

## **Un-common goods in forest commons management: the case of polewood commodification in Mayan forests of Quintana Roo, Mexico**

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**Abstract.** For millennia, the Maya of the southeastern Mexico have depended on the health of their forest resources both for cultural identity and economic well-being. Traditional and institutional forms of forest commons management in this area have been credited as a major factor in maintaining forest health, but the recent and precipitous commercialization of small diameter tropical trees (5-35 cm dbh) as polewood have had considerable social and ecological implications on the future of forest management. I combine concepts from common property theory with data from structured interviews conducted randomly in twelve forest communities in central Quintana Roo, and semi-structured interviews with forest government officials and regional forestry technicians in order to explore the relationship between the future of forest management and a dwindling forest resource base. Although government officials have responded to the commercialization of polewood by creating minor modifications to existing forest policy, polewood has proven difficult to manage as a common good based on its small size and its relative difficulty for enforcement, leading to widespread exploitation and decreasing populations of polewood species and diminishing availability for local use. This trend represents a growing incongruence among existing forest policies, current market conditions, and local users' needs and realities. Points of both conflict and consensus between local communities and government officials suggest that the sustainability of polewood exploitation from forest areas depends strongly on strengthening the capacity for local adaptation of forest management framework to emerging markets of forest goods that are difficult to manage communally. Certain recommendations for increasing ability for adaptive management include increasing access to market information, carefully defining and enforcing boundaries for polewood extraction, and exploring the potential for reforestation of threatened species.

**Key words:** community forestry, forests, Mexico, Quintana Roo, Maya, adaptive management

### **Introduction**

Discussions around tropical forest resources have come to the fore in the past several years due to the realization of both the growing importance of forests in global processes and the mounting evidence of unsustainable exploitation of such resources. While aggregate estimates of dwindling forest resources are becoming more clear amid the growing body of literature that analyzes macro-level causes of deforestation, the ultimate causes of these trends are still under debate (Kaimowitz and Angelsen 1998).

On the other hand, scholars and practitioners that analyze the role of local institutions agree that manifestations at this scale greatly shape the success or failure of forest management (McCay and Acheson 1987; Ostrom 1990; Arnold 1998; Berkes and Folke 1998; Gibson, McKean et al. 2000). Garrett Hardin predicted a tragic, environmental demise when many individuals use a limited resource in common where a specific group of users retain equal rights and access (Hardin 1968), but Ostrom (1990) and others have illustrated that forest resources are more efficiently and effectively managed as common property when certain circumstances are met (Runge 1986; Schlager and Ostrom 1992; McKean and Ostrom 1995). Where exclusion to subtractable goods (goods that are rivalrous in consumption) is difficult, as in the case of common property resources, characteristics such as clearly defined resource boundaries, small resource size, ability to monitor resource, and access to information regarding stocks and flow have been found to be conducive to successful local governance of such resources (McCay and Acheson 1987; Ostrom, Dietz et al. 2002; Dolsak and Ostrom 2003). In addition, a set of shared cultural traits and a clearly defined, homogenous group of resource users adds strength to local institutions (Ostrom 1990). Diverse values, beliefs, and attitudes towards property and its consumption among resource stakeholders complicate commons management, producing resource use conflicts which make general consensus difficult (Lu 2001). This work responds to the need of a deeper look into attitudes towards forest resource use and management (McCay and Jentoft 1998).

In the discussion of communal forest management, Mexico is commonly mentioned. Mexico holds the tenth largest forest coverage in the world with over fifty million hectares of forest (Snook 1993), including temperate pine and oak forest, humid forests, and some tropical rain forests (Sánchez-Sánchez and Islebe 2002). Within these forests resides a rich biodiversity of endemic and rare species of flora and fauna, including one tenth of all terrestrial vertebrates and plants known to science (cite). However, the uniqueness of Mexican forests lies not only in their species richness, but essentially *who* holds the rights to these forests. Under a common property regime unlike any other model worldwide, as much as 80 percent of Mexican forests may be held under different forms of collective land tenure, making Mexico a national laboratory for

studying the social and ecological benefits of delivering forests to local communities (Bray 2003). As such, a significant part of our contemporary knowledge surrounding common-property forests come from scholarly work in Mexico that link land tenure and forest use to demographic (Klooster 2000; Merino 2000), economic (Dewalt, Rees et al. 1994; Deininger and Minten 2002), ecological (Velazquez, Mas et al. 2002) and political permutations (Taylor and Zabin 2000; Bray, Ellis et al. 2004). This work builds on this knowledge base and introduces the importance of perception and attitudes on resource management in this area.

