

**RIGHTS, PRESSURES AND CONSERVATION IN FOREST
REGIONS OF MEXICO. Conditions of communities in
temperate forest regions of Mexico.**

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Introduction

For decades forests and forest policy have had an important place in public debates in Mexico. Among the urban population –the vast majority of the country- it is generally thought that deforestation is intense and widespread all through National territory, collective property and rural poverty are often seen as the main Culp rights. Deforestation and forest deterioration are still frequent realities in many poor regions they cannot be properly understood through simple equations. Simplified perceptions of socio-environmental realities working as presumptions for public policies or as panaceas often misread local realities and let local needs unanswered. Based on the results of empirical research this paper presents some of the main demographic, social and economic characteristics of Mexican forest communities, the main tenure features, uses of the forests and their perception of forest pressures. Considering these conditions I reflect on the roll that communities play in the offer of forest eco-systemic services and on the characteristics of REDD related initiatives that may draw on communities strengths and would on its turn strengthen local capacities.

1. Mexico' s Forests, Ecological and Social Values.

73% of México has a forest cover, nearly 142 million hectares comprising a wide variety of forest ecosystems: pine and pine-oak forests, cloud forests, as well as humid and dry tropical forestsⁱ. Forests are sources of multiple eco-systemic services¹ that benefit a wide range of social actors placed in local, regional, regional, national and global scales. Different rights, large social and political gaps lead to divergent perceptions of the forests and the ways in which they should be used and managed.

Mexican forest regions are home of nearly twelve million people, many of them indigenous (Instituto Nacional de Geografía y Estadística; INEGI, 2000) most of them live under extreme poverty conditions. Forest dwellers are often forest owners with varied levels of dependence on forest resources. The vast majority of forestland (75%) are under collective tenure and more than 50% of all collective holdings are forest communities². Collective forest tenure the result of an extensive Agrarian Reform implemented from the 1930 to the early 1980.ⁱⁱ There are two types of collective property: *ejidos and comunidades agrarias*. The National Forest Commission (CONAFOR) estimates that 105 million hectares are collectively owned by 30,305 *ejidos and comunidades agrarias*.

The Federal Constitution recognizes collective property but limits commoners' rights as it gives the nation the right to rule the use of forest. In other words commoners have access and withdrawal rights (Schlager and Ostrom1992) while

¹ Provisioning, Regulating, Cultural and Supporting, from the Millennium Ecosystem Assessment

² I use the term "community" to refer to the two types of collective property existing in Mexico: *ejidos and comunidades agrarias*. When I refer specifically to the second type of collective property existing in Mexico I call them *comunidades agrarias*.

the federal government keeps strong collective choice rights. Water and underground resources are defined as public property by the same constitution³.

During the last decades, forest conservation and forest environmental services have gained national and global relevance. Forest conservation is particularly sensitive in Mexico, one of the ten mega-diverse countries in the earth with forests hosting much of biological diversity. There is also a growing “perception of scarcity” of the hydrological services provided by forests and of the roll they play in the mitigation of the impacts of catastrophic climatic events. Social perception is mostly expressed as a concern about deforestation. Common wisdom blame collective tenure of forestland and poverty of forest dwellers as the main causes of deforestation. The last two federal administrations have been strongly respondent to this concern. (Merino Leticia and Ortiz Gabriela; 2008)

Within *ejidos* and *comunidades agrarias* there are areas that are individually possessed and managed, basically agricultural plots and houses in the settlements, but the federal agrarian and forest federal laws forbid the division of forestland. Forests within collective properties are by law commonly owned and managed. *Ejidors* were created when the state granted lands to groups of solicitors; in *comunidades agrarias* (mostly of indigenous origin) the state recognized historical property rights to ancient communities over the territories they claimed as their own. The most relevant current difference among them is the capacity of *comunidades agrarias* to include new members in the group of owners and the legal impediment of the *ejidos* to do so, as *ejidatarios* or property right holders) can only inherit their rights to one single successor)ⁱⁱⁱ.

2. Forest Management And Forests Policies In Mexico.

Communal property has deep historical roots in Mexico. It was present in pre-hispanic times, and prevailed in different regions after the Spanish conquest. During the three centuries of the Spanish rule communal tenure was the only type of property allowed to indigenous people by the colonial government (Warman, A., 2003). All through the XXth century after the independence the liberal policies in vogue, regarded private property as an imperative for the desired economic and social modernization. Communal lands and the properties of the Catholic Church - the main landowner of Mexico at the time- became then public property. From the 1870 to the 1890 many of these lands were given in concessions to rail-road companies or sold to privates. Land concentration in private hands became larger than it was during the colonial time. Large landholdings known as haciendas rapidly grew frequently at the expense of old communal lands. Haciendas also benefited from the cheap and often forced labor of those dispossessed. Many specialized in profitable export crops such as sugar, cotton, henequen, tobacco and coffee were produced in haciendas. Nevertheless many forest communities were able to prevail and maintain control of their territories protected by their remoteness and the poor agricultural value of their lands.

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Constitución Federal de los Estados Unidos Mexicanos, Artículo 27.

The restoration of the old communal lands to local communities and the share of the lands of the haciendas to their ancient workers, were the main claims of the massive social movement of the beginning of the XXth century. After the revolution the agrarian reform became a pivotal strategy for peace keeping and political control of the rural society^{iv}. Some decades after the revolution, during the postwar years, as industrial development became a central policy goal, contradictions among different policies became evident. While the Federal Agrarian Department^v granted property rights to rural communities all over Mexico, forest communities were seen as unable to efficiently perform forest logging providing the raw materials that the expanding national economy required. During the 1950, long term logging concessions⁴ in favor of private and (later) state owned industries, were imposed in the richer forest regions in spite of the frequent communal ownership of the lands. Communities were forbidden to make any use of the forest areas under concessions. Logging vans were imposed in the forests of many watersheds close to urban concentrations, reaching the 50% of the country's forestland at the mid 1950. (Bray and Merino, 2004; Merino, 2004; Boyer, 2005; Merino and Segura, 2005; Bautista, 2007).

For more than a decade analysts and lobbying groups in international forums have underlined the importance of the legal recognition of property rights to local forest user groups, as a key element to build sustainability and equity (Whyte and Martin 2003; Ostrom 1991, McQueen, 1997). In Mexico forest communities gained legal property rights way before anywhere else in the world in modern times, but their rights were frequently de facto denied by the same State that granted them. In the context of ambiguous institutional arrangements, communities often perceived forests as obstacles to real tenure; private industry's incentives favored "mining forestry", oriented to maximize short term profits, as industrial lacked formal property rights and their operations were frequently opposed by local communities. Finally the profits of the state owned forest enterprises, established mostly during the 1970, were used to finance non forest activities, defined as national priorities, and were rarely reinvested in forest protection and forest production. Forest cover was generally preserved in the areas under concessions, even if they lost commercial quality as a consequence of management practices^{vi}. In the regions under forest vans communities completely lost legal rights to use and manage forests while the market demand of forest raw materials persisted and grew. The local need of income and domestic forest goods on its turn also increased during this time as a result of population growth and market economy expansion. A last difficulty was (and still is) the very weak capacity of the government agencies to monitor and sanction illegal logging, that results in very low costs of violating the law. Forest vans had mostly perverse impacts creating de facto open access to communal forests, clearly associated with forest deterioration and deforestation (Boyer, 2005; Merino and Hernández, 2004). Policies and institutional failures had pervasive impacts that have proved very hard to revert, some of the most relevant are: (a) important fractures in the forest production chains, (b) lack of investment in

forest resources protection and management, forest roads and industrial infrastructure), (c) des-incentives for forest owners to protect and use forests based on long term perspectives, and incentives for different forest users to maximize short terms profits; (d) land use change and high deforestation rates result of de facto" open access conditions and public incentives to agriculture and cattle raising in mountain and tropical areas

