

Opening Common-Property Forests To Timber Production

**Bolivia's Community Forestry Policies,
Indigenous Timber User Groups' Performance and
Local Perceptions of Forests' Livelihoods**

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ABSTRACT

This paper contributes to the discussion about the influence that a number of reforms launched in Bolivia since the mid-1990s better known under the label of “decentralization reforms” and aimed to improve natural resources governance are having in forests owned by indigenous people. The principal interest of this research is related to the evaluation of the extent that forest governance reforms are motivating indigenous people to participate in timber harvesting, the assessment of timber harvesting performance in timber user groups from Bolivia as a result of community forestry policies implementation, and the evaluation of timber user groups’ perception of the forests as a key asset in the local livelihoods of future people’s generations.

In Bolivia, most of timber user groups recognized with formal property rights over common-property forests, as a consequence of the decentralization reforms and indigenous people’s struggles with central governments, have initiated timber harvesting activities. To date, almost 70 indigenous timber user groups have developed Forest Management Plans encompassing roughly 800,000 hectares of forests. My conjectures are that: (1) Bolivia’s forestry regulations are moving indigenous people toward a timber use of the forest, (2) the performance of timber user groups varies according ecological, economic and social factors, and (3) groups that have a higher timber income have a strong timber commercial perception of the forest for their local livelihoods. This research takes place in six communities located in tropical areas of Bolivia, in which intensive fieldwork was developed by the author through the 2005 carrying out interviews with key informants and focal groups, as well as revision of secondary information generated by timber user groups and by the Bolivian Forestry Superintendence.

Main findings of this research are that timber user groups are increasingly motivated by the forestry regulations to become engaged in timber harvesting. In this context, timber user groups must face economic, ecological and social challenges. Ecological issues have an influence in the generation of timber incomes but this is not automatic. In order to mediate the potentially negative impacts of the expectation of a lower yield from the biophysical world, indigenous forest user groups holding lower timber potential forests invest in a more substantial institutional development for timber management. It is observed that indigenous timber user groups having strong rules for timber management will achieve higher timber incomes in comparison to their counterparts having weaker rules or not rules at all. In addition, some indigenous timber user groups can increase their incomes if they are placed in higher steps in the value-added chain of production, while a condition of higher economic performance seems to be the articulation of timber user groups with permanent timber markets. Finally, local people’s perceptions of the forests as a source of livelihoods are slightly determined by the place that timber user groups occupy in the timber harvesting performance, though primarily forests are considered to fulfill a multipurpose role for provision of food, medicine, and construction materials. As expected, local people’s having higher timber performance put more value in the role of forests as a source of cash income, but they have a contradictory feeling with respect to the role of forests as a key asset for the livelihoods of future people’s generations. Conversely, local people having lower timber performance put less value in the role of the forests as a source of cash income but have a stronger feeling with respect to the major role of forests in the livelihoods of people’s future people’s generations.

1. FORESTRY POLICIES AND INDIGENOUS TIMBER MANAGEMENT IN COMMON-PROPERTY FORESTS OF BOLIVIA

This section contributes to the discussion about the influence that “decentralization reforms” carried out in Bolivia since the mid-1990s are having in the forests owned by indigenous people. This is important not only to infer the future of Bolivia’s forests since indigenous groups are increasingly controlling a great area of forests, but also in order to enquire about the benefits that forests can provide to indigenous people. Indigenous people’s incorporation in timber harvesting in Bolivia is the result of a variety of motivations. First, in an arena of forestland competition with other rural actors, indigenous people attempt to show to governmental authorities that they are the legitimate owners of the forests. Second, indigenous people realized that timber showed up to be a rapid source of cash income among neighboring loggers. Third, it is a practical way to control the forests of encroachers in the indigenous territories.

The principal interest of this research is related to the evaluation of the extent that forest governance reforms are motivating indigenous people to participate in timber harvesting, the assessment of the timber harvesting performance in timber user groups from Bolivia, as a result of the community forestry policies implementation, and the evaluation of timber user groups’ perception of the forests as a key asset in the local livelihoods of future people’s generations.

1.1 Bolivia’s Main Features

This research takes place in Bolivia for several reasons. First, most of half of Bolivia’s territory is composed of a tropical area covered by sub humid and humid forests. Bolivia is a country that comprises an area of 1,098,581 square kilometers, of which about 70% is located in areas below the 500 meters above the sea level, which correspond to what is called the Bolivian lowlands. The two other natural regions in Bolivia are the plateau and the valleys. Total forest area in Bolivia has been estimated in around 53 million hectares according the Ministry of Sustainable Development map (1995) and in 60 million hectares by the Agrarian Superintendence (2001). The Agrarian Superintendence also estimated that 112, 7 million hectares were areas of extensive pasture and that 3, 7 million hectares correspond to agricultural areas. More than 41 million hectares of Bolivia’s forest cover was delimited in 2001 as lands of permanent forest production, from these the 26% are protected areas and 30, 5 millions hectares are devoted to forest management. The species abundance for timber production is higher in deciduous forest, while the estimated logging potential volume is greater in the evergreen forest (Dauber et al. 1999). In 1999, about 43% of total timber extraction was still concentrated in five species out of a total of 200 (STCP 2001).

Second, an extensive process of political democratization including forest institutional reforms and property rights reforms were launched in Bolivia in 1994, which transferred rights and financial resources for the provision of social and productive services to the local municipal governments, involving later some limited responsibilities for the oversight of the natural resources management in their jurisdictions. This process is considered one of the most aggressive efforts in the region to decentralize forest management (Ferroukhi 2003). Different steps were taken towards building a democratic decentralization of public administration, and

specifically forest management, namely: transferring some decisions about forest resources use to municipalities, improving mechanisms for enlarging social accountability of mayors, and democratizing the access to public forest resources by recognizing local forest users' forestry rights. In essence this has been a top-down decentralization model where most of the decisions were taken at the central level and implemented downward (Pacheco 2004).

Third, there are 32 indigenous groups living in Bolivia representing nearly the 50% of its population, which encompasses a total of 8,2 millions of inhabitants (INE 2003). Although most of that population belongs to the indigenous groups located in the plateau and valleys, such as the *Aymaras* and *Quechuas*, at least 40% of the indigenous population is located in Bolivia's lowlands. Furthermore, a higher number of the indigenous populations of Bolivia's lowlands are managing multiple forest resources as an important source of livelihood. It has roughly been computed that nearly 60% of the people uses forest in their daily subsistence, making Bolivia's indigenous population as effectively forest-dependent people. In addition, Bolivia has been designated the country where forest transition is most promisingly taking place, which means that a shift from the traditional use of the forests into a more commercial use is taking place (White and Martin 2002). It has been observed that indigenous areas approved for commercial forest management have rapidly increased since policy changes took place in the mid-1990s (Cronkleton and Albornoz 2004).