### **Forest management in Central Quintana Roo**

Central Quintana Roo is characterized by its relative isolation, persistence of Maya populations and culture, and relatively intact forests (Kiernan 2000) (See figure 1). When analyzed over the past 25 years, local deforestation rates are practically nil (0.1%), much lower than other regional deforestation rates reported in the country (Bray, Ellis et al, 2004). Bray et al (2004) and others generally concur that the relative high levels of forest retention in the area can be linked to the abolishment of forest concessions in the mid-1980s, the devolution of forest resources back to the local communities who ostensibly owned them, and the inception of a unique conservation and development program called the Plan Piloto Forestal (PPF) which in effect, initiated the promotion of community forestry in the context of Mexico's ejido system (Bray 1993; Kiernan and Freese 1997; Snook 1997; Merino Pérez 2004). An ejido is a communal land grant under a unique organization form that in effect is both a common pool resource and a common property regime (Bray 2004). In addition, the PPF facilitated the constitution of second-level organizations that serve as forest technicians, offer a local source of training, assistance, and offer political lobbying and access to government and international sources of funding (Bray 2004). With under the guidance of these second level organizations, member communities agreed to establish permanent forest areas in effect creating an agricultural frontier. As a result, the current regional landscape includes a mosaic of differing aged fallow areas from *milpa* agriculture, a traditional form of swidden agriculture that is still dominant in the region (Hostettler 1996), and these

larger tracts of relatively intact permanent forest areas that have been designated only for the extraction for forest products.

Forestry activities are restricted in these permanent forest areas. Management plans still reflect the enduring effect of the parastatal concessions, who employed a polycyclic harvest of exclusively high-value timber, principally mahogany (*Swietenia macrophylla* King) and to a lesser degree Spanish-cedar (*Cedrela odorata* L.) (Snook 1993). Early attempts to include other, lesser-known timber species failed due to lack of markets (Bray 2004). Only relatively recently have forestry management plans been expanded to formally include other lesser known species as a non-sawn timber (Racelis and Barsimantov, forthcoming), benefitting the majority of communities in the region that are considered as low-volume community forest enterprises (see Bray 2004, p226). The sudden attention to these lesser known, non-sawn timber species is a consequence of the growing demand for small diameter hardwood trees that has emerged concurrently with the expansion of the state-wide tourism sector. Historically used in the construction of local homes, these trees are now harvested at diameters at breast height ranging from five to 35 cm, and commercialized as polewood for new constructions or repairs along the expanding coastal tourism corridor (See figure 2). Increasing harvest rates of these lesser-known species reveal its potential to complement mahogany as an important commercial timber resource in the region (Forster, Albrecht et al. 2003). The development of market opportunities for polewood and other lesser known species could greatly increase available resource utilization, generate income, and create employment diversification in forest management (Racelis and Barsimantov forthcoming; (Forster, Albrecht et al. 2003).

This diversification can lead to an increase in both economic well-being and sustainable resource use (Ellis 2000; Angelsen and Kaimowitz 2001; Vedeld, Angelsen et al. 2004 but see Rice, Gullison et al 1997), especially in forest communities with low authorized volumes of mahogany and Spanish-cedar. However, the lack of historical data on growth and an incomplete assessment of stocks of polewood threaten the sustainability of this relatively new forest product. Recent data show that moderate harvest of

polewood has negative implications on forest structure, diversity, and resilience (Racelis, unpublished). This paper attempts to assess if the benefits of the promises of polewood have been fully realized, by comparing the results of structured and semi-structured interviews among several identified direct and indirect stakeholders in the polewood commodity chain. This work challenges the belief that all forestry done under a common property regime should be deemed as community forestry, especially if we accept the premise proposed by several scholars that community forestry is a strategy for sustainable forest management (Bray, Merino-Perez et al. 2003; Bray 2004). I propose that some timber products like polewood that are dependant on opportunistic markets and do not meet the characteristics that are conducive to successful forest governance (Ostrom 1990) actually threaten the integrity of common property regimes. With this as a central theory, I explore the relationship among the future of communal forest management, a dwindling forest resource base, and a deteriorating social thread of homogeneous attitudes towards resource use within forest communities.