3. Community Forest Management. Potential and Limitations. Case studies.

By the late 1970 it was clear that neither concessions nor vans were close to reach their original objectives, forest deterioration had rapidly grown in areas under vans while the industries of forest concessionaires operated at an average half of their capacity. Logging concession periods were close to an end and communities strongly opposed their renewal demanding rights to manage and use forests resources; finally structural adjustment policies were contrary to state owned enterprises. In this context a progressive current within the forest administration, grouped in the Department of "Forest Development" (DDF) promoted a new "policy experiment": the support to commercial community forestry. This initiative was first implemented in areas under vans that were lifted (Bray, Merino and Barry; 2005) and some years later in forests under concessions, where this initiative got the main successful cases. Pro-community forest policy was based on the assumption that communities could be both: efficient forest producers and viable stewards for forest conservation. The DDF programs were based on intense training and advisory to forest communities, on the support of communities' associations created to get access to technical advisory on forest management that had always been provided by the federal government (Alatorre, 2000; Bray and Merino, 2004). After few years some of the communities with the most valuable forest assets and better internal organization achieved remarkable gains: they made important profits from forest businesses, became able to build and maintain roads, to buy extraction and industrial equipment and to organize their own technical and administrative teams. In the majority of the successful cases the profits of the forest activities were largely re-invested in the development of forest assets including forest protection and improvement of forest management systems. Commercial credit and public funds played only a marginal roll in the growth of communities' assets. Some communities soon adopted an environmental agenda, forest certification under the Forest Stewardship Council scheme was first applied in Mexico in 1993, ten years later around 800,000 of forest hectares and 12% of the timber produced in the country were certified (Klooster, 2004)^{vii}. A new forest law published in 1986 prohibited concessions and granted communities the right to be consulted on the establishment of any policy that restrained their property rights.

During the late 1980 and early 1990 governmental support of community forestry faded. The success cases appear hard to replicate, due to diverse difficulties: the opening of national market to foreign forest products^{viii}, particularly after the implementation of the North American Free Trade Agreement (NAFTA); a strong over-regulation of forest activities that poses high transaction costs to legal forest production; the high opportunity costs of forest conservation favored by traditional

subsidies to mountain agricultural and cattle raising, completely de-regulated in spite of their often high environmental costs; the extended presence of illegal logging and the inability to implement the law. Finally since the mid 1990 the establishment of restrictive protected areas became the main conservation strategy, in spite of their high social costs and often unclear environmental gains (Merino and Hernández, 2004; Durán, Velásquez y Mass, 2005). Since the early nineties massive reforestation programs and subsidies to private companies for the establishment of commercial forest plantations became predominant forest policies, getting repeatedly much poorer results than those initially proposed. Mean while communities coalitions, successful communities and supportive NGOs lobbied for alternative forest policies.

Since the early 1990 numerous successful and UN-successful community forestry experiences have been documented, mostly through case studies (Merino and Hernández, 2004; Durán, Velásquez y Mass, 2005). (Alatorre, 1997; Merino et.al., 1997; Klooster, 2002; Bray and Merino, 2004; Bray, Merino and Barry, 2005; Taylor 2005; Garibay 2007). This literature addresses a wide range of topics: sustainability of community forestry and its efficiency compared with protected areas, the organization of forest communities, the contribution of community forestry to local well being, development and governance, the impacts of social conflict and public policies on forest management. The work that uses Institutional Analysis as a framework is based on the assumption that forest conditions and sustainable use depend on the robustness of the local institutions that communities use to govern their commons ^{ix}. A second hypothesis proposes that institutional strength depends on its turn on inter-linked characteristics of the user groups such as: social capital, shared vision on the forest, forest uses and dependence on the forests, rights and incentives. Through the analysis of successful cases these studies showed that under favorable policy conditions and proper incentives communities can be efficient forest managers in environmental, economic, and social terms. These work also aimed to make evident that policies that disregarded the roll local of communities had unexpected perverse impacts, advocating for careful and interdisciplinary crafting of forest and conservation policies. (Merino, L., 2004; Merino and Segura, 2005; Merino y Ortiz, 2010)

During the second half of the 1990, the recently created Ministry of Environment and Natural Resources (SEMARNAP^x) launched a second generation of Pro-community forestry programs: the Programa de Desarrollo Forestal (PRODEFOR) and the Programa de Conservación y Manejo Forestal (PROCYMAF). PROCYMAF was first a joint initiative of SEMARNAP and the World Bank. It was first conceived as a pilot project that pretended to craft fine-tuned strategies to respond to the diversity of Mexican forest communities. PROCYMAF design and implementation was strongly influenced by the wave of progressive advocacy in favor of participatory, decentralized and pro-poor forest policies. This wave was a result of the recognition among the multilateral agencies of the failure of the projects that during the 1980 intended to halter tropical deforestation through the support of central governments. PROCYMAF had an innovative working strategy, giving a differential treatment to communities with different conditions and levels of

forestry development. The program proposed to address the need of a close presence and intense advisory to forest communities, its goals included: the strength of communities' productive and institutional capacities; the strength of communities assemblies as legitimate decision making bodies; the development of "bonding" social capital within forest communities, as well as "bridging" social capital among communities in order to address shared problems and projects. This program also promoted relations of transparency and accountability between the communities and the program. It worked initially in the southern state of Oaxaca, with a high indigenous presence, high presence of communal forests, an important group of successful community forestry experiences and strong participatory governance traditions. Within few years PROCYMAF got important gains such as the increase of the area under forest management and certification schemes and the creation of numerous community forest enterprises. From 2000 to 2007 the program was extended to other nine forest states.

4. Today' S Conditions Of Forest Communities In Mexico.

PROCYMAF growth and its mainstreaming required an overview perspective on the conditions of the forest communities in different regions of the country. Trying to address this need the IIS-UNAM with the support of Indiana University worked on a survey that aimed to provide statistically meaningful information. In 2007 we developed and applied a questionnaire in communities that owned a minimum of 300 hectares of temperate forests^{xi} in five of the six states where the program worked then^{xii}. Oaxaca, Guerrero, Michoacán, Jalisco and Durango^{xiii}. These are five of the six main forest states in Mexico that together count for more of the half of the forestland of the country, where more than half of its timber produced. Considered as a whole these forest areas have lower population density and lower deforestation rates than the forests of central and eastern Mexico. In this sense the results of the survey can be considered as representative of the conditions of the 50% of Mexican temperate forests facing lesser pressures.

The themes of the survey are: population and poverty, forest tenure, contribution of forest resources to communities' livelihoods, forest uses and forest products, vertical integration of forest production, local institutions that deal with forest management, pressures on the forests, protection and conservation practices, communities' organization and social capital^{xiv}. In the following pages I discuss some the main results that relate to some of the key challenges and assets of community forestry in Mexico now days.

Collective Tenure

Governance of communal forests has undeniable high transaction costs and demands high levels of coordination and cooperation (collective action). It also offers larger social benefits and favors higher social participation in forest protection than private property of forestland does.

Ejido –the type of collective property with lesser autonomy to define succession patterns is the predominant form^{xv} of tenure in forest Mexico, but *comuneros*⁵ are the majority of collective property right holders in forest communities. This pattern is the result of the more inclusive nature of *comunidades agrarias* with more chances to include youngsters and renew their membership. *Ejidors* face more serious difficulties for generational replacement, as lack of access to property rights for young people acts as an expulsion factor. The survey data clearly show this difference: more than 88% of *ejidatarios* and 32.1% of *comuneros* are older than 40 years. On the other hand 19% of the families living in the forest communities of the sample are *avecindados*, without property rights. They are often the poorest families within communities, and have the lesser incentives to take part in forest conservation.

Age groups among property right holders in forest communities	<i>Ejidors</i>	<i>Comunidades agrarias</i>
% of forest communities with the majority of right holders younger than 40 years	11.7%	67.4%
% of communities with the majority of right holders with ages between 60 and 40 years	60%	20.4%
% of communities with the majority of right holders older than 60 years	28.3%	11.7%

Source: Survey about the Conditions of Forest Communities in Mexico

Access to schooling is very low as a joint result of the age of land owners and the prevailing poverty conditions, 46% of the elucidations *and communes* have not completed elementary education ⁶ and only 25% of them have studies other than elementary education.

