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Turning to Forestry for a Way Out of Poverty: Is Formalizing Property Rights Enough?

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Turning to Forestry for a Way Out of Poverty: Is Formalizing Property Rights Enough?

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ABSTRACT

In 1996, the Bolivian government passed a series of bold policy reforms to promote the political decentralization of the country that among other things decentralized the governance of the country's forests and redistributed considerable forest property rights among the country's many resource users. For the first time in the country's modern history, smallholder farmers and indigenous people gained the possibility of formal management rights to forest resources. Because of the importance of a variety of forest products for the livelihoods of the majority of Bolivia's large rural population, rural development analysts and practitioners saw the reform as a big step forward.

While the reform has been hailed by both UNDP and the FAO as a "success-story," a growing body of empirical literature shows that the results are quite mixed, far from any clear-cut success by any standard. Whereas the reforms have given smallholders a possibility to acquire formal rights, getting actual access to such rights has proven to be quite an ordeal for many rural people and communities. Only a small number of farmers have acquired forest property rights for forest exploitation due to the difficulties to comply with the many formal requirements in the forestry regulation. This study takes a fresh look at the meaning of the reforms, not just for the *possibility and probability* of getting formal property rights, but more importantly, for the *prospect* of these reforms producing increased family incomes for small-scale farmers in Bolivia.

The study uses a combination of quantitative and qualitative methods to assess the effects of the reforms at both the national and local level. Our results indicate that (1) the reforms have increased the probability of smallholders accessing formal property rights, but several difficulties subsist; (2) substantial barriers remain for smallholders to engage in commercial forest management activities, even when the trees that they would like to manage grow in their own backyard (3) for one particular type of management schemes, local groups must acquire a total of 26 official government permits to be able to sell timber on the market; (4) smallholders living in municipalities where the local authorities have developed the local institutions for joint management of forests have a much higher probability of acquiring management rights; and (5) communities that manage forests for commercial purposes do better if they enjoy extensive links with the local authorities and market actors outside the perimeters of the community.

INTRODUCTION

Insecure tenure arrangements for forest resources often produce an under-valuation of forests relative to other land uses. If the value of forest products is not competitive with the value of alternative land use products, chances are that the forests will be cleared for other land uses, even if this implies high costs for society at large (less carbon sequestration, loss of biological diversity, more downstream sedimentation, etc.). Further, the economic distortion of the value of forest management may lead to sub-optimal on-farm incomes as it will shift investments away from the otherwise more profitable forestry activities. In this sense, insecure forest property rights weaken the

incentives for the small-holder farmers to invest in forest management activities and reduce the profitability of these farmers' production systems. Without the distortions introduced by tenure insecurity, it may make more economic sense for rural smallholder farmers[1] to *manage* forested land, even in the short term. Consequently, in theory, rural people could increase their overall incomes of their land uses if they had more secure forest property rights. Forestry would then become a more attractive land-use option for rural populations and, in turn, could make a more significant contribution towards the alleviation of rural poverty. The purpose of this paper is to examine this possibility in a concrete field setting: The forest-rich, tropical lowlands of Bolivia.

We analyze two principal questions: (a) Have the forest property rights reform altered forest users' incentive structures in favor of forest management practices?; and (b) For communities that have acquired formal forest property rights, what factors help explain why some are more successful than others with regards to generating benefits from forest use?

To answer these questions, we use the tools of institutional analysis, studying how the incentive structures of local forest users change in the face of recent policy reforms and how these incentives influence actual outcomes. We propose that the outcomes of local forest use is associated with a combination of both macro-level social structure (policy, markets, *de jure* property rights, etc) and local institutional arrangement for self-governance (de facto rules about acquiring, monitoring and enforcing formal property rights, access to markets, relationship with government authorities, etc). We discuss this theoretical proposition with reference to empirical observations from the Bolivian forestry sector. We consider Bolivia an appropriate case to study these issues because its government is considered a forerunner in forestry policy. Their recent policy reforms have given rural dwellers unprecedented rights to forest management, and in contrast to many other countries that have passed decentralization reforms, Bolivia has actually implemented them. Moreover, the country's decentralized forest governance structure makes it an appropriate location for comparative analysis between each local unit's institutional arrangements.

BACKGROUND

The tropical Lowlands of Bolivia is a vast geographical area with diverse ecological, ethnic and socioeconomic characteristics. Despite this diversity, Lowland small-holder farmers share many of the predominant realities of small-scale, subsistence agriculture in the other parts of tropical Latin America. Like other rural populations throughout the region, rural Lowland communities rely on forests to satisfy essential subsistence needs. Forests provide products such as fuel wood, fruits, nuts, fibers, medicinal plants, and wood for construction.

The new property rights regime gives land owners the right to extract these products on their land without the special government permits that were previously required. If landowners want to sell any of their products, however, they must acquire an elaborate set of government permits. This section describes the relationship between the recent political reforms and the land use patterns of rural populations in the Lowlands.

[1] Hereafter referred to as "smallholders". In this paper, there is no distinction made between whether such smallholders are of indigenous, Spanish, or *mestizo* descent.

The Lowlands' rural population lives in three types of settlements: (a) Indigenous communities, (b) local communities, and (c) smallholder colonies.

The Lowlands is the home of nearly 30 ethnic groups controlling some forestland areas along the region. Each indigenous group is composed of a number of small settlements sharing the same language, local customs, and a unique system of organization. Many groups now hold *de jure* rights to their land but over the years they have seen their territories progressively reduced because of the encroachment of cattle ranching and agricultural estates.