PLACEHOLDER Figure 1 – Map of Quintana Roo and Mayan Zone Study Area

PLACEHOLDER Figure 2 – (a) Photo of local Mayan home built of polewood

(b) Photo of polewood harvest (both taken by A. Racelis)

## **Methods**

In order to conduct a region-level assessment of polewood harvest, I first had to identify the stakeholders in the polewood commodity chain. Initial contact was made with representatives from the local second level institution, the Organization of Forest Producing Ejidos of the Mayan Zone (OEPFZM), where through a number of informal interviews I was able to ascertain the key actors in the commodity chain of polewood commercialization. The OEPFZM put me in contact with polewood-selling communities, who through informal conversations, helped illuminate the complex landscape of the commercialization of polewood (See Figure 3). Once the stakeholders were identified, I conducted several semi-structured interviews over repeat visits with key state-level representatives of the Mexican Secretary of Natural Resources Management (SEMARNAT), the Mexican Environmental Protection Agency (PROFEPA), and the

forestry technical director of the local second level institution, the Organization of Forest Producing Ejidos of the Mayan Zone (OEPFZM). Interviews with polewood intermediaries and polewood wholesalers were difficult to arrange, as many were uncooperative and weary of discussing prices, buying schedules, and suppliers. In all, I was able to conduct four in-depth unstructured interviews with intermediaries and polewood traders in the span of my research that I felt reflected accurate and honest information. Finally, I interviewed several ejidatarios and polewood collectors in two different ejidos, asking specific questions regarding knowledge and experience working with intermediaries. All of these interviews were completed in Spanish.

In order to get a more quantitative assessment of the attitudes and perceptions of polewood commodification in local ejidos, I selected fourteen ejidos at random from a list of local ejidos that pertained to a local second level forestry organization, all of which had forestry management plans. One community was not currently harvesting timber as a result of imposed sanctions for illegal harvest. In two other communities, ejido representatives decided that they did not care to participate in the survey, and asked me to leave. In total, 192 interviews were conducted in 12 communities over the span of two years. All communities were in the municipality of Felipe Carrillo Puerto. In each ejido, interviews were conducted with heads of households in late afternoons, when people were most likely to be home. If a head of household was not home, the household was skipped and I moved on the next home. Interviews were conducted in mostly in Spanish, but in some ejidos Maya to Spanish translation was necessary. I randomly sampled ca. 10% of households in each community. Table 1 shows a list of all the communities and relative characteristics.

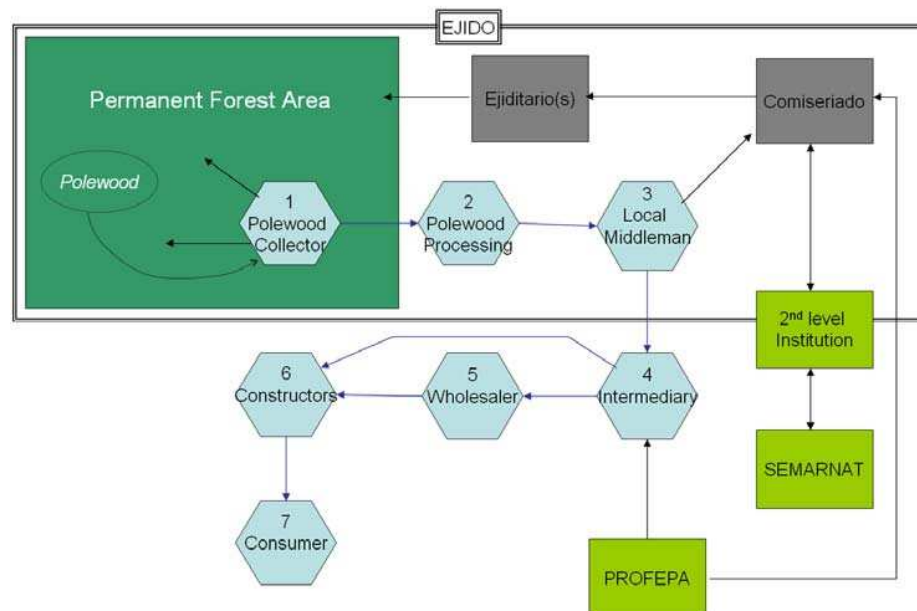
PLACEHOLDER Table 1 – Characteristics of twelve forest communities in central Quintana Roo