Communal tenure in Mexico has a strong presence in the countryside, in spite of the many pressures it has faced, before and after the privatization of *Guido* lands became legal in 1991 (Warman, 2000, Cornelius and Mysore, 1998; DE January, Roulette y Gordimer, 1999). As forest communities are those with the larges share of commons lands, the tendency to maintain collective property is stronger in forest communities than in those with mostly agricultural land. Sales of *Guido* lands had taken place in 30% of our forest communities ^{xvi} but in more than 80% of them local authorities declared that nobody in their communities was interested in the privatization of the *acidosis* or communicates *agrarians*.

Very important pressures on collective property are those created by tenure conflicts among and within communities: 34% of our cases face problems over borders with their neighboring communities and 21% have internal tenure conflicts. Conflicts have negative impacts on forest governance, forest management and forest conditions. Local authorities declared that these conflicts have impacts on forest conditions in about 50% of the cases, favoring deforestation, illegal logging,

⁵ *Comuneros* are collective property right holders in *comunidades agrarias* as *ejidatarios* are in *ejidos*.

⁶ Elementary school studies last six years.

as well as difficulties to fight forest pests and fires. Frequently tenure conflicts impede the development of legal forest uses and forest management plans.

Families Livelihoods and Forest Uses.

The results of the survey show generalized conditions of poverty, with a predominance of traditional agriculture and cattle raising, low income generating activities in Mexican forest regions that often have high impacts on forest conditions. Subsistence agriculture is the most frequent productive activity practiced by 75% of the families of the communities of the sample in 98% of these communities. In spite of agriculture's poor profitability, it allows families living in uncertain conditions, to cover some of their basic food needs. Cattle-raising is also a frequent activity, it is present in 84% of the communities of the sample, but tends to be practiced by small groups few (less than 25% of the families in the majority of the communities). The profits of cattle raising are also low: in 35% of the communities this activity provides less than 25% of the total income of the producers. Cattle-raising is perceived as a form of saving whose (environmental and labor) costs are not fully considered in the cost-benefit analysis of families.

The contribution of forestry to local employment and income is very small, in spite of the productive potential of many forests and the strong need of economic options. In nearly half of the communities (49%) nobody is engaged in any commercial forest use; in 23% of them elucidations/*communes* occupied in forestry are less than 25% of community members. Only in 6% of the communities those elucidations/*communes* who take part in forest activities are more than the 50%. The share of forest activities in local income is equally low: only in 11% of those communities with commercial forestry activities, those who occupied in forest activities get from this work more than 50% of their yearly income.

Many communities of the sample have different types of forest areas ^{xvii} (tropical rain forests and dry tropical forests) due to the varied altitudinal range of their lands. Different types of forest vegetation are used with different purposes and managed in different ways. Forest resources are fundamentally sources of domestic goods. Firewood collection takes place in 65% of the communal pine forests areas of the sample, in 45% of the fir forests areas, in 81% of the pine-oak forests, in 92% of the oak forests, in 41% of the cloud forests and in 61% of the tropical dry forests. Grassing is the second most frequent forest use, it occurs in 60% of the pine and pine-oak forests community areas in 75% of the tropical dry forest areas and 75% of the rain tropical forests. These two types of forest uses are rarely regulated (nor locally or officially).

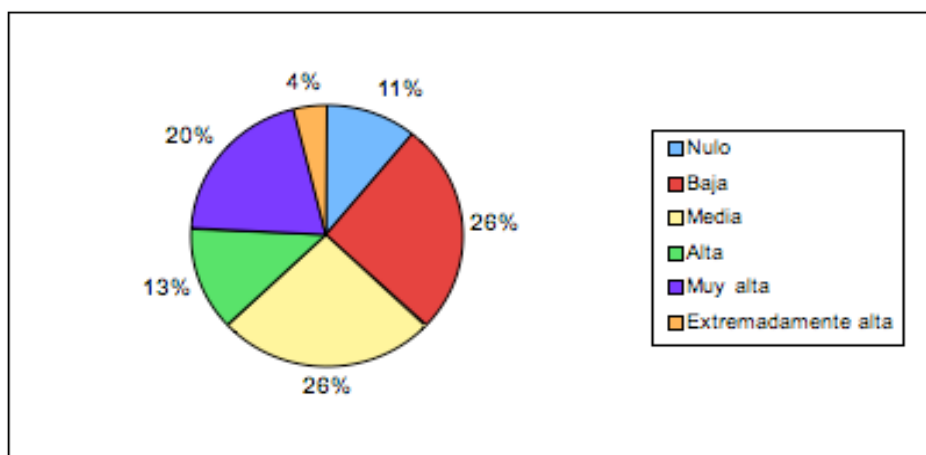
Agriculture is the second most important use of cloud forests where coffee is a frequent crop. The increase of subsidized coffee cultivation during the 1970 was the main driver of the rapid disappearance of cloud forests in Mexico ^{xviii}. Only 18% of the communities with cloud forests within the sample received payments from the PES program at the time of the field work (2007-2008). The limited sustainable options of use for most of the extended areas of oak, dry tropical and rain tropical forests poses serious challenges for the conservation of Mexico's biodiversity. ^{xix}

Commercial logging takes place in 58% of the communities of the sample with pine forest areas, there are community conservation areas in 62% of this type of forest areas. Pine-oak, areas are used for commercial logging in 48% of the cases with this type of forest, 18% of the communities with pine-oak forest take part in the governmental Program of Payment for Environmental Services A Program. There are community conservation areas in 70% of the communities with fir forests, 31% of them take part in the PES Program ^{xx}. Cloud forests, in Mexico are relict ecosystems, rich in biodiversity and endemic species. 80% of the communities of with cloud forests have settled conservation areas. Mexican temperate forests have a highly biological productivity, a potential advantage for Mexican forest producers, nevertheless only one third part of the forests with timber resources of commercial value is under legal extraction. Many forest areas need restoration and management systems need to be improved.

Indexes on the Conditions of Forest Communities⁷.

We summarize many of the results of the survey in five indexes: the index of pressure on forest areas, the index of protection and conservation activities, social organization and social capital, institutional development for forest use and management and the index of community forestry development.

Index of Forest Pressures on Forest Areas



Source: Survey on the Conditions of Forest Communities in Mexico

⁷ The methodology used for the construction of these indexes is included in Annex 1. The variables used for each index are:

Index of Pressure on Forests: Illegal logging, forest fires and pests, grassing in forest areas and deforestation.

I. of Protection and Conservation: Monitoring to prevent forest fires, forest pests, and illegal cutting; forest Fires, forest pests and illegal cutting fighting practices and community conservation areas.

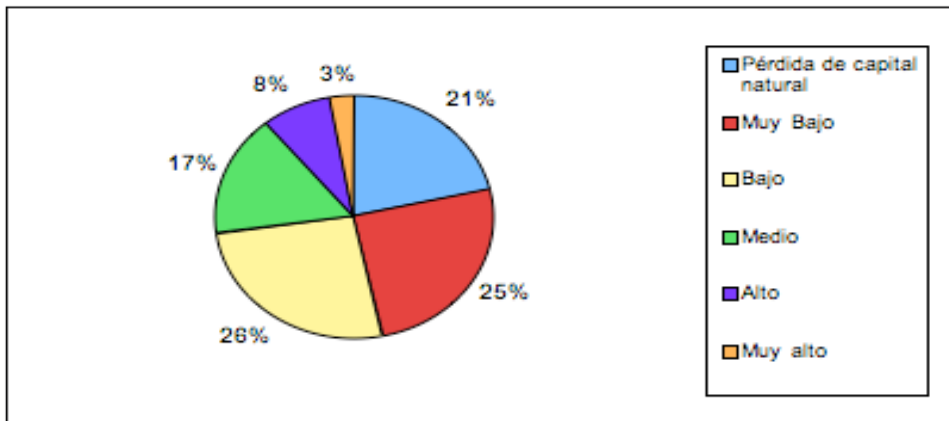
I. of Organization and Social Capital: Frequency of community meetings, strength of local governance systems, participation in community meetings, in local governance and non paid work in favor of communities.

I. of Community Forestry: Level of vertical integration forest production chains, level of diversification of forest uses, productive forest assets owned by communities and financial assets.

I. Institutional Development: Rules for forest protection and management, rules of forest products harvest, forest management plan, rules for community governance and institutional strength.