Therefore, since Bolivia is included among the most successful cases of forestry decentralization in the world and indigenous groups are benefiting from the legal recognition of common-property forests in which they have lived for past centuries, this country offer a very valuable opportunity to study the prospects of community forestry policy in indigenous people's livelihoods. Scholars already studying this process have divided opinions. Some argue that commercial community operations have so far been positive for indigenous people, though the Bolivian timber market is not highly timber oriented (Cronkleton and Albornoz 2004, Nebel et al. 2003), while others are more skeptic with the benefits that timber harvesting provide for indigenous people (Contreras-H. and Vargas 2002) .

1.2 Bolivia's Forestry Development

By the first half of the 1990s, time when the state still held the rights over all forest areas in both public and private properties, about 20,7 million hectares out of the 76 million hectares that comprise the Bolivian lowlands, were granted to forest companies through a system of short and medium-term contracts, although only 3 million hectares were actually harvested every year (Hunnisett 1996:7). This system favored a concentration of forestland areas. After the new Forestry Law was issued in 1996, eighty nine timber companies reduced their concession areas to 5, 8 million hectares, mainly because the change from a volume to an area-based forest fee (\$US 1/hectare). By 2002, the portion under forest concessions declined to 5,3 million hectares due to the devolution of three concessions (Superintendencia Forestal 2003).

The mid-1990s constitutes a breaking point in the way in which forest resources were both allocated and used in the Bolivian lowlands because new opportunities were created for indigenous people, small-scale farmers, and small-scale loggers in order to expand their benefits from forest resources use. Firstly, indigenous people's rights over their common-property

forestlands were formally recognized by the government. Secondly, private landholders were granted with rights over the forest resources located within their properties, and hence they were allowed to develop logging activities within their landholdings. Finally, small-scale loggers, which used to work informally within forest concessions and protected areas, because they did not have legal rights to access forested areas, gained access to some forest resources within municipal forest reserves. All of these events stimulated the development of initiatives of communal forestry management and particularly of commercial timber harvesting.

The potential production of timber in Bolivian forest is estimated in 20 million cubic meters per year (STCP 2001), but only a small portion of this potential is currently utilized. The annual timber extraction was about 560 thousand cubic meters in 2001. Although there are no reliable estimates of illegal logging extraction, some authors mention that it could be in around 50% of the total logging (Pacheco 2005). Additionally, total volumes of timber extraction have grown little in the last two decades, considering that was equivalent to 445 thousand cubic meters in 1980. This growth is mainly due to the increase in the species harvested (i.e., mahogany, cedar and oak trees) in the last years and to the increment of the rates of timber harvesting (Dauber et al. 1999). By 2003, about a half of the total timber production was originated in forest concessions, and the rest was the result of individual private properties, indigenous territories, and municipal reserves (Superintendencia Forestal 2003).

1.3 Forests and Indigenous People

Bolivia's lowlands population consists mostly of indigenous groups who were locally rooted in a combination of subsistence and local market production, and largely disconnected from central government interventions and international markets. In ancient times these societies formed extended families living in domestic units and developing highly mobile patterns over large areas of forestlands to ensure their daily livelihoods.

As soon as the new Republic of Bolivia was constituted in 1825, national governments began a process of confiscation of indigenous people's forestlands to the domain of the nation-state, because these areas were considered uninhabited (Fawcett 1910). Forestlands previously occupied *de facto* by non-indigenous populations were distributed to individuals as private property or concessions. In the absence of the Bolivian government the "law of the jungle" governed a large part of the lowlands and the strongest progressively gained the control of the natural resources.

At the end of the Nineteenth century, indigenous groups that were able to go about their lives relatively undisturbed by centuries were suddenly disturbed and indigenous groups were forced to reduce in size the areas they use to live in because cattle ranchers, rubber producers, and agricultural enterprises invaded their territories. Consequently, most of the indigenous populations were silent witnesses of the curtailing of the forestlands that they used to live for centuries. Other populations faced a struggle for surviving against butcheries organized by rubber tappers, while in other regions indigenous people were captured in order to work in livestock and agricultural ranches (Langer 1994). As a result, indigenous groups composed by thousands and hundreds of people were reduced to small tribes of not a dozen souls in each (Fawcett 1915). Indigenous groups remained in places where there were no rubber attraction and

timber exploitation (Fawcett 1915), until the newest commercial forces of Bolivian western society, during the 1960s and 1970s, reached these areas.

The Missions settled by Catholic priests did have a significant impact on the indigenous population. Their principal aim was to have the indigenous people settled on the land to practice sedentary agriculture (Mather 1922) either giving to the strangers the opportunity to occupy indigenous forestlands or to protect them of slaughters. The role of the Missions was described as: “frontier points to capture, convert, and reduce to civilization some of the less savage Indians, who as neophytes learn the religion and customs of the white man” (Weeks 1946:552).

The conditions for indigenous forest users to enjoy secure forest tenure since the Nineteenth and Twenty centuries could not have been more inadequate, as neither mutually recognized boundaries nor legally empowered indigenous resource users existed at the time. Moreover, the intentions of government authorities and local users with regard to the allocation of property rights were at odds, making any mutually beneficial enforcement of rights impossible. The Agrarian Reform of 1953 gave lands to indigenous and peasants living in the western side of the country but indigenous people located in the tropical area were outside of the scope of this reform. Instead, they were considered as tribal people incapable of managing by themselves their forestlands, and therefore they were designated to remain under the protectorate of both Catholic and Evangelist Churches, who were titled with forestlands in the name of indigenous people.

Later, indigenous people faced an aggressive entry of forest concessionaries in their territories in their selective search of valuable tree species, which triggered indigenous people’s unrest. In the early 1990s, indigenous people developed an historical march requesting the titling of the indigenous territories that they were able to control in spite of all the invasions. The indigenous march that began in the tropical region was headed to the political capital of the country—La Paz, a city located in the plateau. This march began the process for the legal recognition in favor of the ethnic groups as common-property of the forestlands they use to occupy and of those that were despoiled. This process occurred in parallel with the increasing acknowledgment of indigenous people’s rights in the international arena, such as the Covenant No. 169 of the International Labor Organization, related to the recognition of the cultural, social, and economic rights of the “Indigenous and Tribal People in Independent Countries”, which was put in force by Bolivia’s government in 1991.