## Results

### The Commodity Chain of Polewood

Within the commodity chain for polewood, I have identified all stakeholders, both internal and external to the *ejido*. The exchange and movement of polewood includes actors internal and external to the *ejido*, including: (1) polewood collectors, (2) processors, (3) local middle men, (4) intermediaries, (5) wholesalers, (6) constructors and ultimately (7) polewood consumers, or hotels, businesses and their constituencies (see Figure 4). Many actors are not involved in the actual sale of polewood, but participate in the capture of income, administration, harvesting enforcement, including: (1) the *ejidatario*, or the legal *ejido* member, (2) the *comisariado*, who serves as the local leader, (3) non-government institutions such as the second level institution (in this case, OEPPFZM) and (4) government organizations that are involved in polewood permitting and enforcement, SEMARNAT and PROFEPA, respectively. Figure 4 depicts the commodity chain of polewood and all of the direct and indirect stakeholders.

Figure 4. Commodity chain of polewood, including direct and indirect stakeholders.



Polewood sales are regularly reported in each of the study communities except for Xpichil. For communities to sell polewood, intermediaries external to the ejido contact either the comisariado or go directly to a local middle man with whom they may already know through previous business or contacts<sup>1</sup>. The local middle man is typically one of several local work group leaders from the ejido, locally recognized for his dealings in timber. The intermediary works with the local middle man and requests a certain number of poles of specific sizes based on their use (length and diameter), and places a timetable for harvest and processing, to be ready for pick up usually within a week of contact. Prices are typically negotiated at this time. Negotiations are strictly between the local middle man and the intermediary, although participating ejidatarios generally establish a minimum price. Ejidatarios have reported that they have at times scolded the local middle man for accepting the intermediary's initial offer, and sometimes have refused to sell polewood for anything less than what they call a "fair price". Still, negotiations revolve around the "going market price, which more often than not reflects a price favorable to the intermediary" (R. Ledesma, personal communication). According to R. Ledesma, technical forestry director of the OEPFZM, this is because the intermediary has an idea of what prices other ejidos are selling both legal and clandestine polewood, where as those internal to the ejido are not typically privy to this information. In addition, according to several polewood collectors I interviewed, the main reason for this is that since polewood sales are sporadic and sometimes irregular, the intermediary realizes that the ejido is not in the position to bargain – many times they feel they have to either accept the offered price, or lose the opportunity to capture some income. After setting an agreement with the intermediary and receiving an advance payment, the local middle man is responsible then for recruiting the approval of the comisariado (in order to begin the permitting process) and employing the participation and agreement of several ejidatarios. Ejidatarios are faced with three options: (1) collect the polewood themselves (2) hire other local community members to harvest the polewood for them, paying the workers a set wage, or (3) sell their allotment to the local middle man.

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<sup>1</sup> In a few cases, intermediaries hail from the ejido in which they do some of their business. In these few cases, the negotiation process is reported to be favorable for the ejido, as prices are higher than reported in other communities that deal with outside intermediaries.



PLACEHOLDER – Table 2. Distribution of income along the commodity chain of polewood, calculated per cubic meter.

Orders for polewood vary. Intermediaries who come into an ejido and ask for a large quantity of a certain sized pole typically are trucking wood to sell to a wholesaler, according to one middle man that I interviewed. These wholesaler stocks wood and palm thatch in a bodega, selling directly to hotel and building constructors. Intermediaries who do this business are periodical, but regular customers. On the other hand, some intermediaries actually supply polewood directly to building constructors, and thus the order is more sporadic and heterogeneous. These orders usually include the four types of polewood that is required for a building frame of polewood (see table 3).