There is a moderate level of pressure on most of the community forest areas of the five considered states. Seen as a whole: 37% of the forests in the sample face none or low pressures. These low values are related with two issues: on the one hand the possible sub-register of illegal logging in the field, on the other these data reflect reduction of the deforestation rates in many forest communities as a result of emigration and agriculture abandon during the last years. These processes have lowered traditional pressures on forests^{xxi}. Nevertheless 63% of these forests face important pressures frequently related to grassing practices, fires and illegal logging^{xxii}.

Index of Forest Protection and Conservation

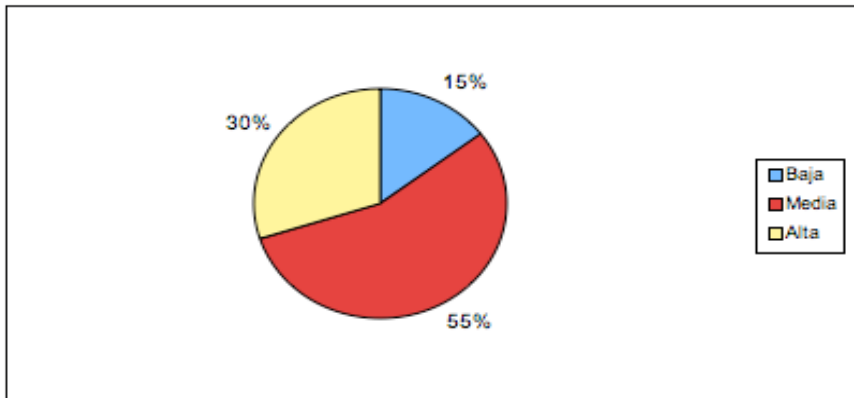


Source: Survey on the Conditions of Forest Communities in Mexico

28% of these communities are actively engaged in forest protection, monitoring forests, fighting fires, pests and illegal logging. 11% of them have established local protected areas based on the decision of community assemblies. Most communities carry on protection activities only at levels that we classified as “low and very low”. Most frequently these practices consist in monitoring and forest fires fighting. An important share of the communities (21%) reported recent forest losses. Protection practices in these last communities are very fable or none existent. The proportion of communities with forest losses in this index is very similar to the proportion of communities with “very high and extremely high” levels of pressures on the forests.

Index of Organization and Social Capital

The data of the survey clearly show that forest communities have an important organizational base. We classified social organization as “medium” in 55% of the cases, and “high” in 30% of them. Governance based on local participation is still in place in many communities. Assemblies of communes/*elucidations* meet regularly and frequently to discuss collective issues and make decisions and rules about matters such as: the use of the forest commons, their relations with governmental programs and other local governance issues. Assemblies have an important attendance and participation of *ejidatarios/communes* those community members with decision-making rights.



Source: Survey on the Conditions of Forest Communities in Mexico

Non paid work in favor of communities takes place and serves as the base for the development and maintenance of communities' infrastructure and public services, but often it is also invested on forest protection and restoration activities.

Social organization in *acidosis and agrarian communities* face a variety of challenges such as the exclusion of young people in *acidosis*, and women in both *acidosis* and *communities agrarians*. Internal conflicts related with "elite capture" of the benefits of common resources are common. In addition out-migration puts social organization under additional stress as it affects generational replacement. These pressures are particularly strong for 15% of the communities of the sample, where local governance structure is losing viability, and social investment in the collective action is sharply decreasing.

There are no communities with "very low or none" organization, neither communities with "very high" social organization. This absence reflects from one side the high costs of the maintenance of communities' and common forests governance systems that require meaningful incentives. Forests used for domestic consumption, the largely predominant forest use provide incentives for conservation, nevertheless as market relations are deeply en rooted in every day life of Mexican communities, economic incentives and community business are a strong drivers for collective action and local institutional development. These incentives tend to be limited in the context of the low development of communal forestry which on its turn requires social capital and institutional strength.

Index of Community Forestry Development

Commercial forestry is absent in the vast majority of these communities (66%) in spite of the ownership of forest assets. In 14% of them forest activities have irregularly taken place and make only a low contribution to local economies. Most of the communities of this second group sell or have sold timber as a stump, but have not developed local productive capacities through the acquisition of machinery, the development of productive infrastructure or trained work force and marketing capacities. Extractions are performed by outsiders with little or none community control. They often with have high impacts on forests resources and

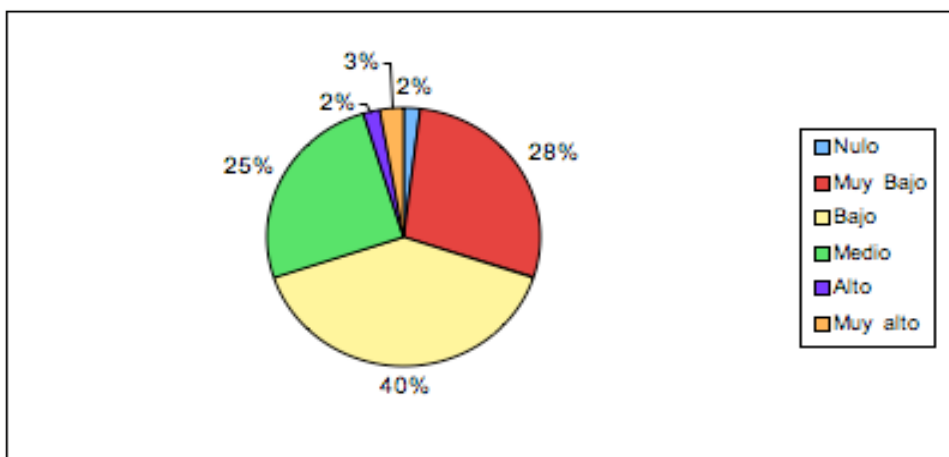
leave scarce benefits for communities. These extractions frequently create a resistance against logging.



Source: Survey on the Conditions of Forest Communities in Mexico

Community forestry takes place in 20% of the cases. These communities manage their forests, and control extraction processes. 13% sell timber as logs, developing limited productive capacities, none have the resources to finance forest production through the year and rely in timber buyers to do so. Finally 7% of the sample had forest industries, selling tables and in some cases products with a higher value added. About half of the communities within this last group have also diversified commercial forest uses. Together with timber they extract and sell resin, bottled water ^{xxiii} and provide Eco-tourism services, creating important local sources of employment and income. Logging remains the most important forest activity that often finances the development of new forest activities (Antinuclear, 2000). Certified communities are part of this group.

Index Institutional strength for forest use and management.



Source: Survey on the Conditions of Forest Communities in Mexico

Local institutions for forest use are poorly developed in 70% of our cases. Institutional strength is moderate in 25% of them it is high and very high in just 5%

of these communities. The most common type of local institutions is that related to the enforcement of communities' governance rules: the obligations to attend assemblies, to take part in local governance activities as well as in the non-paid work in favor of communities.

The low values of this index relate to the low level of forest uses, and the consequently of the low incentives for communities to engage in the development of rules related to forests^{xxiv}. The communities with the highest institutional strength are those with the more developed and diversified forest economies. In such cases, institutional development refers not only to rules crafted around sustainable harvest of different resources, but also favors rules enforcement around land use planning and local governance.

Comparisons of the values and relations among different indexes

As I mentioned above, the low level of development of forest activities in communities whose main productive assets are collective forests is one of the most striking features of Mexico's forest regions. Institutional development is also low but the values of this index are higher than those related to forestry development. There very few communities with no local institutions (2%), while 66% of the communities have no forestry development. The communities with low and very low institutional strength tend to be communities with rules developed around local governance and domestic forest use. The values of the indexes of forestry development and institutional strength have a closer relation in the higher levels backing up of the hypothesis that in Mexican forest regions the development of forestry provides strong incentives for local institutional development, but also relies on it.