Local communities were formed as a result of the migratory population flows within the Lowlands region. This was motivated by Lowland settlers search for proximity to urban cities, roads, and better agricultural lands. These communities are composed of migrants of the indigenous settlements who formed new dwellings composed of persons holding multiethnic backgrounds and who have subsequently developed their own local cultures. These farmers typically practice small-scale, slash-and-burn agriculture as well as cattle husbandry for family consumption. They are often weakly connected to external markets and rely on a rotating pattern of forest clearings for their cultivations.

Finally, following the 1953 agrarian reform, farmers from the land-scarce highlands migrated to "colonize" the tropical Lowlands, taking advantage of the reform's offer to own a piece of agricultural land on the frontier. Newly arrived "*colonos*" (settlers) acquired formal land titles by joining farmer unions that were given official community titles by the central government's land reform agency as individual property. Each individual title holder was assigned a maximum of 50 ha. One of the conditions of keeping the title was that the claimant should prove in the subsequent years that he or she was making "productive use" of the land to which title was sought. Since forestry was not considered productive use, the old property rights regime created strong incentives for smallholders to convert existing forests to agriculture and pasture. All trees and forests were considered the property of the State and in this condition both land and forests were freely granted and sold as individual property for diverse land uses. However, only individuals or firms with forest concession from the government held the formal right to extract forest resources for any kind of use, commercial or subsistence.

The bias towards agriculture and the complete State ownership of the overall forests were two of the main issues addressed by the 1996 forestry law and land reform.[2] The reforms affirm that forestry is a legitimate land use and should be considered a productive use of the land, alongside of agriculture and cattle-raising. However, the traditional strategy of using land-clearing to secure land tenure had become deeply engrained in rural areas of Bolivia, and a simple adjustment in the legal texts is probably insufficient to do away with the de facto bias against forestry in Bolivia (Contreras and Vargas, 2001).

Smallholder agricultural production constitutes a very important part of agricultural activities in Bolivia's total agricultural production, more so than in any other country in Latin America (FAO, 1988). The typical smallholder farmer practices slash and burn agriculture to produce mainly maíze, rice and yuca and also clears forests for pastures to graze cattle on. A common livelihood strategy for small scale farmers is to produce enough crops to satisfy two primary objectives: First, to produce enough food crops to feed their families, and second produce enough excess crops to sell these for a

[2] These are two different laws that were both passed in 1996: The forestry law 1700, and the INRA law 1725.

profit, which is then used to the family's non-food needs, such as school fees and health care items (Thiele, 1995). Once the basic livelihood objectives are met, households will invest any remaining residuals in alternative activities that yield the highest possible return to their scarcest resources, which is often cash and family labor (Davies et al, 2000). Cattle has proven to be the most popular investment object, regarded by many as a comparatively low-risk placement option for excess resources in the Lowlands (ibid). Despite the 1996 reforms, forestry has not been able to stir up much of an interest as a prospective area of investment for risk-averse, small-holder farmers, even in the forest rich tropical lowlands.

Lowland farmers who practice slash and burn agriculture often keep a large proportion of their land under forest cover, as they only clear small areas of forest each time they rotate their crops. Because forest clearing is very labor intensive and family labor is a scarce resource for many smallholders, it is common practice to rotate the crops every two years between 3-4 different fields rather than clearing new forest areas every year. Over a 20 year period, the average lowland farmer uses about ten hectares for agricultural production (Maxwell and Pozo, 1981). The remaining land is usually used for a combination of housing, pastures and forest. However, according Godoy (2001) it is inevitable that smallholder farmers reduce old-growth forest cover overtime, unless economically viable alternatives to slash and burn agriculture exist.

Through the 1996 forestry law, the commercial extraction of forest resources has become a possible source of income for all Lowland settlers. While timber extraction is often mentioned as the most significant income-enhancing activity, the law also provides for the possibility to acquire alienation rights for a variety of other forest products such as nuts, grasses and mushrooms. In an increasingly specialized market-economy, rural settlers need cash to acquire many essential household items, such as food, farming equipment, health care, and school fees. Unlike household consumption, however, the commercial extraction of forest resources requires the forest users to comply with a large number of government regulations.

The problem for many smallholder farmers in the Bolivian Lowlands is that it can be both costly and complicated to obtain the necessary government permits. As a result, even the smallholder communities that have vast forest resources on their lands tend to view forest management as an uncertain and costly land-use activity. Under such conditions, forests often take on the characteristics of an open-access resource and users view forests as an obstacle to agriculture and pasture. Evidence of such behavior is prevalent in Bolivia. For example a recent study in the Department of Pando found that the price of one hectare of forested land to be about USD $4-20 compared to about $200-300 for land in the same region with the only difference being that it had been cleared for agriculture or pasture (Tratado de Cooperación Amazónica, 1997).

In the Bolivian forestry legislation there is a clear distinction made between forest use of household and commercial nature. Another distinction is made between forest management and forest clearing for agricultural purposes. An individual, or a group of individuals, who has private ownership of a piece of land with forest on it cannot clear forest areas for agricultural purposes, including smallholder subsistence agriculture, without a government permit for forest clearance. Permits, in turn, may require a specially developed land use plan signed by an authorized agronomist that the land is apt

for agriculture as well as an advance payment of a flat administrative fee.[3] For all other household uses of the forest, including extraction of timber, firewood, fruits and plants, the proprietor has the authority to define rules of access, withdrawal, management and exclusion rules with respect to the forest. However, they do not hold the alienation rights that would authorize them to sell some of the forest products that they harvest from the resource.