Since the beginning of the 1990s indigenous people from Bolivia have already developed some commercial timber management practices, even before the forestry decentralization reform was launched. Since then there have been some skepticism about the capacity of indigenous groups to manage commercially their forest and about the prospect of the forests being transferred to them as common-property. Some scholars noticed some bad-practices in forest management such as the fact that indigenous leaders have entered in some cases into clandestine agreements with loggers to exploit species of high commercial value (Contreras-H. and Vargas 2002, Roper 2000). Pacheco (2005) added more negative features to this already pessimistic scenario by estimating that roughly 50% of the domestic timber consumption in Bolivia comes from illegal sources. Even more pessimism was added to the scene after the first experiences of indigenous timber management in Bolivia led to failure at the beginning of the 1990s (such as Lomerío,

Ayoreo, and Yuracaré). Nevertheless, at the beginning of the 2000s there is a renewed optimism about the role of timber harvesting for indigenous people (Cronkleton and Albornoz 2004).

1.4 Bolivia's Community Forestry Policies

In the early-1990s, diverse countries around the world initiated a process of decentralization. In Latin America, issues of distribution of economic benefits from forest resource use, social participation in decision-making, and efforts to secure forestlands property rights were all at the bottom line of decentralization, though the pace and characteristics of decentralization have varied significantly between countries (Ferroukhi 2003). Decentralization of forest resources management in Bolivia is well known because an aggressive model was adopted in this country in comparison to other ongoing initiatives in Latin America.

In Bolivia, decentralization of forest management was strongly linked to three ongoing processes that were formally launched in separate legislations, which are the consolidation of the municipal governments and the decentralization of the Bolivian government, the development of technical regulations for sustainable forest management, and the devolution of natural resources to local people. These legal reforms were developed in the context of Bolivia's Constitutional change undertaken in 1994. One transcendental change was the country designation as multicultural. A modified article 174 of the new Constitution refers to the indigenous people's rights to the formal property of their "originary community lands" (*tierras comunitarias de origen*) including the overall set of resources over the soil surface, mainly land, water, and forests. The Constitution also recognizes indigenous people's traditional authorities as well as local people's customary rights to manage and administer their renewable natural resources. Since indigenous people were called by Bolivia's legislation out to the beginning of the 1990s as tribal people these changes were without doubts the most significant for indigenous people since the foundation of Bolivia's Republic in 1825.

The Popular Participation Law (1994) granted rights and responsibilities to municipal governments for promoting local development. In addition, the Administrative Decentralization Law (1994) established three decentralized levels of governance: national, departmental, and municipal. The popular participation process was aimed at enlarging the responsibilities of municipal governments considering the provision of social services, water management, and local roads maintenance, but also institutionalized a process of social participation in the formulation of municipal investments plans and in the monitoring of their implementation. The forest regulations reform implemented two years later in 1996, had ineludibly to take into account to the municipal governments as a strong emergent actor with the ability to mediate conflicts, facilitate dialog among local actors, and to produce and deliver services to those actors. Hence, political and technical dimensions that embrace a municipal administration were considered at the moment of granting municipal governments with functions regarding forest resources.

The Land Law (1996) established the mechanisms for the forestlands distribution and redistribution through a process of title regularization to be executed in a ten-year period (through 2006), and recognized indigenous territories as common-properties for indigenous people.

The Forestry Law (1996) created the organizational framework of the forestry sector and delegated powers to lower political-administrative entities to coordinate the planning and development of the Bolivian forests. The forest policy's explicit goal is that sustainability of forest management can be achieved through a progressive incorporation of less valuable timber species and the application of extraction techniques allowing the natural regeneration of the forest. Furthermore, it seeks to define clear rights over forest resources in part to encourage increasing investments in forest management, to eliminate forest crime and illegal logging, and to define rules for forest management according to certain technical criteria. Also, the law created the Local Forest Associations tending to formalize the people that were harvesting illegally the forests. It was planned that the municipal governments should provide planning support to the Local Forest Associations in order to increase their managerial capabilities for timber harvesting.

1.5 Bolivia's Regulations for Indigenous Timber Management

According Bolivia's new regulations there are two ways in which timber would be harvested in common-property areas. First, timber for traditional domestic use and timber for interchange among indigenous community's members can be harvested in the scope of traditional systems of management. Second, traditional and intensive commercial use of timber must be carried out following the regulations of the Bolivian government. The Ministry of Sustainable Development passed in 1997 the guidelines for timber management in indigenous common-property areas, which main dispositions are highlighted in the paragraphs below.

In order to begin timber management each forest user group must formulate a Forest Inventory in the total area of the common-property forest chosen for developing timber management activities, following a sample of random plots in a systematic approach. This consists of selecting forest plots between 0,5 to 1 hectares every 500 to 1,000 meters according the size of the forest managed area, aimed to recording data about the forest including mature trees, young trees, saplings and seedlings. The most important data recorded includes total height, diameter, and quality of trees. Once the Forest Inventory is formulated, the timber user group must elaborate a Forest Management Plan, which is a document that includes, besides the Forest Inventory, information about the organization of the timber user group that will be in charge of carrying out timber harvesting, the scheme for the distribution of timber earnings, and the planned activities to be enforced for forest conservation.

Once the Forest Management Plan is formulated and approved by the Bolivian Forest Superintendence, a timber user group must select each year a parcel of the forest within the forest managed area in which timber harvesting will be developed. The selection of such a forest parcel allows for a process of rotation of different forest parcels within the total forest area selected for forest management. The Forest Superintendence allows a process of rotation of a minimum of 20 years, which means that a forest user group should divide the total forest area at least in 20 parcels of forests to proceed for a rotation period of 20 years. Therefore, if a common-property forest has 20,000 hectares and it has been defined a rotation period of 20 years, the annual area for timber harvesting should be of 1,000 hectares. Once the parcel of the forest for timber harvesting is selected the forest user group must develop a Forest Census in order to exactly register the location of the trees for cutting down in the timber harvesting process.

Coordinates of each tree to be harvested are recorded in a map, and as well as the identification of roads and rodeos, which area usually round areas cleared out in the middle of the forest near to the open roads with the purpose of gathering the roundwood (trees devoid of branches), and the location of the paths for the transit of the chainsaw operator.