	Forestry development	Institutional strength	Organization strength	Forest protection	Pressures on forests
Very high	1% of communities	3%	0	3%	4%
High	6%	2%	30%	8%	20%
Medium	4%	25%	55%	17%	13%
Low	9%	40%	15%	27%	26%
Very low	14%	28%	0	25%	26%
None	66%	2%	0	21% ⁸	11%

Source: Survey on the Conditions of Forest Communities in Mexico

The values of organizational strength in many communities – particularly for communities with a “medium” level of organization show a high independence from forestry development while the level of organization is higher than the level of institutional development. Governance structure, and willingness to take part on it - covering the related transaction costs- is in place even when it not fully backed by local institutions. In other words there is a local “institutional gap” to support the existence of organization and social capital present in forest communities.

⁸ The “none conservation practices” corresponds to these communities where we found recent forest losses.

Forest protection and pressures on the forests are highly dependent on the development of community forestry, local institutions and organization. Our data show no linear relation between forest protection and forestry development. As a general tendency forest protection practices are more frequent than the experiences of forestry development, at least for the presence of basic protection measures such as forest fighting and some forest monitoring. This tendency may reflect the fact that forest products used for domestic consumption sustain incentives enough to engage in a basic level of forest protection, but does not enable communities to invest more effort and resources in a more detailed institutional crafting, intense monitoring system and/or more costly conservation measures such as the segregation of community protected areas in their lands. The percentage of communities with the three highest levels of protection/conservation practices (28%) of the sample is also higher than that of the communities with the three highest levels of forestry development (11%), showing –that in the present of proper incentives, even if they are not very high–communities make considerable investments in forest protection and conservation and develop the capacities to do so. These practices include: conservation areas, management of seedling areas, forest studies to base management practices, biodiversity protection and forest certification ^{xxv}.

6. Main challenges, policies responses and conclusions.

Data from a recent study on the performance of forestry and forest policy during the 2000-2006 federal administration in Mexico (Merino and Ortiz, 2008) showed two clear tendencies: from 1994 to 2000, forest production grew by 49%, (from 6.3 million m³ of round wood to 9.4 m³r), five years latter in 2005, timber production had dropped to the level it had in 1994. This loss of 33% of the wood production occurred in the middle of a considerable increase of the national consumption of forest products, that grew from 16.3 million m³r in 2000 to 27.5 in 2003 and 21.3 in 2005. As a consequence of the trends of the forest national supply and demand, the deficit of forest products increased in volume and value: in those five years the volume of the forest deficit increased by 167% in volume, while its value grew by 222%, in spite of the relative monetary stability during this period ^{xxvi}.

Forest production´ s performance form 2000 to 2005 reflects an important loss of the capacities of forest communities to produce raw materials and add value to their products. Low forest production and productivity in Mexico contrasts with those of its main commercial partners: the United States has a forest land four times larger than Mexico´ s and produces 50 times more timber mostly coming from natural forests. Chile –whose forest area is a third of Mexico´ s and has an important share in Mexico´ forest imports– produce three times more timber.

Mexican legal framework provides important advantages for community forestry as the recognition of communal forest tenure set by the General Constitution of Mexico since 1917. More recently the last forest law (2003) has formally recognized the public value of community forest management and the need of

governmental support; the support of schemes of payment for forest environmental services; and the importance of forest certification.

The rapid deterioration of forest production capacities has occurred during a period of an important growth of the public investment in the forest sector. There are different institutional reasons of the poor results of this important public effort: i. The concentration of forests governance powers in the federal government. ii. Regulatory policies that highly increases transaction costs, iii. Insufficient human resources of the government` s forest administration. Iv. Failure of the monitoring and sanctioning of illegal activities schemes that creates a wide impunity of forest together with absence of legal and/or market mechanisms that recognize legally produced forest goods.

The survey shows conditions of persistent and generalized poverty in Mexico` s forest regions together with reduced productive options compatible with the conservation of the forest cover. In this context of limited experience and poor incentives and options, training and advisory are critical needs of today` s fragile forest communities. Without the investment in local capacities, public investment in forest restoration and conservation loss viability. The successful communities` and policy experiences show that close and high quality advisory and training have been key factors in success histories. (Merino et.al, 2007; Bray, Merino 2004; Alatorre 1991; Merino, 2004).

Another key “lesson learnt” is the need of collective action for sustainable forest management. Forests “behave” as commons their sustained management requires high levels of cooperation among relevant social actors ^{xxvii}. The need of collective action for forest governance is even higher taking into account the collective tenure of the vast majority of forests in Mexico. Local organization as well as community and regional social capital are also fundamental for forest sustainability, when they are present collective property becomes an important advantage for conservation.

During the period 2000-2006 two programs of CONAFOR, PROCYMAF and COINBIO oriented their efforts in favor of the development of local institutional, organizational and productive capacities. In spite of their achievements, and of the World Bank` s recognition of PROCYMAF as one of the Bank` s most successful community programs, they received less than 5% of CONAFOR` s budget all through the past federal administration. In December 2007 during the United Nations Conference on Climate Change, Mexican government adopted the commitment to plant trees in 500 thousand hectares per year. Massive reforestation –already favored in the past in spite of constant failures- became a central goal of forest policy with resources multiplied by various fold.

The results of the survey express some of the main challenges faced today by social sustainable forest management schemes: 1. The right holders in the majority of *ejidos* are ageing, generational replacement required for forest protection and communities entrepreneurialship is under treat in the majority of forest communities. 2. Tenure conflicts are frequent and have pervasive impacts

on local peace and on forest areas. 3. Poverty is widespread, economic options are limited and often non compatible with the conservation of the forest cover. This is particularly true for those forest ecosystems with the highest biodiversity, dry and humid tropical forests. 4. There are few incentives to sustain and develop local institutions around forest use and protection. 5. Hardly developed community forestry experiences that provide a bundle of social and ecological benefits need support in order to be able to compete in open global markets.

These challenges need to be strongly addressed by public policy based on a clear understanding of the conditions of forest communities. Social organization needs to be treated as a key resource by main-stream forest and environmental policies. Up to now community organization has often suffered the negative impacts of policies that mis-regard the nature of common goods and collective property of forest resources in Mexico, and the potential advantage of groups with social capital for sustainable forest governance.

Our results show that the communities with stronger organization are also those with the more intense practices of protection and conservation. Communities with developed and successful forestry experiences are a minority, but their presence and success express the viability of community forestry as a driver of local economy and forest protection.

i The total forest cover of Mexico is 141,745,168 hectares, 32.3 million hectares are pine and pine-oak forests, 1.8 million of cloud forests, 33 million of tropical rain forests, and 56 million of dry forests (SEMARNAT, 2006).

ii The rest of the forest is mainly in private hands.

iii From 1993 to 2007 the “Programa de Certificación de Derechos Ejidales” certified property rights of *ejidos*, defining their limits. It also certified individual property rights over agricultural plots in those *ejidos* that agreed to do so. PROCEDE only worked with *comunidades agrarias* in a second phase and only defining their borders. In 2007 when PROCEDE closed 41% of the collective lands of the country remained uncertified they were mostly forest *comunidades agrarias* (Procuraduría Agraria, 2007) they not included in the statistics of the Registro Agrario Nacional (RAN).

iv All solicitors of land were registered as members of the official party, the *Partido Revolucionario Institucional (PRI)* that remained in power for more than 70 years. Most of the times *campesino* members of the PRI were not aware of this affiliation. As party members their votes were automatically assigned to the PRI in all elections.

v That later became the Agrarian Attorney.

vi Some of the most significant impacts of the activities of forest concessionaires were the reduction of the volumes of the tree species with the highest commercial value. From an economic perspective they impoverished the forest genetic stock.

vii Forest Certification has not grown, and has even decreased as it poses high demands in terms of: certification costs, forest management requirements and production quality, while in general it has not provided better prices or marketing conditions

viii Canada and the United States –Mexico’s partners in the NAFTA are the two main forest producers in the World. For decades their forest production has benefited from different subsidies. They have strong forest industries and large forest roads networks. Mexican community producers -with a short experience in the forest business, with frequently deteriorated resources, no coherent policy support, and strong barriers to access credit, have found hard to compete with their closest commercial partners and with other forest counties such as Chile with whom Mexico has also signed trade agreements.