In order to acquire alienation rights, proprietors need a series of special government permits. According to one recent study, applicants need to fulfill 26 different administrative requirements defined by the central government—a process that involves providing proof of land possession or title, an official forest management plan, as well as an advance payment of a tax representing 17 percent of the commercial value of the products that will be harvested and sold (Contreras-Hermosilla and Vargas, 2001). An individual or a group who acquires the government permit can be considered a conditional owner of the resource since such individuals are authorized to make decisions with regards to rules of access, withdrawal, management, exclusion and alienation, as long as these rules do not break the forestry law and the regulations of the forest management plan.

Once a group has obtained the formal rights for commercial forestry activities, it faces an array of operational challenges, such as learning how to operate a commercially efficient forest management operation, developing market contacts, and organizing the participating forest users in the day-to-day forest management activities.

ARE FORMAL PROPERTY RIGHTS ENOUGH?

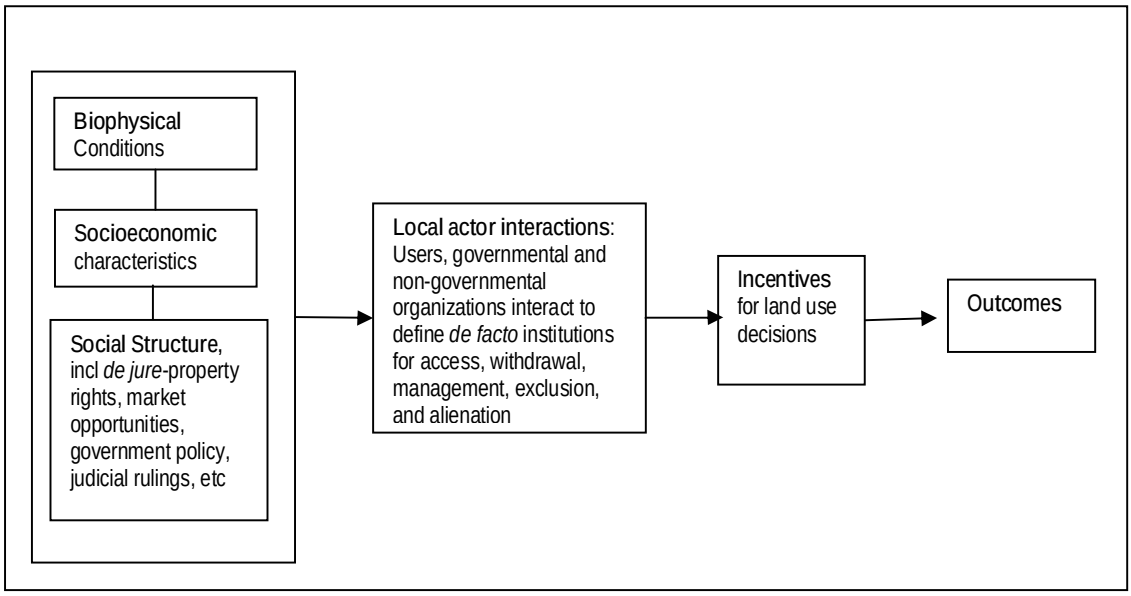
The farmer's decision to dedicate a piece of his or her land to formal forest management activities, with all the necessary government permits, boils down to weighing the likely costs against the projected net income from future forest product sales along with the estimated value of potential non-monetary benefits (Davies et al, 2000). Even if local users are able to acquire formal forest property rights, there are several potential pitfalls that hamper the facilitative effect of formal property rights on the emergence of positive incentives to motivate more sustainable forest management. For instance, a forest users who have high discount rates and value short term income much more than long-term returns to investments, formal forest property rights may not do much to strengthen the incentives for forest management, even if the implementation of such rights should provide effective forest tenure security. Other public policies, including formal property regimes, land reform initiatives, agricultural subsidy programs, and trade policies, can also counteract the incentives to invest in forestry. Public policies that are biased in favor of agriculture have contributed to make agricultural activities artificially more profitable than investments in forest management even in places where agriculture is not an ecologically sustainable land use (Stewart and Gibson, 1995; Solorzana, 1994).

The introduction of a formal property rights system that recognizes the rights of rural smallholders may be a necessary policy reform for improving forest tenure security

[3] Land areas inferior to 3 hectares are exempt from land use plan, and fee, but must still obtain an official permit from the municipal government and the Agrarian Superintendence. This exemption rule was the result of a social movement led by the federation of organized indigenous groups across the country in April of 2000.

for smallholders, but it is hardly sufficient. The degree to which a new formal regime is actually able to deliver the promise of forest tenure security, we argue, depends to a great deal on how local forest users are able to organize themselves to respond to the constraints and opportunities represented by the existing biophysical conditions, socioeconomic characteristics, and the social structure embodied in government policies and governance tradition. We articulate the relationship between these concepts in the theoretical framework in Figure 1 below.

Figure 1. Linking Context, Institutions, Incentives and Outcomes



Source: Author's elaboration based on the Institutional Analysis and Development framework (Kiser and Ostrom, 1982; Ostrom, Gardner and Walker, 1994).

In our view, the bundles of forest property rights form a part of the social structure in which local forest users carry out their forestry activities. The way local forest users respond to government policies and the particular property rights that are available to them, also depend on other factors, such as the availability of valuable forest products, market opportunities, social networks connecting local users to market actors, government agencies, among others. Local land owners tend to filter, modify, adapt and sometimes even ignore the formal *de jure* rules of the government, especially if the government lacks an effective enforcement mechanism at the local level. In this sense, local forest user institutions interpret the meaning of the forestry reforms and transform the *rules-in-form* into *rules-in-use*. We posit that the degree to which these rules-in-use conform or not with the rules-in-form depends on whether the new rules are beneficial to local users combined with the intensity with which governmental organizations enforce the rules of the new property regime.