Once the poles have been felled and grouped into bunches, they are dragged out to the main road to process for pick up. If the designated cutting area within the PFA is far from the main road, the local middle man typically will have to hire a tractor to pull the poles out, a cost that the participating ejidatarios communally bear. When the poles are delivered to the road, they require some minimal processing – the outside bark must be stripped off. This part represents another step in the commodity chain. Ejidatarios that helped in polewood collection can either process the bark themselves, or employ others from the community to perform this task. Payments are paid per pole, depending on the size. The wives and children of the participating ejidatarios sometimes help, and it is quite common to see entire families preparing polewood.

Within a week of placing the initial order, the intermediary returns to pick up the processed poles. Using a crew of one to two others that he brings with him, the intermediary, in the presence of the local middle man, carefully inspects the poles. Polewood that do not meet the requirement of the wholesaler or the building constructors will be ultimately rejected. Thus, polewood collectors adopt a similar mentality; instead of risking that poles they collect and process be rejected, they make sure to select trees

that are as straight as possible and have no defects, such incorrect species<sup>2</sup>, parts with rot, or that do not meet the minimum length requirements. In effect, polewood collectors forage for only the straightest, healthiest, and tallest polewood species, raising questions about the long-term impacts on forest structure. Preliminary studies show that this foraging strategy has resulted in a significant shift in the stature of forests leaving trees that on average have shorter bole length (Racelis, unpublished data).

Once paperwork is completed and signed by the comisariado, poles are transported by intermediaries to the tourism corridors that are expanding along the state's coastline. Upon review of sales documents, which has to list the end destination of the resource, polewood has traveled as far as Merida, the capital of the neighboring state of Yucatan. Dates must be clearly reported in a sales document—intermediaries are typically given three days from the time they pick up the polewood to transport it to the buyer. In confidential conversations with both a comisariado and two local middle men, all have reported that they have had at least one request in the last year by intermediaries who ask them to falsify pick up or delivery dates, so that they can make multiple purchases under the same document. Temptations to aid clandestine activities are compensated by monetary bribes, and happen quite frequently according to some ejidatarios.

PLACEHOLDER – Table 3. Differing types of polewood (source: Racelis and Barsimantov, forthcoming)

### *Conflicts within the ejido*

Ejidos are typically granted a certain volume of polewood per year based on inventories done by their respective second-level institution. Under the community forestry framework of the PPF, each ejidatario has a right to an equal share of the yearly allowable polewood volume. For example, if a community of 100 ejidatarios has a polewood volume of 100 m<sup>3</sup>, each ejidatario has a right to an equal share, or one cubic

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<sup>2</sup> Certain hardwood trees species are more appropriate as polewood, given their uses. For example, only a few species are selected as posts, and even fewer are acceptable as hiles.

meter of polewood. However, unlike income from high value timber, where ejidatarios share equitably distributed economic benefits whether they participate in the actual harvesting or not, income from polewood comes only opportunistically for those who are actively harvesting polewood. Some ejidatarios in several communities have reported that those who do not harvest their wood are asked by local middle men to sell their share of polewood for a reduced price, and if they decline, the wood is likely harvested anyway. This pressure serves as a disincentive for ejidatarios to stress a sustainable harvest of polewood, and typically forces to sell their share of polewood for what is practically 1/20<sup>th</sup> the price that local middle man sells at to the intermediary (see Table 2). According to one ejidatario:

“Albeit small, this income is better than nothing. What should I do? I am too old to cut polewood. I cannot do the work. But if I do not agree, they will sell it anyway, and [the comisariado] will permit them. Only I will suffer.”

Interview, August 2007

Some ejidatarios have gone so far as to leverage their future polewood shares, selling these shares sometime five or even six years in advance.

The inequitable distribution of benefits from polewood sale is compounded by a high subsistence value that polewood has in the community. Unlike mahogany and other high value sawn timber species, local people depend on the direct use of polewood for homes and other constructions (see figure 1). 76% of 192 households surveyed had polewood homes as their principle residence, and 90% of all households had at least one construction on their property built from polewood. Although the pressure that commercialization has put on native polewood populations have not been quantified, locals have taken note. Ten years ago, locals recall having to walk less than 1.5 km on average to find quality polewood, while today they report having to travel on average more than 7 km. Respondents complain that they now have to sometimes pay people to help them retrieve polewood from these distant sources. When asked to free list their ideas of the causes of this apparent polewood decline, 48.7 % of all respondents cited sale of polewood, while 18.3% and 23% mentioned milpa expansion and urban growth/local demand as principle threats to polewood availability ( $\chi^2=271.5$ ,  $df=7$ ,  $p=0.000$ )