Timber harvesting must be developed following a strict supervision of the logging process. Each tree is recorded with a number tag, the same that is registered in a forest certificate that legalizes the timber harvesting process, which it is checked out in the tolls installed by the Forest Superintendence along the most important timber roads by which roundwoods are transported. Finally, an Annual Harvesting Report must be elaborated once timber harvesting has finished. This report displays the effective timber volume by species harvested, it corrects the coordinates of the trees, and shows additional information regarding timber harvesting such as the number and volume of logs left out in the forest or in the rodeos.

According to Forest Superintendence's regulations, an efficient timber harvesting should takes also into account the following issues: (a) the construction of rodeos and the delimitation of roads must take into account the topographic limitations of the soils and forest conditions to avoid unnecessary removal of trees; (b) the processes of removal and pulling out of the trees must avoid the unnecessary construction of roads, execution of activities in wet soils, and inappropriate use of machinery; and (c) after the timber harvesting process roads that were open for this purpose must be closed and others that would cause soil erosion must be maintained.

1.6 Community forestry in Bolivia: Between Theory and Practice

Community forestry in Bolivia in the context of the decentralized forestry policy was merely aimed to promote the commercial management of the forests and particularly of the development of timber harvesting. Other community forestry practices were ignored such as the traditional management of the forests for multiple uses, the enforcement of forest plantations, the development of acroecological systems, and other general activities for the conservation and protection of the forests.

Summarizing, main objectives of the community forestry policies were aimed to promote local people's secure rights to the forests, to democratize the access to the forests, to levy fewer taxes in community user groups regarding private forest enterprises as an incentive for timber management, to develop technical regulations and oversight to illegal logging, and to support forestry planning. Nevertheless, results in the ground were not necessarily the expected as depicted in Table 1 below.

Table 1. Community forestry policy in Bolivia: between theory and practice

Policies in Theory	Policies in Practice
Secure rights to the forests	From 20 million of hectares demanded for titling as indigenous common-property forests, there have only been titled 5 million hectares after 10 years of title regularization.
Democratization of the access to the forests	* Forest enterprises have received 5.4 million of hectares of forests. * From 1.5 million of hectares requested for Local Forest Association there only have been recognized 1 million hectares and few of them are harvesting timber. * There are around 60 indigenous timber user groups but only a third is developing some timber harvesting.
Fewer taxes for community user groups	Throughout time the taxes for timber harvesting in forest concessions have been reduced and the incentives for indigenous timber user groups have been eliminated.
Technical regulations and oversight of illegal logging	Almost a 60% of the timber harvested is still illegal and the Forest Superintendence oversight actions in the field are too weak.
Planning support	Few municipalities support to the Local Forest Associations and the indigenous user groups do not have any support from the government.

Source: Author's own elaboration.

The first objective of Bolivia's community forestry policy has not been fulfilled yet since after 10 years of initiated the titling regularization process only a small percentage of common-property areas have been granted to indigenous populations, and at the national level only a 10% of the forestlands have been titled. Also, the democratization in the access to the forests has failed. Public forests oriented to forest concessions are roughly 6,3 million hectares including those granted to timber enterprises (5, 4 million hectares) and municipal forest reserves given in concessions to local groups are almost 1 million hectares, though municipalities have requested an additional area of 1, 5 million hectares in that condition. Since the early 1990s indigenous people have been demanding originary community lands for a total area of 20 million hectares, but only 5 million has been titled.

The adjustment of the regulations to please forest enterprises based on large forest concessions was aimed to reduce the taxes originally arranged, depicting a situation in which there are no longer particular incentives for community user groups regarding timber harvesting.

Finally, the legal framework has developed a structure of technical support devoted only to Local Forest Associations through municipal governments, though they have not fulfilled satisfactorily

this role and if done it was focused only on the planning harvesting process. The governmental support to indigenous timber user groups was completely ignored.

Previously denoted processes led a situation in which the implementation of community forestry policy is not closely linked to its theoretical postulates. There has only been a limited democratization of the forests to indigenous people and small-scale timber producers, and most of them have not been granted with secure property rights. Regarding financial, technical, and managerial issues, indigenous timber user groups are in practice considered as being in a similar situation to private forest enterprises, assuming that they have similar capabilities to participate in the markets of services, capital, and technology. This has resulted in the invisibility of indigenous timber user groups and in the development of community forestry policies that discriminated against indigenous populations. Also, the weaknesses of the Bolivian forestry institutions draws a scenario in which illegality is a major issue, where formal timber harvesting must compete with informal or illegal logging. In spite of these factors, timber production among indigenous timber user groups has significantly increased since 1996.

2. THE EMPIRICAL ENQUIRY

The empirical research aims at explaining three processes. First, to what extent Bolivia's forestry policies are influencing indigenous people to get involved in timber production. Second, this research assesses what ecological, economic and social factors explain the timber harvesting performance of indigenous timber user groups. Finally, this research explores a statement that is taken as a given true, though without fully understanding, which is to what extent indigenous people of Bolivia are shifting their perception of forests livelihoods towards a timber-use oriented vision of their forests.

My principal conjectures are that: (1) Bolivia's forestry regulations are moving indigenous people toward a timber use of the forest, (2) timber harvesting performance of timber user groups varies according ecological, economic and social factors, and (3) groups that have higher timber earnings have a strong timber use perception of the forest.

2.1 Selection of Case Study Sites

Case studies of indigenous forest user groups were carried out to study the relationship highlighted previously in the form of conjectures. A total of six cases were selected according to a three-step selection procedure.

First, a comparison between the indigenous areas recently titled by the Bolivian government and the total number of indigenous groups that have approved a Forest Managed Plan for timber production, after receiving a title of the Bolivian government, is developed. Second, among these that have approved a Forest Managed Plan I have selected six forest user groups, those that are heavily engaged in timber production. I mean as heavily engaged these groups that are harvesting timber annually without interruption since they started-up timber business. Third, among the selected six timber user groups, I have chosen those that have a higher and a lower performance in timber production because of their higher timber incomes per hectare and per family, the achievement of the full potential of their forests, and the fulfillment of a sustainable

timber production. This dual assessment has the merit of helping to select the opposite extremes of timber user groups harvesting performance, and then making more accurate comparisons of local people's perceptions of their livelihoods based on the forest use.

Having followed this procedure my conjectures were studied in six communities. We use fictitious names to protect the anonymity of the community members.

