from interest generated (i.e. incremental growth in the resource) the needs that ejidatarios expect to satisfy from that source within a portfolio of other sources. If the interest generated is

insufficient, ejidatarios, even on larger ejidos, will begin to liquidate the capital. Given this constant tension, if the legal rights to liquidate the forest endowment have been vested with local populations through decentralization of control, then under certain circumstances decentralization can work against conservation in practice. For example, while the 1992 amendment to Article 27 of the Mexican Constitution helped further decentralization of control over forest resources to lower levels, it also resulted in an increased threat to biodiversity conservation in ejidos with lesser-endowed production forests.

Additionally, the factors that determine the economic viability of forestry as a land-use are tied up with the realities of the market for forest products. Most market variables, for example control of either timber supply or demand, are largely beyond the control of the ejidos. To the extent that the economic viability of forestry to the ejidos is subject to such market variables, effective power to decide how to manage the resource really does not rest with the ejido.

Moreover, ejidatarios are unable to take effective advantage of certain land-use alternatives if they don't have the requisite skills. If a strong market exists, it will probably be possible to develop the requisite skills over time. If they have to develop the skills first, before building their market ties, the resource will probably succumb to more competitive uses. Ejidos are not likely to be concerned with understanding or respecting the complex relationships that exist between components of an ecosystem, or with protecting biodiversity per se. All attention is focused on a few species, and managing these does not necessarily guarantee the integrity of the overall system.

If the economics transforming natural resources from the point of extraction to purchase of the final product do not in some way provide the resource manager with sufficient income to cover the costs associated with achieving sound and stable management, then the power and control over this resource is not effectively in the hands of the manager, and the resource will likely not be conserved. If management and conservation is determined to be in the public interest, then the public has the responsibility to see that these costs are covered, by sequestering some of the value added and sending it back to the resource manager. The state cannot wash its hands of the responsibility for ensuring that this occurs. It must also play an effective role in providing

oversight and enforcement to ensure that private interests do not prevail over public ones in the specific activities or areas where the latter are deemed to have priority.

Decentralization is not just a downward or vertical process. It can also imply horizontal sharing of control that has been dispersed from a central point. In the case of Quintana Roo's forestry ejidos, control, always dynamic, has shifted to an arrangement characterized by sharing among various levels of the state and of civil society. It is important to remember that in most circumstances, socio-political change is constantly taking place. It appears that for the future of Quintana Roo's forestry ejidos, the trend is likely to be toward even greater fragmentation of ownership and management authority.

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Editor's Note: The issues surrounding Quintana Roo's forestry ejidos and related topics have benefited from extensive research in recent years. Readers interested in exploring these questions beyond the scope of this BSP case study report might wish to consult the documents listed in this bibliographical note, in addition to those cited among this case study's references.

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The Biodiversity Support Program (BSP) is a consortium of World Wildlife Fund, The Nature Conservancy, and World Resources Institute, funded by the United States Agency for International Development (USAID). BSP's mission is to promote conservation of the world's biological diversity. We believe that a healthy and secure living resource base is essential to meet the needs and aspirations of present and future generations. BSP began in 1988 and will close down in December 2001.

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Visiting BSP Web Sites

We invite you to visit our general and program-specific Web sites even after the program closes down.

Biodiversity Support Program
www.BSPonline.org

Biodiversity Conservation Network
www.BCNet.org

CARPE: Central African Regional Program for the Environment
<http://carpe.umd.edu/>

KEMALA: Supporting Indonesian NGOs for Community Based Natural Resource Management
<http://www.bsp-kemala.or.id/>

BSP Listserv

Through June 2001, you can receive e-mail updates about BSP through www.BSPonline.org. To join our listserv, click on **stay informed** and enter your e-mail address. We will keep you posted on project highlights, upcoming events, and our latest publications.

Ordering BSP Publications

Many of our print publications are now also available online at www.BSPonline.org. At the home page, click on **publications**. You can view publications online or order copies to be sent to you. You can view publications online or, through June 2001, order copies to be sent to you.

Contact BSP

For more information, to give us feedback, or to order copies of BSP publications, contact us.

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