The empirical analysis assesses this proposition by first looking at the extent to which smallholders' access to *de jure* property rights have raised their likelihood to

choose forest management over alternative land uses. We then analyze the conditions that seem conducive for successful community forest management by comparing two communities' experiences after acquiring formal forest property rights.

THE EMPIRICAL INQUIRY

The empirical research aims at explaining local land use decision-making with respect to how the introduction of *de jure* alienation rights affects the probability of a typical small holder farmer to opt for forest management as a viable land use alternative. Case studies of forest user communities were carried out to study the factors that influence the formation of forest user incentive structures in the Bolivian lowlands. A total of six cases were selected, according to a three-step selection procedure.

Selection of Case Study Sites

First, on the basis of the results from a survey with the mayors of 50 randomly selected municipalities in the Lowlands (see Andersson 2002, 2003, 2004, Gibson and Lehoucq, 2003) three municipalities were identified in which the municipal governments had worked actively to promote the new formal forest property regime and another three municipalities in which such efforts had not materialized. In addition to the property rights criterion, in order to ensure comparability between biophysical characteristics a criterion of *forest resource availability* was applied.[4] Second, each of the selected municipalities was visited and a workshop was held with representatives of all forest-dependent rural communities.[5]

During the workshop, the costs and benefits of forest management were discussed for forest users in the municipality in general. At the end of the workshop, participants were asked to identify a community that represented, for the municipality, typical characteristics with regards to forest management activities, and in which the research team would be able to conduct an in-depth, community case study. On the basis of the participants' suggestions, the research team selected a community where the predominant land uses included forestry, agriculture and cattle-raising. Although this approach by no means guarantees that a truly representative community is chosen in each municipality, the approach does help researchers avoid selecting extreme outliers. The main characteristics of each of the selected communities are summarized in Table 1.

Having followed this procedure in the visited municipalities, the land-use decision making was studied in six communities. We use fictitious names to protect the anonymity of the community members:[6]

"Castaña" is located in the Municipality of Filadelfia in the Department of Pando. It is a nut-gathering community with no formal rights to timber resources, but with a livelihood based on the sale of non-timber forest products and subsistence agriculture. The better-off families invest their cash incomes in cattle, which are managed individually.

[4] In addition to the property rights criteria, to qualify, the selected municipalities had to have an existing percentage of forest cover above 50 percent, and a predominantly rural population.
[5] We let the municipal forestry officers determine what they viewed as "considerable".
[6] The policy of the IFRI research program is to protect the identity of the communities we study since some of the activities and behavior that we analyze are sometimes illegal according to the formal legal system.

"Ganado" in the Municipality of San Borja and the Department of El Beni is a settlement that was formed in the 1950's following the agrarian reform. It features predominantly individualized agricultural production, after the community abandoned the cooperative organization which promoted mechanized production in the 80's. Currently, there are some self-organized efforts in the areas of pasture management, and illegal forestry activities. There is very little organized activity related to forestry on private lands, because, according to community members, most of the valuable species are scarce.

"Carbón" in the Municipality of El Torno, Santa Cruz consists of highland migrants from Cochabamba who arrived about 10 years ago. Community members live off charcoal extraction and subsistence agriculture. The community has acquired formal permits from the Forestry Superintendence but their extraction is not closely monitored. The municipal government has been active in brokering contacts between community and central government bureaucracies, which has enabled the community to acquire alienation rights. This has somewhat improved their tenure security.

"Café", in the Municipality of San Ignacio, Santa Cruz is a community which was formed by settlers in the early 1960's. The community has a self-organized cattle cooperative, certified ecological coffee production for export, and more recently a community forest management plan with logging rights. Despite its relative young age, the community is well organized and has a long-term plan for forest management. Thanks to their effective organization, the community has been able to lay claims on large tracts of forest land with commercially valuable tree species on them. A revisit to the community was carried out in January of 2004.

"Maíz" in the Municipality of San Rafael, Santa Cruz, is a small settlement (13 families) who was recently declared as indigenous community although its members settled the area in the late 1960's like any other lowland settlement. This identity switch from *colono* to indigenous was a pragmatic move as the community felt that as an indigenous group they would receive more attention and support from external organizations, especially when it comes to land claims. In 2000, the community asked the municipality of San Rafael for help in acquiring formal user rights through the development of a community forestry management plan to be implemented on the community land. Thanks to the plan, in 2001 the community harvested 165 cubic meter of 6 different timber species on 39 hectares of community land. The community's first legal logging activity raised over US $ 3,000 for the community which was distributed equally among the 13 families. A revisit to the community was carried out in January of 2004.

"Arroz" in the Municipality of Buena Vista, Santa Cruz, is located right next to the National Park of *Amboró*, constituting a part of the park's buffer zone. The community has developed an ecotourism center with trails and a picnic area for visitors. A couple of community members have been trained by an external NGO to guide tourists in the forest, but due stiff competition from urban agencies and a lack of active promotion, visitors relatively few and the eco-tourism project still has not generated any substantial cash income to community members. In fact community participation in the maintenance of the facilities is dwindling. No formal forest management activities take place in the community and members live off individualized subsistence agriculture and raising cattle.