The “**Ambaibo**” community belongs to the Ayoreo indigenous group and is located in the savannas of the departments of Santa Cruz and Beni. They were contacted by western civilization around the 1940s through the New Tribes missionaries. In 1950 the South American Mission founded a mission in this community. To date, the Ayoreo live a violent process of acculturation since they still preserve a tribal life. In the community coexist in conflict two indigenous groups such as the Ayoreo and Chiquitano, since the second treats as less civilized to the former and is allied with the South American missionaries, who have a greater influence over most of the decisions that are taken in the community. This is one of the indigenous territories recently titled by the Bolivian government.

The “**Cedro**” community belongs to the Chiquitanos ethnic groups who were not traditionally a cohesive group; they are the result of the coexistence of a variety of ethnic groups differentiated by cultures and languages. The Chiquitano settlements were formed as missions in the mid 1600s by Catholic priests, who developed a model of local community. This change in lifestyle eliminated the nomadic sources of livelihood such as game, fishery, and gathering of forest products in favor of agriculture and livestock rising. Later, most of the indigenous groups were kept in slavery conditions on the livestock ranches of the region. This situation remained until the end of the 1970s, when indigenous families started leaving the estates, as was the case in the Cedro community.

The “**Yesquero, Bibosi and Mapajo**” communities belong to the Guarayos, who are located in the north of the department of Santa Cruz in the transition zone between the Chiquitanía and the department of Beni. The Guarayos were contacted by Catholic missionaries at the beginning of the 1880s. When the missions ended, the indigenous forestlands had been transformed into agricultural and livestock ranches. The selected community of Yesquero as a case-study area is one of the oldest missions of the region. Bibosi is the product of the missionaries' advance over the areas of the Sirionó forestlands at the beginning of the 1900s. Finally, the Mapajo community is a small neighborhood belonging to the Yesquero community.

The “**Mara**” community belongs to the Tacana indigenous group that is located between the northern parts of the departments of La Paz and Beni. The history of the Tacana dates from precolonial times, and they fulfilled a role of mediation between the cultures of the Andean and the Amazon regions. They suffered the Spanish invasion and, later, occupancy by the Catholic missions beginning in the 1700s. The Mara community is a Tacana community that shares a close history with the Cedro community since they were workers in a ranching estate to the end of the past century.

2.2 Case Study Methods

In order to compare to what extent indigenous groups are becoming attracted by commercial use of the forests and particularly timber harvesting, I have developed simple descriptive analysis showing the total number of indigenous timber user groups that have formed after they have received the formal recognition of their forests property rights. Then, I have used in-depth case studies in the six communities selected, representing two opposite scenarios in the performance of timber production. In order to explore the factors leading to such different performances I simply used descriptive statistics. In order to select the communities as truly representative of either a higher or a lower performance in timber harvesting I have developed three indicators using secondary information.

First, I have developed two variables to measure timber earnings, which are timber incomes per hectare and timber incomes per family. For this, I have considered the net timber incomes achieved by a timber user group per year, averaging the earnings that they have achieved since they began with timber production.

Second, I have explored to what extent indigenous user groups are reaching in terms of timber incomes per hectare the full potential of their forests. For this, I have compared the net timber potential of the Annual Forest Area and the current net timber income per hectare that indigenous forest user groups are achieving in such area. Timber potential refers to the averaged annual income per hectare in American Dollars regarding the Annual Forest Area, according an ideal price for commercial trees established by the Forestry Superintendence, and assuming that all the recorded timber stock (measured in cubic meters per hectare) would be sold in timber markets at once. Current timber income refers to an average per hectare of the net earnings obtained in the three last years per indigenous user group according data availability. A comparison between these two dates gives an indicator of the achievement of what I was called as the full earning potential of the forests.

Third, regarding sustainable timber management I have developed an indicator using a comparison between the timber volumes planned for harvest in the Annual Forest Area and the timber volume effectively harvested and sold recorded in the Report of the Annual Forest Area. Development of this variable is based on the two annual reports referred above that are compiled each harvesting year by community members and approved by the Forestry Superintendence of the Bolivian government. I have calculated the percentage that results from such comparison, averaging the results from the times the timber user groups started timber operations. A closer relationship between these two variables depicts a more sustainable timber management. These two former variables are depicted in Table 2. In order to split the groups in higher and lower performance I have simply divided the highest number by two, taking the result as a breaking point for separating degrees of performance.

Table 2. Selection of Degrees of Performance regarding Timber Harvesting

Indigenous user groups	Timber Earnings		Achievement of full earning potential of the forest	Sustainable Timber Management	Timber Harvesting Performance
	Income per family	Income per hectare			
Cedro	(*) 94	29	18,4	82	Higher
Mara	484	14	8,3	93	Higher
Bibosi	472	11	11,6	(**) 34	Higher
Yesquero	131	8	6,3	22	Lower
Mapajo	71	8	6,0	46	Lower
Ambaibo	128	6	3,4	20	Lower

Source: Author's own elaboration.

Note: (*) This data appears not to be low in proportion to the other timber user groups considering the relationship of number of hectares per family in Cedro, which is of 3 hectares per person, while for Bibosi and Mara this relationships is of 42 hectares per person and of 35 hectares per person respectively. (**) This data is low because this timber user group had technical problems with the Forest Superintendence in the starting-up period of timber business, which were solved later in the timber harvesting operations.

My analysis of the assessment of timber user groups' performance takes into account ecological, economic and social issues. For this, I have developed a set of indexes and indicators using secondary and primary information gathered from the own timber user groups and the Forest Superintendence. Then I develop some simple matrices in order to cross out the obtained indexes and indicators and to obtain some inferences.

Moving my analysis to explore local people's perceptions of the forests as a key asset for the livelihoods of future people's generations, I have used an adaptation of the method developed for the Center for International Forestry Research in the context of the Multidisciplinary Landscape Assessment called the Pebble Distribution Method (Sheil et al. 2002). The adaptation has been developed in order to make it simpler and more accessible to indigenous people unfamiliar with complex inferences. This method was originally developed to assess the importance of biodiversity in the local people, which is effectively expressed not as a list of prices and quantities, but rather as a more holistic rating of relative preferences. I have reframed this method in order to assess timber user groups' perceptions of their livelihoods based on the forest use. This was developed in three focal groups formed in each of the six indigenous user groups, each encompassing young man people, older man and authorities, and women of any age, with exception of two indigenous timber user groups where was difficult to gather women. Each group was requested to rank from 0 to 100, using maize seeds, the importance of natural resources and other places of the community—such as the own community, the near town, rivers, agricultural parcels, garden and forests—for developing some local livelihood activities, such as the gathering of food, medicine, construction materials, the importance of forests as a source of cash income, and the value of the forest as a cherished natural resource worth to be transferred to the future people's generations.

