

Challenges of Community Forestry in Tropical America¹

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Many national and international donors support community forestry. The government of Acre expects this project to prove community forestry as a viable alternative to cattle ranching. Settlement project Pedro Peixoto, Acre, Brazil. Photograph C. Sabogal.

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RÉSUMÉ

DÉFIS DE LA FORESTERIE COMMUNAUTAIRE EN AMÉRIQUE TROPICALE

La foresterie communautaire est une voie jugée prometteuse pour améliorer la situation souvent précaire des familles en milieu rural tout en contribuant à la conservation des forêts. Des organisations nationales et internationales encouragent cette pratique en affichant un ensemble d'objectifs clairs visant l'utilisation légale des forêts, des récoltes à faible impact, une commercialisation sur des marchés extérieurs et le recours à des services de formation technique. Si l'on peut faire état de certaines expériences et réalisations réussies, la plupart des initiatives de foresterie communautaire sont confrontées à des défis importants et ne subsistent qu'avec des aides extérieures. Un bilan des expériences de foresterie communautaire en Amérique tropicale suggère que, pour mieux répondre aux réalités de terrain, celle-ci doit passer d'une approche fondée sur des transferts de technologies et des plans d'organisation sociale définis à l'extérieur à des stratégies facilitant le développement et la mise en œuvre par les communautés elles-mêmes de leurs propres visions et aspirations relatives à la gestion des forêts locales. Cela implique que les efforts déployés pour adapter la foresterie communautaire aux concepts extérieurs doivent eux-mêmes s'adapter pour réellement venir en appui aux intérêts et aux capacités locaux.

Mots-clés : communauté forestière, conservation des forêts, petits producteurs, développement rural, Amérique latine.

ABSTRACT

CHALLENGES OF COMMUNITY FORESTRY IN TROPICAL AMERICA

Community forestry is seen as a promising option to improve the often-precarious situation of rural families while at the same time contributing to conserve forests. National and international organizations are promoting community forestry, aiming for a clear set of features that include: legal forest use, reduced impact harvesting, commercialization in non-local markets, and technical training services. While some successful experiences and achievements can be reported, most community forestry initiatives confront severe challenges and only continue while being externally supported. A review of experiences with community forestry in tropical America suggests that to better respond to local realities, community forestry has to shift from transferring externally defined technologies and schemes for social organization to strategies for facilitating communities to develop and implement their own aspirations and vision on local forest management. This means that efforts to adapt community forestry to external concepts need to adapt itself as true support of local interests and capacities.

Keywords: forest communities, forest conservation, small producers, rural development, Latin America.

RESUMEN

RETOS DE LA SILVICULTURA COMUNITARIA EN AMÉRICA TROPICAL

La silvicultura comunitaria se considera una vía esperanzadora para mejorar la situación, a menudo precaria, de las familias en el ámbito rural, al tiempo que se contribuye a la conservación de los bosques. Algunas organizaciones nacionales e internacionales fomentan esta práctica marcando una serie de objetivos claros destinados a lograr un uso legal de los bosques, cosechas de bajo impacto, la comercialización en mercados exteriores y el recurso a servicios de formación técnica. Aunque existen algunas experiencias y realizaciones exitosas, la mayoría de las iniciativas de silvicultura comunitaria enfrentan importantes retos y sólo subsisten con ayudas externas. Del balance de las experiencias de silvicultura comunitaria en América tropical se desprende que, para aportar una respuesta más adecuada a la realidad sobre el terreno, ésta debe pasar de un enfoque basado en transferencias de tecnologías y planes de organización social definidos exteriormente hacia estrategias que faciliten el desarrollo y la aplicación por las propias comunidades de sus propias visiones y aspiraciones relativas al manejo de los bosques locales. Esto significa que los esfuerzos destinados a la adaptación de la silvicultura comunitaria a los conceptos exteriores también deben evolucionar para convertirse en un apoyo real a los intereses y capacidades locales.

Palabras clave: comunidades forestales, conservación de bosques, pequeños productores, desarrollo rural, América Latina.

Introduction

It is estimated that in Latin America approximately 25 million people live in forested landscapes (KAIMOWITZ, 2002). At present, forest dependent communities have land tenure or access rights to more than 200 million hectares of forests (SUNDERLIN *et al.*, 2008), equivalent to 16 % of the forested area in the region. At the same time, however, forest-dependent families are still among the poorest populations in the country (POOLE, 2004). About one million people in Latin America are employed in the forest sector. In Bolivia, for example, approximately 50,000 people are involved in the extraction and processing of Brazil nuts (*Bertholletia excelsa* Humb. and Bonpl.; STOIAN, 2005) and in Brazil, some 300,000 people are engaged in babaçu palm (*Attalea speciosa*) production and processing (KAIMOWITZ, 2002), generating approximately USD 60,000,000 per year (IBGE, 2007). Nevertheless, successful integration of local families in national or international timber and non-timber forest products (NTFP) value chains is rare. Local forest use is mostly for subsistence or local markets.