PLACEHOLDER FOR –(More text and cross tabulation of data set, under preparation)

*Conflicts between ejido and external stakeholders*

Polewood is recognized by SEMARNAT as a timber, and thus are included as such in annual forestry permits. According to local forest policy, polewood is only to be harvested only in the permanent forest area. Discrepancies exist between polewood permitting and the actual management of these timber resources, and are discussed in more detail by Racelis and Barsimantov (forthcoming). Yet, the discrepancies go beyond the policy level, and pervade even in the attitudes of these external stakeholders. Table 3 depicts responses to key, structured questions posed to SEMARNAT and PROFEPA officials and compares them to the responses by ejidatarios and intermediaries.

Table 3. Summary of responses to structured questions administered to government officials, households in forest ejidos, and polewood intermediaries.

	<i>Government<sup>a</sup></i>	<i>Ejido<sup>b</sup></i>	<i>Market Chain<sup>c</sup></i>
<i>What is / what can be used as "polewood?"</i>	Any small diameter tropical trees, straight and long	Construction materials, best come from deep forests Specific species are best for different uses.	Straight trees that are good for constructions, with certain size Specific species
<i>Do you see the harvest of polewood as good or bad?</i>	Bad: ecological effects unknown, negative impacts  Good: provides income	Bad: nothing left for domestic use, forest is disappearing poor distribution of income  Good: income	Good: provides income for locals, meets demand.  Bad for communities that don't know how to manage forest
<i>What is the trend?</i>	Polewood is a boom, demand will saturate shortly	Quality polewood is increasingly rare. Sales impact local supply	Demand is sporadic. Pulses with hurricanes, but plenty of polewood
<i>How do you see the forest in 10 years?</i>	Change in forest ecology, decrease in forest health	If continues, forest will "disappear" No more/few good poles	Forest is resilient, will bounce back if managed properly

<i>How do we improve polewood management?</i>	More studies Protect threatened species Reforestation	Other work options Reforestation Parcelize ejido	PROFEPA should streamline paperwork Polewood Plantations
<i>Who has the responsibility to improve?</i>	Ejidos	Comisariado / Internal to the ejido 2nd level organization	(no answer)

<sup>a</sup> Includes structured interviews with SEMARNAT and PROFEPA

<sup>b</sup> Lists the most salient responses from 192 semi-structured household surveys conducted in various ejidos.

<sup>c</sup> Responses collected from four unstructured interviews with polewood intermediaries and wholesalers.

Conflicts in how the different stakeholders view polewood management begin with the basic definition of polewood. While both ejidos and intermediaries agree with government officials and see polewood as trees that have a certain dimensions which make it suitable as construction materials, they mention that there are certain species that are preferred. This contrasts the attitude of policy makers who decide that polewood is “any small diameter tropical tree” that grow straight and tall. Only intermediaries see polewood harvesting as something “good”. They cite that while some communities may mismanage, polewood harvesting provides an “alternative source of income to poor people”(anonymous personal communication). In fact, I gathered from one of the intermediaries I spoke with that they feel that they are providing that income by purchasing polewood in communities. He mentions:

“Polewood... there is plenty. You cut it, and it grows back. These forests are strong, and they provide for poor people. They should be able to make money for it, and I pay them for their wood. Before polewood, I didn't buy anything from them [which means that]... there was nothing. Now, they make money. If [they] take care of it, the forest will give.”

These comments reflect another marked difference from the view of the other stakeholders. Locals are concerned of the disappearance of forest resources, and the decrease in polewood for local use. Government officials agree—if the boom cycle continues, forests are at risk.