2.3 Results

At the end of 2005, almost 20 million of hectares have been demanded by almost 30 indigenous groups to be recognized with secure property rights as common-property areas. After 10 years of initiated the process of land regularization only roughly 4,5 million of hectares (25% of forestlands) have been titled as common-property areas benefiting to nearly 32 originary community lands and 20 indigenous ethnic groups. By date, there are still 28 demands waiting or in process of title regularization as originary community lands (Bolivia 2005). Among them, almost 800,000 hectares has been approved by the Bolivia's Forest Superintendence with a Forest Managed Plan for harvesting their common-property areas. They are located in nearly 16 originary community lands benefiting to similar number of ethnic groups. Therefore, as showed in Table 3 below there has been a rapid increment of the indigenous common-property forests moved to timber production since 1999, after three years the Forest Law was launched, which means that forestry policies were a strong incentive for indigenous people's shift of livelihoods mostly from the subsistence use to a commercial use of their forests.

Table 3. Areas under forest management by type of actor in selected years (thousand of hectares)

Detail	1997	1999	2001	2003	2005
Concessions to logging companies	5,498	5,330	4,972	5,399	5,484
Concessions to local groups (a)	0	0	407	906	940
Indigenous territories	0	141	444	723	819
Private properties	0	199	238	1,078	1,237
Long-term contracts	361	294	112	225	

Source: (Pacheco 2005)

Notes: (a) Refers to Asociaciones Sociales del Lugar, ASLs. Adapted by Pacheco, 2005 from Cámara Nacional Forestal (CNF), based on annual reports from the Forest Superintendence.

In Table 3 above is observed that the Forest Law is successfully achieving its goal of incorporating progressively indigenous common-property forests to commercial timber management. In general, the forest coverage devoted to timber production has been increased in Bolivia but the one that have a more rapid increment in the last years is related to indigenous areas, though there are still problems in some forest managed areas because of the encroachment of producers devoted to agriculture and livestock production.

Regarding the importance of diverse sources of livelihoods for indigenous people's earnings, a survey developed by BOLFOR in 2005 showed that the monetized per capita annual income for a family from both non forest and forest products is of US\$ 370, where agricultural incomes are related to the 25% of the total incomes, family incomes for game and gathering of non forest products is the 13%, and family incomes for forest and non forest products are roughly the 15%. My own data computed in the six timber user groups ends up with an average family timber income per year of US\$ 250. This report concludes that activities related to forest harvesting are the third most important source of livelihood in indigenous communities (Mattos 2005). In spite of the increment of forest products in indigenous families' incomes, the economic performance

of the indigenous timber user groups is still very poor, though there are some variations within these groups as depicted in Table 2.

Timber harvesting performance depends at least upon three factors such as ecological, economic and social, each including a number of different aspects as depicted in Table 4 below.

Table 4. Principal characteristics of indigenous timber user groups determining timber performance

Performance	Indigenous user groups	Ecological			Economic		Social
		Size of the area (Has)	Timber potential (Thousands of US\$)	Timber density per Hectare	Location in the chain of production	Market availability	Institutional development Index
Higher	Cedro	7,434	2	3.1	Trees in rodeo	Permanent	13
	Mara	21,411	30	12.0	Basket stand trees	Permanent	14
	Bibosi	47,666	12	1.7	Basket stand trees	Permanent	12
Lower	Yesquero	28,586	10	0.9	Selected stand trees	Unstable	9
	Mapajo	2,433	5	4.0	Selected stand trees	Unstable	12
	Ambaibo	19,360	19	1.4	Basket stand trees	Permanent	5

Source: Author's own elaboration.

Within the ecological variables I have considered the size of the area that refers to the total number of hectares that has been considered in the Forest Management Plan for harvesting each year per timber user group. Among them each timber user group considers a forest rotation period taking as a minimum 20 years, as it is established by the Forest Superintendence. Timber potential, as mentioned above, refers to the average annual income per hectare in thousand of American Dollars, assuming that all of the recorded timber stock of the forest managed area (measured in cubic meters per hectare) would be sold in timber markets at once. Timber density per hectare refers to the volume of timber in cubic meters that are harvested in average each year for timber user group.

The location in the chain of production displays in what step in the integration of the value-added chain of timber production is located each indigenous timber user group. Communities fall generally into four main categories indicating their level of ownership and control of the production process from standing timber to finished wood products, such as: (1) timber user groups that contract with private companies who pay them to harvest standing timber either selecting species or as a basket of species, which includes all the harvested species together, (2) timber user groups which harvest the timber themselves and sell roundwood in rodeo, (3) timber user groups which harvest the timber themselves and sell roundwood in sawmills, and (4) timber user groups which harvest the timber and transform it into lumber or other wood products.

Regarding markets there are two types of timber user groups' market articulations. First, there are user groups that have a permanent relationship with the market due to the neighboring presence of a forest concession enterprise and/or private sawmills, and where competing issues with other community timber user groups or small-scale timber producers are not a key issue. Second, there are groups where face a more competing supply of trees in the timber market, mainly due to the highly presence of small-scale producers that are individual owners of forests and a disloyal competence of other indigenous timber user groups, environment that creates an unstable and more competing timber market (Pacheco 2006).

Regarding the evaluation of institutional development I have developed a framework to evaluate the institutional development strength in each timber user group, identifying the six clusters of rules highlighted by the Institutional Analysis and Development framework developed by Ostrom and colleagues of the Workshop in Political Theory and Policy Analysis at the Indiana University (Ostrom 2005). Rules are the regulations created and enforced by timber user groups' members for managing the whole process of timber production. Also, I have introduced several aspects within each cluster in which rules must be developed by a timber user group in order to achieve good timber management. One point has been assigned to each aspect within the cluster when the norm or rule is present in the timber user group, and conversely a zero value when the norm or rule is insufficient or absent at all. Values to each timber user group have been assigned out of a total of 16 points.