Table 1. Main Characteristics of Selected Case Study Sites

Community	Main Income	Land Uses[7]	Forest property rights[8]
"Castaña" Filadelfia, Pando	Nuts	Forestry (NTFPs), ag and Cattle	Informal de facto rights, conditional proprietors
"Ganado", San Borja, Beni	Maíze, yuca, cattle	Ag, Cattle, and Forestry	Informal de facto rights, conditional proprietors
"Carbón", El Torno, Santa Cruz	Charcoal, maíze	Forestry, ag, and Cattle	Formal harvesting rights, conditional owners
"Café" San Ignacio, Santa Cruz	Cattle	Pasture, Forestry, Coffee, and ag,	Formal harvesting rights, conditional owners
"Maíz" San Rafael, Santa Cruz	Maíze	Agriculture, Cattle Forestry	Formal harvesting rights, conditional owners
"Arroz" Buena Vista, Santa Cruz	Rice, maíze	Agriculture, Cattle, Forestry	Informal de facto rights, conditional proprietors

Source: Author's elaboration based on IFRI database information

Case Study Methods

In the community level case study, the research protocol of the International Forest Resources and Institutions (IFRI) Research Program was employed. The IFRI research protocol is an institutional analysis tool that focuses on forest users interactions with forest resources. The protocol, which relies primarily on participatory rural appraisal methods and in-depth interviews with key informants for information gathering, contains a set of key questions in ten different subject areas, increasing the viability of cross-site comparisons.[9] Moreover, the community level case studies also provided an opportunity to validate the information obtained in the municipal workshops with community leaders.

The analysis compares the effect of formal forest ownership rights on land use decision in forest dwelling communities. The analytical approach for this exercise draws on the earlier work by Davies et al (2000) who has developed a benefit-cost analysis tool to assess local landholders' economic payoff for a variety of different land uses. The gross marginal analysis compares the benefits and costs of forest management for two different sets of communities. The first set includes three communities in which formal property rights authorize logging activities by community members (conditional **owners**) according to an approved forest management plan. The second set consists of three communities in which forest logging is also prominent, but primarily without formal logging permits (conditional **proprietors**).

[7] In order of the size of land share proportions. For instance in Arroz, approximately 50% of the land is dedicated to Agriculture, 30 % to cattle pastures and the remaining 20 % is forest.

[8] Users who are considered claimants have some collective choice authority when it comes to access, management and exclusion decisions with regards to the forest resources on their land, but unlike users with *de jure* alienation rights (owners) they cannot sell any products.

[9] These questions guide the researchers in the discovery of the relationships between human institutions and the surrounding natural environment. The IFRI protocol explores these relationships in the following 10 subject areas: (1) Community background and history; (2) The nature of the natural resource; (3) The quantitative definition of the condition of the natural resource; (4) characteristics of the physical realities of the human settlements of the study area; (5) definition of and description of the characteristics of the different resource user groups; (6) characteristics and influence of formal user group associations; (7) inter-user group relations; (8) locally extracted natural resource products and their importance for users; (9) the influence of non-harvesting organizations, such as municipal governments, and (10) Inter-organizational relations.

RESULTS

In the six sites, smallholder community representatives were first asked about the differences in existing market prices of timber harvested with and without the required logging permits. In areas where there are markets for both legal and illegal timber, the difference in prices for illegal products varied between 45-72 percent of legal product prices, even for relatively abundant species. It was found that the stricter the control against illegal logging the larger the differences between prices between legal and illegal products.[10] Users were then asked to specify what some of the most important non-monetary benefits of acquiring formal property rights to forest products are. Farmers generally agreed that having *de jure* logging rights could increase the market value of the property where the timber extraction takes place; speed up the land title regularization process; increase institutional support for forest management from municipal government, NGOs and Forestry Superintendence. Although such benefits are not trivial, farmers who had formalized their forest management activities said such benefits had not been important in their decision because so far most of these expected benefits were hearsay that had not yet been validated by experience. There was consensus among the interviewed smallholders that the most important consideration of whether to apply for logging permits or not was the prospects for increasing economic profitability of their production system.

Table 2, which displays the comparison of the economic costs and benefits between formal and informal forest management activities, shows that users with formalized forest management rights generally receive considerably higher economic returns than users without such rights.

During first year of community-based forest management activities in “Maíz”, household net incomes increased by an average of US$ 320 for all of the 13 families that constitute the community members. Only one of these families had incomes related to forestry activities previous to obtaining the community logging permits. In “Café”, aggregate gross incomes from community forest management were slightly higher than in “Maíz”, reaching almost US $6,000, but this amount was divided between 48 families, providing a forest management-related net household income of US$ 125. Previous to acquiring alienation rights, forestry activities were not part of the community-organized production activities, but were carried out by a group of six individuals. These individuals estimated their annual net incomes from these to about US$ 400 per person without the official permits.

[10] This control is carried out by a combination of organizations at the local level, among them the municipal government, the forestry superintendence’s local and regional offices, the regional government’s representatives as well as INSPECTORATE, a private contractor that operates several road-side control points.

Table 2 Returns for Forest Management *With* and *Without* Formal Rights

Forest management *with* logging permits[11]	**Average annual US$/ha**	**Forest management *without* logging permits**	**Range average annual US$/ha**
Benefits[12]		**Benefits**	
Timber sales (at farm gate)		Timber sales (at farm gate)[13]	
- hardwoods per hectare	43.64	- hardwoods per hectare	18.54-28.80
- softwoods per hectare	94.55	- softwoods per hectare	31.23-52.27
		- 10% risk of loosing timber through inspections[14]	-6.91
Total benefits	138.18	Total benefits	42.86-74.16
Costs		**Costs**[15]	
- planning	21.82		
- logging (incl. hired labor)	18.18	- logging (incl. Hired labor)	21.99
- training, taxes, depreciation of equipment	13.45	- depreciation of equipment	9.00
Total costs	53.45	Total costs	30.99
Family labor average 15 days per year/ha		N/A	
Net income/year/family/ha	**84.73**	**Net income/year/family/ha**	**11.67-43.17**
Returns to cash	**1.59**	**Returns to cash**	**0.38-1.39**

Source: Author's elaboration

In "Café", getting formal logging permits have produced a more equitable distribution of the benefits from forest management activities and has increased average household incomes and a diversified production for a majority of community members. Among the three communities where a majority of the members enjoy alienation rights to forest resources, the effect of formal property rights less conclusive in the community of "Carbón". There, formal alienation rights were given to community members authorizing them to produce and sell charcoal from hardwoods, household incomes have increased somewhat after formal permits were, but production has not diversified noticeably. The same number of households now engage in forest management as before when the activity was considered illegal.