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- ix In this theoretical frame the term “institutions” is used to designate “rules in used”, this is repeated patterns of behavior that individuals use in particular settings and get then institutionalized.
- x SEMARNAP was created in 1994.
- xi 300 hectares are considered as the minimum forest extension for viable commercial forestry.
- xii The sample was built following a simple stratified random sampling method. The size of the sample was 103 forest communities out of a universe of 2,293 forest communities. The sample has a 90% confidence level and a 7% sampling error.
- xiii The survey was not applied in the state of Quintana Roo –with tropical rain-forests- where PROCYMAF already worked as we consider that the ecological conditions, management practices and forest economy were too different from temperate forest regions. We neither could apply the survey in the state of Chihuahua (the one with the largest forest area and the second forest producer in Mexico) where PROCYMAF did not work at the time of the fieldwork.
- xiv The questionnaire has 350 questions and was tested in 20 pilot cases. Due to the size of the sample and the costs of the fieldwork, the survey was only applied to the communities authorities (*comisariados*), but always to focal groups composed of at least three people.
- xv *Ejidos* are predominant in terms of their share of the national forest extension and also by the number.
- xvi These are sales of some plots, frequently among inhabitants of *ejidos*, in most cases they are not privatization of the whole *ejido* lands and *ejido*’ disappearance. They neither include sales of forestland. Sales of the lands of *comunidades agrarias* are illegal, their assemblies need to decide to become *ejidos* before selling their lands.
- xvii Temperate forests include: pine, pine-oak, oak and cloud forests.
- xviii Since 1990 many communities in southern Mexico practice shade coffee cultivation, maintaining the forest cover and getting certification as organic-sustainable producers. This was not the case in the 1970 and 1980 when sun-coffee cultivation, based on forest removal was promoted by government programs.
- xix Endemic species are classified as paleo-endemism and neo-endemisms. Cloud forests in México are those with the highest level of paleo-endemism, dry forests and arid vegetation areas are the richest in neo-endemism.
- xx This Program was established in 2001 by CONAFOR with support of the World Bank, it pays yearly rents to forest owners whose properties –or part of them- take part in the program,. Any activities other than those related to forest protection, are prohibited in these areas, while owners receive these payments.
- xxi In some cases the abandon of agriculture has stopped forest clearings, but it is also related with the lower numbers of forest fires, as frequently mountain agriculture was based on slash and burn practices.
- xxii It should be remembered that the sample of forest communities is representative of the half of the country’ s forestland currently, under less pressure.
- xxiii Some communities collect water from water sources in the forests, and bottle it in plants installed in communities.
- xxiv The development of sustainable institutions is a demanding process with high transaction costs.
- xxv The Forest Stewardship Council has certified around 800,000 forest hectares, corresponding to 28 Communities. The number of certified communities has not growth due to the absence of the expected market incentives for certified forest products, and the high costs of forest certification.
- xxvi From 2000 to 2005 the Mexican currency, the peso, lost only 10% of its 2000 value in relation to the American dollar.
- xxvii In terms of Natural Resources Economy forests are “common pool” goods. Their sustained use relies on cooperation because it is difficult to exclude potential users, while the use made by some users affects the resource and other users’ future use.

Annex No. 1 Methodology used for the construction of indexes.

These indexes were built adding the values assigned to the answers related to the indicators selected for the description of the variables under study. The weight given to each indicator was assigned with base on the knowledge of the variable under study.

First we established the criteria used to select the indicators and questions of the questionnaire that seemed more relevant in terms of the operational definition of the variables. The different answers were ordered in a same direction (positive or negative) and classified in different categories. In order to classify these categories we assigned to each of them a number (or range) that gives a certain weight to each type of answer, this number is known as the "weighting coefficient".

The rank or weight given to a certain category only represents a hierarchical order of the answers, this is to say that a certain category is larger or smaller than other one (not that category "1" is the double of category "2"). In order to develop the indexes the ranks correspondent to each indicator were added, obtaining a value for each individual, this value was divided between the number of indicators integrated in the index. Ranking refers to the decision on how to classify the values of the indexes. Our ranking was not based on our own knowledge of the themes under study and not on any formal technique.

I. Index of pressure on forest areas

$$IPFA = ((A + B) * C) + (D) + (E) + (F)$$

A. - presence of small scale illegal logging

Yes and it is very important = 6

Yes but it is reduced = 3

Absence = 0

B = Presence of large scale illegal logging performed by organized groups

Yes it is very frequent = 6

Yes but it is not frequent = 3

Absence = 0

C = Perception of the growth of illegal logging during the last 10 years

It increased very much = 3

It had a modest increase = 2

It remained the same = 1

It had a modest reduction = 1

It decreased very much = .5

There is no illegal cutting and there was not 19 years ago = 0

D = % of the community forest area affected by fire

(Affected hectares) * (100)

$$\frac{\text{Affected hectares}}{\text{total community forest area (hectares)}} = \% \text{ of the forest area affected by fire}$$

The values obtained were categorized as follows:

0% of community forest area affected by fire = 0

More than 0% and less than 0.5% = 1

More than .5% and less than 3% = 3

Between (3%, 10] = 6

Between (10%, 20] = 9

Between (20%, 50] = 12
 Between (50%, 100] = 24

$E = \frac{\text{Affected hectares} * (100)}{\text{total community forest area (hectares)}} = \% \text{ of the forest area affected by pests}$

The resultant values were categorized as follows:
 0% of community forest area affected by pests = 0
 More than 0% and less than 0.5% = 1
 More than .5% and less than 3% = 3
 Between (3%, 10] = 6
 Between (10%, 20] = 9
 Between (20%, 50] = 12
 Between (50%, 100] = 24

$F = \% \text{ community forests that experienced land use change}$
 Total forest area under land use change = hectares of old forest transformed ed in agricultural plots + transformed in grassing areas + transformed to other non forest uses.

$\frac{\text{(Total area under land use change) * (100)}}{\text{Total community forest area}} = \% \text{ of area under land use change}$

0% of community forest under land use change = 0
 More than 0% and less than 0.5% = 2
 More than .5% and less than 3% = 6
 Between (3%, 10] = 10
 Between (10%, 20] = 14
 Between (20%, 50] = 18
 Between (50%, 100] = 39

The highest value that this index can reach is = 102 and the lowest = 0.
 For our sample values were distributed between 0 and 72.

Ranking:

(0] = Null
 (0, .5] = Very low
 (.5, 3] = Low
 (3, 10] = Medium
 (10, 20] = High
 (20, 50] = Very high
 (50, 72] = Extremely high

II. Index of Social Organization (ISO)

$ISO = A + B + C + D + E + F + \sum G + (Q * R) + N + (S * T) .$

$A = \text{Forest management pattern (the forest is managed by the community, it is divided and managed by groups, it is divided and managed by individuals)}$
 the forest is managed by the community = 4
 it is divided and managed by groups = -4

it is divided and managed by individuals = -1

B = Period of community authorities service

Three years = 3

One year and six months = -1

One year = -1

C = Number of assemblies per year

Less than one per year = -4

From 1 to 2 = 2

From 3 to 5 = 3

From 6 to 11 = 4

From 12 to 24 = 6

D = Percentage of communal right holders taking regularly place in assemblies

Less than 51% = 0

From 51% to 60% = 1

From 61% to 70% = 2

From 71% to 80% = 3

81% and more = 4

E = All the towns within the community' s borders take part in the assemblies.