It is of common understanding among forest practitioners that in order to capture the potentialities of scale economies the size of the area for a timber user group to be successful should be around the 20,000 hectares. Regarding this issue, it seems that the size of the forest managed area is determining a higher timber income per family but not necessarily a higher timber income per hectare (see Table 2 above) since there are groups for above and below such scale in the two scenarios regarding both higher and lower performance. A similar situation occurs with timber potential and timber density per hectare since there are indigenous timber user groups with higher and lower values in both scenarios.

The subsequent factors, which are the economic and social, seem to be highly related to a higher performance such as the location of timber user groups in the value-added chain of production, at least selling basket stand trees and better if selling trees in rodeo, which seems to compensate the small size of the area and a lower timber potential such as in the Cedro timber user group. A permanent market relationship appears to be as a key variable in the higher performance of timber user groups, as well as their institutional development. Groups having permanent market articulations and higher values for institutional development design experiences that result in a higher timber harvesting performance.

Analyzing comprehensively the overall factors mentioned previously, I have observed that higher timber potential of the forest managed areas seems to have a direct relationship with higher timber incomes per hectare and families' earnings are favored by the size of the total area devoted to timber harvesting, though this is not automatic. In order to mediate the potentially negative impacts of the expectation of a lower yield from the biophysical world, indigenous forest user groups holding lower timber potential forests invest in a more substantial institutional development for timber management, and therefore timber user groups that have low timber

potential develop stronger institutions for timber management. The achievement of higher timber incomes acts as an incentive for creating better rules for developing timber harvesting, in addition to the ancient rules that they have developed for centuries for decision making. Once created such institutions they have almost a direct effect in a more sustainable timber management which preserves forest regeneration for the commercial use of the forest for future people's generations.

Since there are some factors that are improving the performance of timber harvesting in some groups instead of others, would be coherent that the groups having a higher performance in timber harvesting would have a more timber-commercial vision of their forests. This is because timber harvesting has been introduced as a new source of livelihood providing timber user groups with cash income for families' subsistence. Results of the Pebble Distribution Method that was mentioned earlier, corresponding to the six timber user groups are showed in the graphs displayed in Annexes. These graphs represent the subjective perception of randomly selected groups of old men and timber user groups and communities' authorities, youth people, and women for the six timber user groups selected in this research, about the importance of forests among other resources in key activities related to indigenous groups' livelihoods. The first column refer to the vision of these three generational and gender groups regarding the importance of forests as source of food provision, the second column is related to the value of the forests for medicine provision, the third column addresses the importance of the forest for provision of material for basic constructions (mainly house and tools). The late two columns are more related to the local people's value of forests regarding timber harvesting either as a source of cash income or as a key natural asset for the livelihoods of future people's generations.

According to what I expected there is a pattern in which groups having higher timber earnings rely greatly on the forest as a source of income, but paradoxically forests are not considered in all the groups as a key asset worth to be preserved for the future generations, though most of the indigenous groups and people within the groups still rely in the forests as a multiple source of livelihoods such as the provision of food, medicine, and construction materials. Forests have become a main source of income mainly for older generations that rely more in forests as a source of cash income, ranging people's values from 30% to 60%. Regarding the question if it is worth to preserve the forests to transfer them to future generations as a key asset for forest-dependent people's livelihoods answers are more contradictory, ranging values from 0% to 50% in older man and from 0% to 35% in other focal groups. In some of the groups regarding this scenario non-farm activities and raising livestock are more important than preserving forests for future people's generations.

Within timber user groups linked to a lower-timber harvesting performance scenario there is also a highly variability in responses related to the multiple uses of the forests that confirms that the forests have a multipurpose use. In relation to the forest as a source of cash income, an issue which is closely related to timber harvesting activities, values range from 10% to 30%, which is almost a half of the value that groups with higher timber harvesting performance place. Contradictorily, in this scenario the forest is a resource that it is worth to preserve for future people's generations. Responses from older people ranges values between 15% and 30%, and youth people place a higher value between 15% and 50%. In this context, it will be necessary to explore more in-depth why lower-performance timber user groups place a higher value to forests

as a key asset in the livelihoods of future people's generations regarding those higher performance timber user groups.

3. DISCUSSION OF FINDINGS

I have analyzed that community forestry policy is successfully achieving its goal of incorporating progressively indigenous common-property forests to commercial timber management, though the multipurpose use of the forest has been ignored. In general, the forest coverage devoted to timber production has been increased in Bolivia but the one that have a more rapid increment in the last years is the related to common-property forests belonging to indigenous people. Nevertheless, the timber harvesting performance of timber user groups in order to achieve the full potential earnings of the forests is still poor, but the factors causing this poor performance have not been analyzed in this research.

Higher incomes per family seem to be affected to a small extent by the size of the forest managed area but this is not automatic. Also, better timber potential seems to have a direct relationship with higher timber income per hectare, and the effect of density timber per hectare (more trees in a given one hectare) is uncertain. In this context, we can assert that ecological issues do not necessarily have a predominant influence in the generation of timber incomes. Groups with good timber potential and higher timber density per hectare do not necessarily are able to achieve higher incomes. It is for example the case of Mara and relatively of Ambabio. Conversely, timber user groups having poor timber potential and lower timber density per hectare do not necessarily present the worse incomes such as in the Cedro case.

In order to mediate the potentially negative impacts of the expectation of a lower yield from the biophysical world, indigenous forest user groups holding lower timber potential forests invest in a more substantial institutional development for timber management, since groups that have low timber potential present strong institutions for timber management, and conversely. It can be observed that indigenous timber user groups having strong institutions will achieve higher timber incomes per hectare. This refers to the fact that ecological conditions cannot be seen as burdens difficult to overcome, and that human interactions can overcome biophysical limitations by investing in institutions, an action which is reciprocated by achieving higher timber incomes than those that could be expected without investing in institutional development, which could be supposed would be much lower.

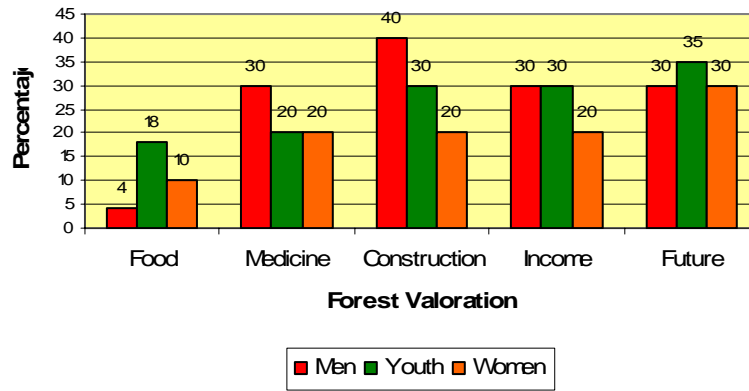
In addition, some indigenous timber user groups can increase their incomes if they are placed in higher steps in the value-added chain of production, and basically by selling roundwood in rodeo, which is the case of Cedro, in comparison to simply selling stand trees. It is also observed that selling timber species in basket is better than selling selected timber species. In this context, a condition of timber user groups' higher performance seems to be their articulation to permanent timber market, which allows to indigenous timber user groups to stay comfortably in the timber business.