These results indicate a noticeable positive effect of the introduction of formal forestry alienation rights on smallholders' incentives to engage in forestry activities. Acquiring formal ownership rights to forest resources, although conditional in nature, has increased average household incomes compared to previous levels of incomes, and

[11] Costs and benefits for legal and illegal logging activities are calculated *averages* from the six selected municipalities and communities respectively.

[12] Benefits do not take into consideration non-monetary items such as increased property values, higher probability of acquiring regularized land titles, or lower management costs because of the legal back-up and assistance from the municipal authorities.

[13] Illegal timber sales vary greatly from one area of the country to another, depending on a combination of factors such as local demand for wood products and the rigor of law enforcement agencies.

[14] The ten percent risk is based on the analysis of Stocks (1999) who estimates that the SIF is able to confiscate about ten percent of all illegally extracted wood in Bolivia.

[15] These costs do not take into account the lost non-monetary benefits derived from de jure rights, such as increased property value, access to credit markets and institutional support, technical assistance, and lower management costs among others.

smallholder communities in which formal forest property rights exist, land use-based production is more diversified compared to communities that do not possess government permits to commercial forest management. However, this result requires some further discussion.

It is important to note that the costs of formalized forest management in this comparison are based on a policy instrument introduced by the Forestry Superintendence in 2001 with the intention to make the acquisition of *de jure* forest property rights more accessible for rural communities with forest resources on their lands.[16] The introduction of this new instrument has cut the initial cash expense for smallholders by almost 80 percent compared to what they would have had to pay before 2001. Had the costs of the old instruments been applied, the returns to cash in Table 2 would actually be negative.

Another complication of this comparison is that legal and illegal logging activities follow fundamentally different strategies. While legal logging activities take place in a specific area according to the approved management plan, such area specificity does not apply to many illegal logging activities. Organized illegal logging often take place on *de facto* open-access lands outside community boundaries, which makes a per hectare comparison of net benefits skewed in favor of formalized management. Another extremely important factor that was not held completely constant in the comparison was the availability of valuable timber species. At the individual farm level, the potential net gains derived from formalizing forest management activities are likely to vary with the values of available species. Nevertheless, the comparison does give a powerful testimony about the *potential* economic benefits from acquiring *de jure* forest property rights.

If the economic benefits are so substantial, why do not more smallholders apply for formal forest user rights? The municipal case studies point to three hypothetical explanations. First, smallholder farmers to acquire rights of forest products use must be recognized previously with rights over forest access. The legalization of such a right can be undertaken either by the State or the private forestland owners, but if the latter is the choice the private owners should pay the costs of the sanitation. Since the land sanitation process is expensive and smallholder farmers cannot afford these costs by themselves the land titling must follows the land sanitation planning of the National Institute of Agrarian Reform (INRA). Some areas will be prioritized will others will wait the pace of the process of forestland regularization.

Second, smallholders in the three municipalities with poor institutional arrangements for municipal forest governance were of the impression that forest management was not intended for rural communities, because of the high costs associated with the development of a forest management plan, the government permits, taxes and fees. None of the interviewed forest users in these municipalities had ever heard of the possibility to avoid these costs with the assistance of the municipal staff. What is even more surprising is that none of the municipal staff in the municipalities with less favorable institutional conditions knew about this possibility.

[16] One of the unique features of this policy instrument is that in order to receive the logging permits it is not necessary to carry out an all-out, 20-year forest management plan, developed by team of expensive, certified forester contractors. Rather, for community logging permits it is sufficient for the community members to present a relatively simple extraction plan for a forested area of a maximum area of 200 hectares, which describes which trees should be harvested and which should be kept as seed trees until the next rotation. If need be, the Municipal Forestry Unit personnel is available for technical advice. The municipal personnel approve the plan and then present it for final approval to the Superintendence.

Table 3 Comparing Economic Incentives for Smallholders' Land Use Decision-Making

Formalized Forest Management	Average	Manual Agriculture	Average	Cattle raising	Average
Benefits[17]	US$/ha/ year	**Benefits**[18]	US$/ha/ year	**Benefits**	US$/ha/ year
timber sales (at farm gate)		Sale of excess production of		Sale of excess production of	
- hardwoods per hectare	43.64	- maíze	54.55	- Milk and Cattle	240.00
- softwoods per hectare	94.55	- other crops	330.55		
Total benefits	138.18	Total benefits	385.10	Total benefits	240.00
Costs		**Costs**		**Costs**	
- planning (inventories, management plans, bureaucratic relations, etc)	21.82	- Inputs (seeds, herbicide, insecticide, fertilizer, transport, etc)	54.55	- Inputs (seeds, fence, vaccination, medicine, salt blocks)	104.62
- logging (incl. hired labor)	18.18	- hired labor (land clearing, weeding, harvesting, etc)	92.73	- hired labor (fencing, pasture improvements, maintenance)	24.66
- training, taxes, depreciation	13.45				
Total costs	53.45	Total cost	147.27	Total cost	129.28
Family labor average 15 days/year/ha		Family labor average 35 days/year/ha		Family labor average 20 days/year/ ha[19]	
Gross margin/ha	**84.73**	**Gross margin/ha**	**237.81**	**Gross margin/ha**	**110.72**
Gross margin/cash[20]	**1.59**	**Gross margin/cash**	**1.61**	**Gross margin/cash**	**0.86**

[17] These benefits do not take into consideration non-monetary items such as increased property values, higher probability of acquiring regularized land titles, or lower management costs because of the legal back-up and assistance from the municipal authorities.
[18] These benefits do not include the contribution of these crops to subsistence needs and the value of food security
[19] The areas taken into account are limited to the improved pastures from year to year and not total areas of pastures
[20] Figure represents investment returns to cash, because cash is one of the scarcest resources in smallholder communities in the Lowlands.