In tropical frontier regions, local families and communities generally compete for land and forests with cattle ranchers, agro-industries, energy and mineral companies and conservation NGOs. Favored by neo-liberal economic policies, the poor performance of the state in rural areas allows these powerful actors to accumulate resources. Typically, frontier dynamics imply extensive land use changes, causing environmental degradation and rural migration. The resulting deforestation is likely to endanger the livelihoods of 15 % of the world's population (MERY *et al.*, 2005). In these settings, local families usually practice traditional slash-and-burn agriculture, but are gradually shifting to agricultural crops that can be integrated into a regional market economy.



Timber for local development? A community leader checks logs harvested from family owned forests. A State driven cooperative to support commercial management of community forests organizes transport, processing and marketing of the logs.
Extractive settlement project (Projeto de Assentamento Agroextrativista)
Cachoeira, Xapuri, Acre.
Photograph G. Medina.

Community forestry has evolved as one of the most promising options to meet the challenges of rural development, as it is supposed to combine both economic development and the conservation of tropical forests. The approach aims to provide an urgently needed source of income to local forest users, and thereby motivates them to value and conserve forests (PALM *et al.*, 2005). Community forestry may also contribute to carbon sequestration, biodiversity conservation, avoidance of erosion and ensuring water quality. In some countries, such as Mexico, community forestry has a long history as a rural development strategy, while in many Amazonian countries, efforts to promote community forestry only began in the last decades. But despite numerous efforts from governments and NGOs, it is still generally unclear whether, and under what conditions, community forestry can meet its stated objectives. While governments and NGOs continue to promote community forestry programs and projects, scholars have pointed out serious difficulties.

Against this background, a group of researchers and professionals working on community forestry in Latin America have joined forces to gain a better understanding of what is meant by community forestry, who are its protagonists, what are the critical dimensions of the enabling environment that influences community forestry, and what are the challenges that families face when pursuing community forestry. This paper reviews the outcomes of this effort and assesses the achievements and challenges of community forestry in Latin America. The next section characterizes community forestry as it is currently promoted in the region. Section three reviews the actors and organizations involved in promoting community forestry. Section four critically discusses the policy environment that affects community forestry. Section five reviews experiences of community forestry in the region, from the management, social outcomes and technical capabilities perspectives. The concluding chapter argues that community forestry as currently promoted in the region suffers from shortcomings, and that an in-depth review of its approach and strategies are needed.



Timber economy in frontier areas. A sawmill worker observes a boat delivering logs harvested from communities along the river Ucayali. City of Pucallpa, Peru. Photograph B. Pokorny.

What is community forestry?

Community forestry is defined here as a complex of local activities relating to woody vegetation that are being actively promoted by external players as income opportunity for local families and for the conservation of trees and forests and the environmental services they generate. This definition implies a close relationship between community forestry and the prevailing development approaches to rural development, which have changed over time. In Latin America, forestry became an element of development policies only in the 1980s, mainly in the form of reforestation programs. The latter half of the 1980s saw worldwide concern for tropical deforestation, and this heavily influenced ways of implementing rural development forestry. In the 1990s, the sustainable development paradigm emerged, coinciding with a new understanding that rural development needed to address economic, social, political and cultural dimensions simultaneously (BEBBINGTON, 1999). Since the 1990s many rural development projects have combined development and conservation objectives. Hence, forestry development projects have

promoted timber and NTFP to generate local income and preserve forests. During the late 1990s, poverty reduction opportunities through forest activities increasingly came to the fore. Current concerns about climate change have shifted the balance of forestry development back again to an environmental focus.

The term community forestry necessarily covers a wide range of activities related to woody vegetation and undertaken by a variety of players including native groups, other traditional communities like *caboclos* or *riberños* (river dwellers) or, more recently, settlers and migrants, who naturally have different interests and capacities in working with trees and forests. Managed areas range from a few hectares to more than a million hectares, such as the indigenous reserves in Brazil. The land may be individually held by a single person or family, or collectively owned by communities as in Mexico and Bolivia, or publicly owned with individual or collective user rights, as in the case of extractive reserves or indigenous territories in Brazil. An important factor that also influences the diversity of Latin American community forestry results from differ-

ences in the quality and intensity of external support provided by governmental agencies and NGOs. However, in spite of these differences, there are several common features in community forestry as it is promoted throughout the region:

- **Legality.** Forest use is ideally in full compliance with the legislation, including formalized user and access rights, development of management plans (if legally required) and their approval and supervision by government authorities.
- **Demarcation of management areas.** Community forestry involves long-term decisions about the area to be managed and the related use and access rights. Decisions are ideally made collectively in accordance with traditional or agreed principles.
- **Low-impact harvesting.** Community forestry applies adaptations of low-impact techniques to use the economic potential of forests effectively and to minimize the impacts of forest product harvesting. Such guidelines are well developed for timber, but much less so for the harvesting of NTFPs.
- **Commercialization on non-local markets.** Community forestry focuses on national and international markets to ensure attractive prices.