All the towns take part = 2

Not all the towns take part = -2

There is only one town = 2

F = Participation of people without tenure rights in the assemblies

They cannot take part in these meetings = -1

They can take part but without voice or right to vote = 0

They can take part with voice but without voting right = 2

They can take part with voice and voting right = 4

∑ G = Decisions taken by the assemblies related to common forest management

The assembly takes decisions about:

G1 Timber sales = .5

G2 Investment of forest production profits = .5

G3 Participation in government programs = .5

G4 Rules on forest management/use = .5

G5 Forest management plan = .5

G6 Land use planning = .5

G8 Conflicts with neighboring communities = .5

G9 Administration of the community forest enterprise/forest activity = .5

G10 Community by laws = .5

Q = Frequency of conflicts at the assembly

They are frequent = 0

They rarely take place = 1

There are never conflicts = 2

R = Capacity of the assembly for consensus reaching and conflict resolution

Very High = 3

High = 2

Medium = 1.5

Low = 1

There is not such capacity = .5

No response = 1.5

N = Type and level of sanctions when community members do not take part in non paid work in favor of communities (tequios)

There are no sanctions = 0

Fine = 3

Non paid work = 3

Lack of access to community resources = 3

S = Number of days of non paid work in favor of the community (tequios)

There are no "tequios" = 0

From 1 to 6 days of "tequios" per year = 1

From 6 to 12 days of "tequios" per year = 2

From 12 to 24 days of "tequios" per year = 3

From 24 to 60 "tequios" per year = 4

T = Frequency of sanctions when community members fail to take part in non paid work in favor of communities (tequios)

Sanctions are applied whenever a fault occurs = 1.5

There are no sanctions = .5

Sanctions are seldom applied = .75

No answer = 0

The highest possible value of this index is = 42.5 and the lowest is = -12

Ranking:

[12, 0] = Strong des-organization

(0, .8.5] = Very low organization

(8.5, 16.5] = Low

(16.5, 24.5] = Medium

(24.5, 35] = High

(35, and more] = Very high

III. Index of Institutional Strength

Index of Institutional Strength = (CP *r) +(CRNTLFP *r) + (TE r) +(ICG r) +(FW*r)

This index has five sections:

CP= Community planning

CRNTFP = Community rules for non timber forest products harvest

TE = Rules for timber extraction

CI = Communities Institutions in general

FW = Rules for the harvest of fire wood

r = Weighting coefficient

CP = Community Planning

CP = ((Σ A) + B) * C + (A + B) * D + (A + B) *E)* 0.293650794 .

Σ A = There is a community working plan for natural resources management

A1 Rapid Rural Appraisal = 1
A2 Analysis of Community' s weaknesses and strengths (FODA) = 1
A3 Land use planning (and mapping) = 3

B = Years the community working plan has been in place

From 1 to 3 years = 1
From 4 to 6 years = 2
7 years and more = 3
No answer = 0

C = Knowledge of the community working plan among the members

All community members know the working plan = 3
Almost all community members know the working plan = 2.5
Half of the community members know the working plan = 2
Few community members know the working plan = 1.5
Very few community members know the working plan = 0.5
No answer = 0

D Are the community rules included in the community working plans enforced and followed by community members?

Yes, very much = 3
Yes but few = 1
No = 0
The rules are under discussion = 1
No answer = 0

E Have the decisions taken in the community working plans been also included in the community by laws and/or other rules?

Yes very much = 3
Yes but only in few cases = 1
No = 0
No answer = 0

0.293650794 is a weighting coefficient used to homogenized the highest value obtained for this sub-index and the highest values obtained for the rest of the sub-indexes.

The highest value of the sub-index of community planning = 18.5 and the lowest = 0, (once multiplied by the weighting coefficient

CRNFTP = Community rules for non timber forest products harvest

CRNFTP = (F * G) + F * (H + I) + J.

F = Existence of community provision and appropriation rules about non timber forest products

There are internal rules for about all the used NTFP = 3
There are internal rules for about half of the used NTFP = 2
There are internal rules for less than 50% and less than 25% of the used NTFP = 0.5
There are internal rules for less than 25% of the used NTFP = 0

G = Is there monitoring of the compliance with the rules?

Yes = 2
No = 0
More or less = 1

H = Are sanctions applied when violation of the rules occur?

Yes = 2
Some times = 1
Never = 0
It has never happened = 2

I = Type of sanctions

Fines = 1.5
Verbal sanctions = 0.5
Property rights are withdrawn = 1.5

J = How is the technical advisory for NTFP management financed?

With governmental funds = 1
With community resources = 2
The buyer finances it = 0.5
With user payments = 2
N.A = 0
No answer = 0.1

1 = The weighting coefficient was used to homogenize the highest value obtained for this sub-index and the highest value obtained for the other sub-indexes.

The highest value of the sub-index "community rules for NTFP" = 18.5 and the lowest = .1 (once it was multiplied by the weighting coefficient)

TE = Institutions for Timber Extraction

TE = ((K+L + M + N + O + P) *2) * 0.578125 .

0.578125 is the weighting coefficient

K = The members of the "comisariado" (local authorities) know the forest management plan

They are fully informed = 2
They are informed but not completely = 1
They know it exists but they did not know what it says = 0.5
They do not know anything about it = 0

L = The rest of the community members fully know the forest management plan

They are fully informed = 3
They are informed but not completely = 1.5
They know it exists but they did not know what it says = 1
They do not know anything about it = 0

M = Who does take care of the administration of community forestry?

- if less than 5000 m3 were harvested:

The "comisariado" (local authorities) = 2
A committee or a person assigned by the Assembly = 2
A person or a team responsible of the administration = 2

The client = 2
A community forestry enterprise = 3

-if more than 5000 m3 were harvested:

The "comisariado" = 1
A committee or a person assigned by the Assembly = 2
A person or a tema responsible of the administration = 2
The client = 1
A community forestry enterprise = 3

N = Who supervises the administration of community forestry?

If the administrator supervises himself = 0

The "comisariado" = 2

A committee assigned by the Assembly = 2

An administrative team = 2

The "surveillance committee" = 2

The assembly = 2

The technical advisor = 0

O = How the technical advisory for timber extraction was financed?

With the government' s support = 1

With community resources only = 2

With the client' s resources = 0

It was financed by both the community and the government = 2

P = Is the total forest area of the community managed as a whole, or is it divided and managed by groups?

All is managed as a whole = 4

The forest is divided, but it is managed as a whole = 4

The forest is parceled = 0

The forest is parceled and the parcels are managed by individuals = 0

The forest is parceled and the parcels are managed by groups = 1

The highest value is = 18.5 and the lowest is = 1.156

CI = Community Institutions

$$CI = (Q + R * (S + T) + U * (S + T) + W * (S + T) + (X * Y) + Z)$$

Q = The capacity of the assembly to reach consensus and conflict resolution is

Very high = 3

High = 2

Medium = 1

Low = 0.5

None = 0

S = Does the community has a by-law or an internal rule

Yes = 3

No = 0

It is under development = 1

T = The by-laws are registered in the Nationa Agrarian Register (RAN)

Yes they are registered in the RAN = .5
No they are not registered in the RAN = 0

R = Who took part in the development of the community by-laws or rules?
A commission assigned by the assembly = 2
The local authorities = 1.5
The assembly = 2.5
The Procuraduría Agraria = 0
The Procuraduría Agraria together with the community = 2.5

U = Do community members know the by-laws?
All the community members do = 4
Almost all of them do = 3
Half of them do = 2.5
Only some members of the community do = 1.5
Very few members of the community do = 0.5

W = How much are the by-laws enforced?
Always = 4
Almost always = 3
Sometimes = 1
Never = 0
It just started being enforced = 0.5

X = Is the community periodically informed about the activities of the representatives?
Yes = 3, No = 0

Y = How often?
Once a year = 1
Twice a year = 1.5
Between three and five times each year = 2
More than six times every year = 2.5
Only when this is required by the assembly = 0.5
Every year and half = 0.5
Every three years = 0.5

Z = During the last 10 years has there been need of a third party's intervention to settle internal conflicts related with the use of the forest?

Yes 0
No 2
No answer 1

The highest value is = 18.5 and the lowest = 0

FIRE WOOD= Rules for fire wood harvesting

FIRE WOOD = ((aa * (ab + ac + ad + ae))+ (af * (ab + ac + ad + ae)) / 3)*.925 .

aa = Is there scarcity of firewood in the community lands?
There are strong problems = 2
There are few problems = .5
There are no problems = 0

ab = Are there rules on the allowed harvest volume?

There are strong problems

There are moderate problems

There are no problems

There are rules

There are no rules

ac = There are rules that limit the sale of firewood

There are strong problems

There are moderate problems

There are no problems

There are rules

There are no rules

ad = There are rules that define limit the forest areas where firewood can be harvested

There are strong problems

There are moderate problems

There are no problems

There are rules

There are no rules

ae = The harvest of living trees for firewood is prohibited

There are strong problems

There are moderate problems

There are no problems

There are rules

There are no rules

af = How many households use firewood?