Although government officials have responded to the commercialization of polewood by creating minor modifications to existing forest policy, polewood has proven difficult to manage as a common good based on its small size and its relative difficulty for enforcement. PROFEPA reports difficulty in polewood enforcement, citing lack of staff and resources. Enforcement for polewood is much more cost-intensive than enforcement for larger, high value timber where simple observations can quickly reveal species type, size limits infractions, and volume. In addition, locals complain of the lack of vigilance in the fair distribution of economic benefits. Results from the household survey suggest that this lack of enforcement of both harvesting and equitable income disbursement threatens the maintenance of common property management systems (Schlager and Ostrom 1992; Munoz-Pina, de Janvry et al. 2003). When queried about what could be done to improve polewood management, a small but impressive percentage (7%) mentioned that they had already suggested to the ejido assembly that they divide the forest resource to “ensure that [they] could protect their ‘share’ of forest resource, and guarantee that [they] and their children would have polewood to use for homes”. In a subset of interviews (n=42), I posed whether ejido parcelization would be a possible means to sustainably manage polewood supply. 69% (n=29) of the respondents thought it would a good idea, 19% (n=8) did not know, and 12% (n=5) disagreed.

## **Discussion**

Ostrom and others have established that forest resources are often more efficiently and effectively managed as common property (McCay and Acheson 1987; Ostrom 1990; Agrawal 2001). When managed effectively, intact forests can yield to the people who manage them benefits derived from economies of scale, in effect perpetuating the maintenance of such resources (McKean and Ostrom 1995; Arnold 2001). Under certain conditions, common-property institutions can be robust enough to mitigate collective action problems. Community forestry in the tropical forests of Quintana Roo is an apparent example of an effective common property regime (Bray 2004; Bray, Ellis et al. 2004). . Given the historical context of forest exploitation in the area, most forest communities do not possess a strong forest resourc. In forest ejidos that do not have high

stocks of high value timber but do have sufficient stocks of lesser known species, as most ejidos in the region, polewood can serve as a commercially valuable resource base that in theory can strengthen communal management. Forested ejidos without significant timber stocks then, now find themselves in a better position to create common economic benefits and thus maintain communal property rights.

Naturally, each common-property regime is unique. The current situation of polewood management in forest ejidos suggests community forestry should not be lumped into a complex, large scale common-pool resource management regime, but instead requires a shift from a focus on sawn timber such as mahogany to a recognition that communal forests may hold resources that potentially endangers the conservation of common property management regimes. Polewood, unlike mahogany, does not exhibit the characteristics that are conducive to successful management of forest resources (see for example Ostrom 1990; Dolsak and Ostrom 2003). The small sizes at which polewood is generally harvested make its monitoring difficult, and boundaries for harvest are not well defined (Racelis and Barsimantov, forthcoming). In addition, the conflicting use-values of subsistence and commercial significance add tension among local ejido-level stakeholders: polewood collectors and local middle men compete with other ejidatarios from the same ejido for the same resources, who are usually unequally compensated, if at all, for resources that they have an equal right to. As more and more people aim to exploit the same resources for either subsistence or cash, or both, a *de facto* open access regime and associated resource degradation emerges. Community forestry is thought to diffuse the kind of tensions over access to resources that frequently make centralized forest management systems based on the principles of scientific forestry ineffective and conflictive. In the case of polewood, attempts at communal management amidst incomplete market information, competition among local level stakeholders, and shifting attitudes and perception of the stocks and flow of such resources has actually provided a disincentive to communal management.

Still, the solution to this discrepancy is not deference to centralized forestry. Indeed, forest bureaucracies often impose restrictions based on perceptions that are

incompatible with local knowledge and market realities. What is necessary here is a reassessment of community forestry and common property regimes in the context of forest goods that are possibly impossible to manage communally, unless certain conditions are met. In order to wholly reexamine the future of forest management, stakeholders must be willing to adapt current management regimes. Community forestry and scientific forestry must not be considered as mutually exclusive -- the strengthening of local governance can only be effective if information is available to stakeholders, and this requires investments by forest governments, second level institutions, and universities to perform much needed research. Assessments of stocks and flows, measurement of ecological dynamics of polewood extraction, and accurate information about prices and market schedules, are key pieces that must be conveyed to ejidos to inform perceptions and attitudes towards forest management. Second level institutions can serve this role, but realistically, a move toward this recommendation will require participatory efforts that include all stakeholders.

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*Paper presentation at the 12<sup>th</sup> Biennial Conference of the International Association for the Study of Commons, July 14-19, 2008. Draft under preparation, please do not cite without author's permission.*