Finally, forestry is a relatively new land use alternative and although its proponents claim that it may generate increased household income to farmers who engage in such activities, farmers still not perceive these benefits as reliable as the more traditional land uses, such as agriculture and cattle-raising. Even if formalizing forest management can increase the net benefits from forestry, this increase may not be enough to motivate smallholders to shift their investments from the activities that have proven to be secure, albeit low-yielding investments overtime.

The comparison in table 3 shows that formalized management has the potential to become an increasingly attractive alternative land use. However, this calculation does not take into account all possible costs and benefits that are of importance to farmers. In order for risk-averse farmers to decide to change their present investment strategies, they are likely to want to see a proven, successful track record of formalized forest management, because such a change would involve considerable costs for the farmer. To start, a forest management operation would require substantial financial investments in terms of new production hardware as well as time and effort to learn effective forest management techniques, develop market contacts, and if management is not individual, to create institutional arrangements that allow for effective collaboration with fellow community member forest managers. Interviewed smallholder farmers who were skeptical to starting forest management activities mentioned the high opportunity costs as a major constraint together with a general lack of trust towards governmental authorities.

What Makes Formalized Forest Management Profitable?

Once communities acquire formal property rights to forest resources, the question becomes what factors influence their performance as commercial forest managers. To find answers to this question we went back to two of the communities that were visited just after receiving formal forest property rights in 2001 to see what had happened to them three years later. The communities we visited in 2004 were “Maíz” and “Café”, both located in the *Chiquitanía* region of the Department of Santa Cruz, Bolivia. Communal assemblies and interviews to key informants were developed to have a better understanding of the processes that currently are underway.

Even though these communities have been pioneers in the development of commercial community forestry in the region they have achieved dramatically different outcomes regarding timber production. Among them can be noticed that the “Café” community has had only one timber harvesting while the “Maíz” community is preparing for its third annual harvesting. We use the theoretical framework presented in Figure 1 to orient the discussion of the factors that explain the different outcomes that these communities have had with regards to forest management activities

Biophysical Conditions

The *Chiquitanía* is a region in which some of the most precious timber in Bolivia exist and where forestry sector infrastructure is superior to most other places in Bolivia. In this sense, both communities enjoy good external conditions for commercial forestry activities. In other words, whatever external difficulties communities in this region face,

such difficulties are likely to be many times worse for communities in other regions of the country.

According to the forest inventories carried out in connection with the forest management plans for the two communities, "Maíz" has a larger quantity of high-value timber species, and because of this one would expect that "Maíz" would have a higher potential for commercial forest management than "Café".

One of the factors limiting the development of timber extraction in "Maíz" is the relative lack of valuable forest species to be sold in the local markets. Community members, who had not studied the local timber markets before harvesting, found this out only after their first harvest. The "Café" community's expectations were not fulfilled and the income from the first timber harvest barely covered the costs, leaving each family with about US$ 125. Community leaders told us that the results from the first harvest were so disappointing that the community council decided that it would be protect the forest and wait a few years to anticipate better market conditions for the species that exist in their forest. One of the benefits from the forestry property rights that the community did value was the fact that the rights reinforced the community's evidence of controlling their territory which is due to be formally titled in late 2004.

Socioeconomic Conditions

According to the socioeconomic characteristics the two communities are very similar. Both communities are practice subsistence agriculture and are engaged in community-level agriculture development projects, involving cattle-raising and agroforestry activities with the objective of raising complementary cash income. Both communities are governed by a Communal Council, a traditional system of governance. One of the members of the Council is the community representative of the Territorial Grassroot Organization, which is the authority linking the community with the municipality. The main difference between the two is the size of the communities. The "Café" community is larger and therefore pays higher transaction costs to coordinate and reach agreements about collective activities.

Social Structure

Finally, in relation to the social structure both communities are in a similar situation. Both have formal forestry property rights for carrying out commercial forest management. What is to some extent different are the interactions between the local community and external actors who deal with forestry, including municipal authorities, the central government's forestry service, timber buyers. We call these contacts the external networks of commercial forest management. We find that the strength of this external network is a key factor in explaining the different outcomes in the two communities.

The "Maíz" community can more easily mobilize internal networks because its small population size. They do not have difficulties to organize timber production that include all community members. The expectations of the "Café" community's members are more diverse since productive activities are more diversified and families rely on long traditions of cultivating cash crops for export. Regarding the development of external networks the "Maíz" community has developed more opportunities to create linkages with market actors, because of the closer distance to the main rural dwelling. We found

that the personal contacts of the community leaders to be crucial in the development of the commercial agreements for timber.

Outcomes

Families of "Maíz" identified a timber buyer that offered them up to 20% more per cubic meter of wood regarding the "Café" community. The differences in the wood price were in average a 12% favoring the "Maíz" community in 2003. This community had a net benefit of USD 6,618 more than the other community regarding timber production. Table 4 displays the average timber prices received for the harvests in both communities.