Finally, the perceptions of the forests as a source of local livelihoods are slightly determined by the place that timber user groups occupy in the two scenarios related to the timber harvesting performance, though primarily forests are considered to fulfill a multipurpose role for provision

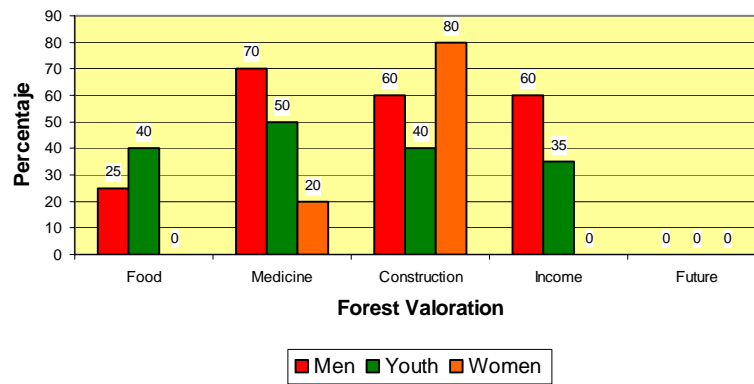
primarily of food, medicine, and construction materials. As expected, those belonging to the higher-performance scenario put more value in the role of the forests as a source of cash income, but they have a contradictory feeling with respect to the role of the forests as a key natural resource asset for the livelihoods of future people's generations. In turn, those belonging to the lower timber harvesting performance scenario put less value in the role of the forests as a source of cash income but have a stronger feeling with respect to the major role of the forests with respect to the contribution of the livelihoods of the future generations.

ANNEXES

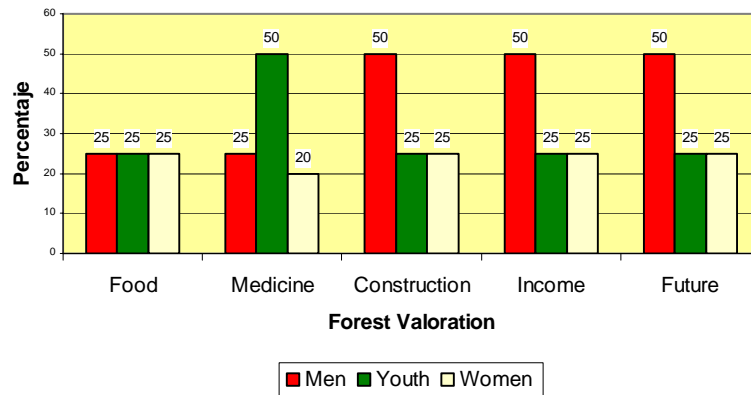
Graph 1. Cedro Timber User Group



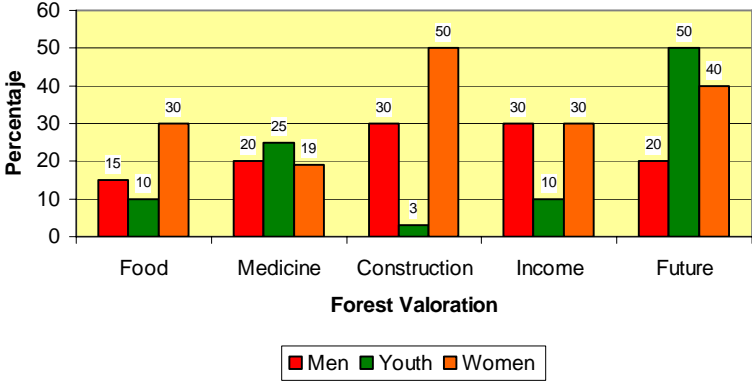
Graph 2. Mara Timber User Group



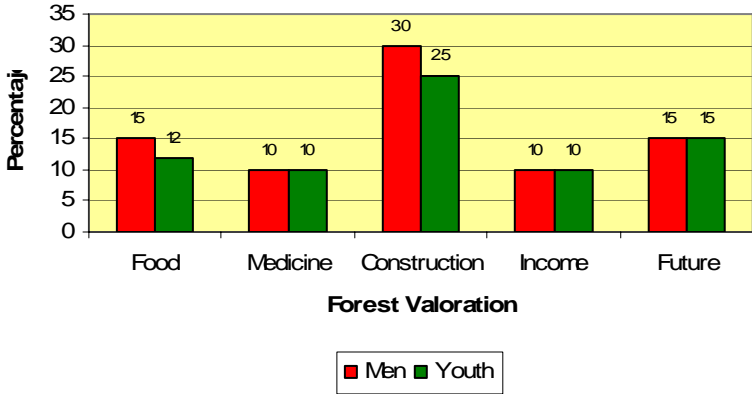
Graph 3. Bibosi Timber User Group



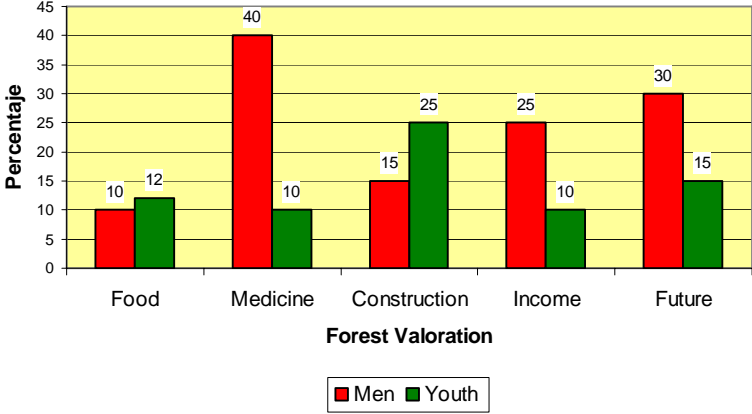
Graph 4. Yesquero Timber User Group



Graph 5. Mapajo Timber User Group



Graph 6. Ambaibo Timber User Group



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