All the households of the community = 2

About 75% = 2

About 50% = 1

About 25% = .5

Less than 25% = .5

None = 0

.925 = is a weighting coefficient used to homogenized the highest value obtained for this sub-index and the highest values obtained for the rest of the sub-indexes.

Summary :

Índex for Institutional Strengtj == (CP *r) +(CRNTLFP *r) + (TE r) +(ICG r) +(FW*r)

r = weighting coefficient

We present here the table of the weighting coefficients *r* for the different variables, e.g if the five variables considered in this index (CP, CRNTLFP, TE, ICG and FW) are relevant for the analysis of a certain community we use the weighting coefficients correspondent to "case 1, if only the variables CP and ICG are relevant we use the weighting coefficient correspondent to "case 8".

Table of WEIGHTING COEFFICIENTS (r) case 1, case 2, case 3, case 4, case 5, case 6, case 7, case 8

CP 5.185.64255.966255.64256.8456.413333336.8458.60251

CI 16.4756.93757.261256.93758.147.708333338.149.8975

CRNTFP 1.8502.636252.31253.515000EM3.1453.607503.607504.3783333300

FIREWOOD 1.852.31252.636250003.5150

Case 1 = CP, IS, CRNTFP, TE, FW

Case 2 = CP, IS, - , TE, FW (they did not harvest NTFP)

Case 3 = CP, IS, CRNTPF, - , FW (they did not harvest timber)

Case 4 = CP, IS, CNTFP, EM, - (they did not harvest firewood)

Case 5 = CP, IS, CRNTFP, - , - (they did not harvest timber, nor firewood)

Case 6 = CP, IS, - , TE, - (they did not harvest NTFP nor firewood)

Case 7 = CP, IS, - , - , FW (they did not harvest NTFP nor timber)

Case 8 = CP, IS, - , - , - (they did not harvest NTFP, firewood nor timber)

Ranking:

(0, 10] = No community institutions

(10, 80] = Very weak community institutions

(80, 150] = Weak community institutions

(150, 210] = Medium community institutions

(210, 280] = Strong community institutions

(280, to the highest value] = Very strong community institutions

IV. Index of protection and conservation

$$IPC = A + (\sum B) + K + L + M$$

A Forest surveillance

Paid guardians = 6

Local authorities = 3

There is no surveillance = 0

$\sum B$ = **Protection and conservation actions**

Forest conservation and protection activities

b1 Reforestations = 1.5

b2 Areas of forest seedlings = 1.5

b3 Forest thinning = 1.5

b4 Fire cut paths = 1.5

b5 Forest fire fighting = 1.5

b6 Forest pests fighting = 1.5

b7 Cleaning of the forest take place after logging operations = 1.5

b8 Soil conservation activities = 1.5

b9 Forest monitoring to prevent forest fires and illegal logging = 1.5

K = Proportion of the total community forestland occupied by c. conservation areas

(Forest area used for community conservation) * (100)

_____ = % of community forestland ...

Categories:

0% de area under community conservation = 0

More than 0% and less than 15% = 4
More than 15% and less than 35% = 8
Between (35%, 55] = 12
Between (55%, 74] = 16
Between (74%, 100] = 20

L = Presence of tree species with market value

It has considerably increased (more than 10% of the volume in the last 10 years) = 12
It has little increased (less than 10% ...) = 8
The volume has remained the same = 4
The volume of these tree species has decreased a little (less than 10% ...) = -8
The volume of these tree species has considerably decreased (more than de 10%) = -12
There are no tree species with commercial value = 4

M = Presence of wild life

It has considerably increased = 6
It has increased a little = 4
It has remained the same = 2
It has decreased a little = -4
It has considerably decreased = -6

Highest value of the index (t) = 57.5
Lowest value of the index (t) = -18

Ranking :

The value of the categories is:

(0] = No conservation nor protection
(0, 10] = Very low
(10, 20] = Low
(20, 30] = Medium
(30, 40] = High
(40, to the highest obtained value] = Very high

IV.1 Sub- index protection and conservation

Σ **B** Forest protection and conservation activities

b1 Reforestations = 1.5
b2 Areas with seedling trees = 1.5
b3 Forest thinning = 1.5
b4 Fire cut paths = 1.5
b5 Forest fire fighting = 1.5
b6 Forest pests fighting = 1.5
b7 Cleaning of the forest take place after logging operations = 1.5
b8 Soil conservation activities = 1.5
b9 Forest monitoring to prevent forest fires and illegal logging = 1.5

K Proportion of the community forestland occupied by community conservation area

(% of the c. forestland occupied by c. conservation areas * (100))

total of the community forestland = % c. forestland ...

0% of community forestland = 0
More than 0% and less than 15% of community forestland = 4
More than 15% and less than 35% of community ... = 8
Between 35% to 55% ... = 12
Between 55% to 74% ... = 16
Between 74% to 100% ... = 20

Then if ($\sum B$) + K equals :

Between [0, 5.5] = 0
Between (5.5, 11] = 1
Between (11, 16.5] = 2
Between (16.5, 22] = 3
Between (22, 27.5] = 4
Between (27.5, 33.5] = 5

0 = Null or almost null
1 = Very low
2 = Low
3 = Medium
4 = High
5 = Very high

V. Index of Forestry Development

IPC = A + B + C + D + E + F + G + H + I + J + K + L + M

A Community harvest commercial NTFP and NCFP
For each commercial NTFP and NCFP = 1

B Presence of forest management plans to sustain the harvest of NTFP and/or NCTF
If the community has had and has a forest management plan = 1
If they have a FPM but did not have it 3 years ago = .5
If they do not have a FMP = 0

C Typology of forest producers (level of vertical integration of timber production)
Type I potential forest producers: Communities owning forestland and able to perform sustainable forest management and do not perform any commercial logging under a forest management plan = 1

Type II forest producers selling timber as stump: Communities' owners of forest land where logging under forest management plans take place, and logging operations are performed by third parties based on selling contracts = 2

Type III forest producers selling timber as logs: Communities' owners of forest land where logging under forest management plans take place, communities control extraction processes and sell logs = 3

Type IV forest producers able to add value and market forest production: Forest producers with access to industry and infrastructure who market their production = 4

D Participation of community inhabitants in forest activities
Community members take part in forest extraction = 1
Community members take part in the documentation of forest production = 1

Community members take part in the different tasks included in forest production = 1.5

E Harvesting of oak timber

If the community harvest oak and are forest producers types 2, 3 o 4 = 1

F How is the forest technical advisory for timber extraction

It was financed (partly or completely) by the community = 1

It was financed with governmental funds = .5

The timber buyer paid the forest technical advisory = 0

G Productive capital

The community has extraction equipment = 1

The community owns transport = 1

The community has a sawing mill = 1

The community owns a drying stove = 1

The community owns equipment to build and maintain forest roads = 1

The community has other equipment for forest production = 0

H There are commoners that privately own extraction equipment = .5

There are commoners that privately own transport = .5

There are commoners that privately own sawing mills = .5

There are commoners that privately own other type of forest production equipment = 0

I How was the acquisition of forest extraction equipment financed?

It was acquired using only community resources = 1

It was acquired using community resources and governmental funds = .5

It was with resources of the timber buyers = 0

It was financed with joint funds of the community and the government = .5

J How was the acquisition of forest transport financed?

It was acquired using only community resources = 1

It was acquired using community resources and governmental funds = .5

It was with resources of the timber buyers = 0

K How was the acquisition of forest industry financed?

It was acquired using only community resources = 1

It was acquired using community resources and governmental funds = .5

It was with resources of the timber buyers = 0

L Economic feasibility of logging operations

Enough to cover production costs and to generate profits = .5

It is only enough to cover production costs (the only benefit is employment generation) = 0

M Economic feasibility of mills

Enough to cover production costs and to generate profits = .5

It is only enough to cover production costs (the only benefit is employment generation) = 0

Ranking

The values of this categories are:

(0 – 3.5] = Null

(3.5, 6.5] = Very low

(6, 5.25] = Low

(9.25, 11.75] = Medium

(11.75, 14.5] = High
(14.75, 18] = Very High

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