Table 4. Comparative timber prices in both communities

Type of timber	"Café" (2001)		"Maíz" (2001-4)		Diff. Income ($)	Diff. Price (%)
	Vol. (m3)	$/m3	Vol. (m3)	$/m3		
Roble	35	25	17.0	28	+349 (Café)	12
Tajibo	55	25	267.5	28	+6115 (Maíz)	12
Morado	0	n/a	15.7	32	+502 (Maíz)	n/a
Cuchi	5	20	0	n/a	+100 (Café)	n/a
TOTAL:	95		300		+6168 (Maíz)	12

However, better networks for forest commercialisation are not the only reason to get a better timber income. A factor that has an important influence in the price is the volume extracted from the forest. The "Maíz" community has had more wood volume per cubic meter influencing the greater prices achieved since this reduce the transportation costs for the timber buyer.

Therefore, the identification of valuable timber species, the size of a community helping the development of collective action, similar expectations regarding forest management, lower internal differentiation, and external networks are factors that allow the "Maíz" community to achieve higher incomes from community timber production. These results are mutually reinforcing since sustained timber production enables the community actors to strengthen their external networks and improve their production strategies, which may lead to better negotiated prices in the market, higher incomes of the families. The higher returns may in turn improve the conditions for investing a part of the yield in production assets for adding value to the chain of timber production.

These results confirm earlier research findings that forest management in the tropics can be economically viable, although the traditional policy bias towards agricultural activities tends to distort farmers' decision making at the cost of forestry investments. Based on data from Costa Rica, Stewart estimated that without distortions, well managed tropical forests can yield yearly incomes of US$270-450 per year and per hectare (Stewart, 1994). Most competing agricultural crops yield much less. In Ecuador, for instance, Southgate et al (1994) estimated agricultural income of no more than US$20 per year and hectare. Income from cattle ranching can be as low as $2.50 to $3.00 per year and hectare (Stewart, 1994). Profits for all agricultural crops for all three countries were less than a US$ 100 per year and hectare, except for potato in Bolivia (Cámara Agropecuaria del Oriente, 1992, Stewart and Gibson, 1995).

The results of the economic importance of forest management in this study are less dramatic, but they nevertheless show that forest management can, under some circumstances, compete with agriculture and cattle-raising, even with a policy that favors these traditional land uses. The returns to cash for formalized forest management are only slightly lower than agriculture and actually higher than cattle-raising. The most remarkable finding from the comparison of gross margin returns to cash is the notable difference that exists between the net incomes from forest management under different constellations of property rights. Formalized forest management, which operates with alienation rights, generate from 15 to 300 percent higher returns per dollar invested, compared to informal forest management.

However, substantial barriers remain for smallholders to engage in commercial forest management activities, even when the trees that they would like to manage grow in their own backyard. Even after the forestry titling communities need to request a forest permit to exploit commercially their forests. To date, very few communities have been able to fulfill these requisites, most after a great deal of struggle. The model for commercial timber production in Bolivia seems to have been developed to favor large forest concessionaries. Overtime some simplifications of the procedures trying to favor smallholder farmers have been introduced but more simplification is needed to make commercial forest management a more widely accessible form of land use.

Finally, communities that manage forests for commercial purposes do better if they enjoy extensive links with the local authorities and other actors outside the perimeters of the community. Therefore, the development of networks is a crucial aspect for presenting improved conditions for forest management. However, property rights, collective action, and external networks are not variables that by themselves ensure the success in outcomes, and the biophysical conditions of the forests as well as market structures are critical factors.

CONCLUSIONS

The empirical evidence from six selected municipalities suggests that that acquisition of *de jure* alienation rights can strengthen forest users' incentives to engage in sustainable forest management. The benefit-cost analysis suggests that, all other factors equal, the profitability of forest management increases if users have *de jure* alienation rights for forest products. Nevertheless, existing farming knowledge, skewed policies in favor of agriculture and cattle-raising as well as more advantageous subsidies and technical assistance for such land uses, may potentially weaken the perceived viability of commercial forest management, even if *de jure* alienation rights are attained.

The qualitative case study analysis also compared two communities that had received formal property rights in 2001 and that were revisited in 2004. The results of this comparative analysis indicate that simply getting *de jure* alienation rights to timber products is not sufficient to produce successful outcomes. The comparison also points to the importance of the community's connectivity with external governance actors and markets, the community capacity for organizing collective enterprises, and the availability of valuable timber species, as key factors that help explain why some communities *with formal property rights* are commercially more successful forest managers than others.

Despite these results, the new forest property rights regime that was introduced in Bolivia in 1996 has had a hard time catching on among the nation's forest users. The reform has not succeeded in converting any significant numbers of rural smallholder farmers into forest managers. It is interesting to note that in none of the examined cases had community members acquired logging permits without the external technical support of some sort. The role of the municipal forestry unit seemed particularly critical for making *de jure* alienation rights more accessible to rural settlers. The incentives for municipal governments to engage in such mediation activities may be questioned, however, as their potential financial gain from facilitating *de jure* rights are minimal, especially for the relatively small forest areas that are normally associated with smallholder forest management. This lack of institutional incentives for municipal governments may be a contributing factor to the fact that in more than 60 percent of all Lowland municipalities, no *de jure* alienation rights were issued to any smallholders during the 1997-2000 period (Superintendencia Forestal, 2002). It is indicative that all three of the municipal governments that had actively promoted formal forest property rights among its forest dwelling communities, had received some type of external support to do so.

Judging from national statistics on the distribution of formal logging permits, smallholder farmers are heavily under-represented, constituting only a fraction of total permits granted. Interviewed smallholder community members offered a mix of explanations, including the lack of information about the opportunities of the new regime; perceived high transaction costs associated with the application process; widespread insecurity with regards to the eventual benefits of formal forest management rights; more support and credits for agriculture, as well as a general lack of legal and administrative support.

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