- *Integration in value-chains.* It also involves the integration of local players in forest product processing and market chains so that community members can capture a larger share of the value added along these chains.
- *Formal organization.* Community forestry initiatives generally follow collective approaches targeting communities or groups of individual families, and therefore require a structure and formal organization to comply with legal, technical and financial regulations.
- *Strengthening of managerial capacities.* To guarantee a satisfactory level of financial returns and to ensure competitiveness on international markets demanding high standards in terms of quality and delivery, community forestry seeks to strengthen the managerial and business capacities of local forest managers.
- *External support.* Due to the technical, managerial and financial requirements of community forestry, external support is provided in the form of training and specialized services.

Community forestry, as defined above, needs to be distinguished from other forms of forest management, in particular as regards the customary practices of local families. This helps to assess development potential, to understand the obstacles to realizing this potential and to detect the social consequences of community forestry. In this respect, figure 1 places community forestry and alternative strategies along two axes: intensity of forest interventions and formal organizational complexity. This illustrates how forest use patterns range from occasional gathering of forest products for subsistence and local markets, within sustainable production limits, up to predatory harvesting that widely ignores existing thresholds. Predatory harvesting may occur when families spontaneously react to increased demand for a certain product, or when relatively stable harvesting of forest products exceeds forest reproductive capacity, as in the case of *Chamaedorea* palm leaves in Guatemala.

Customary forest use by rural families who gather forest products for subsistence and occasional commercialization falls between these extremes and

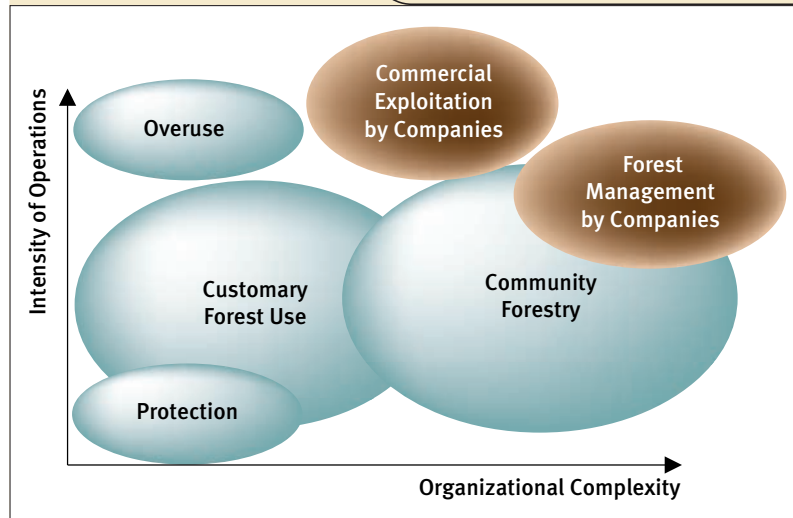


Figure 1.

Intensity and formal organization of community forestry compared to other forest use strategies.

normally includes the use of a wide range of NTFPs, as well as the management of secondary forests and forest gardens. It is mostly organized by individuals or families. Occasionally, families may work in groups, for instance when hunting or collecting thatch and timber for construction. However, minimal formal organization is typical. Community forestry, in contrast, promotes collaboration through organized formal structures to carry out harvesting, processing and commercialization, mainly to ensure competitiveness on markets, but also because forest management areas are located by preference in commonly owned land or at least in contiguous individually owned properties. Community forestry also aims to establish an intensity of forest use that allows sustainable production, mainly of timber or other forest products, where market demand is stable.

To summarize the situation, community forestry as currently promoted throughout the region aims to support local families in replacing their traditional forest use patterns with externally defined technologies and organizational approaches designed to achieve a higher and sustainable contribution of forests to local well-being. In this sense, community forestry can be interpreted as an attempt to modernize traditional forest livelihoods and institutions and therefore reflects a classic (modernistic) approach to rural development.

Supporting community forestry

Since the 1980s, development organizations have considered involving local families more actively in the production and trade of financially attractive timber or internationally traded NTFPs. The first experiences largely failed because of insufficient local technical, managerial and financial capacities. In response, community forestry projects began to invest in more effective organization of communal forestry activities. The challenges imposed by complex markets and limited profit margins shifted organizational support to the active creation of a well-trained local managerial framework. More recently, and guided by climate change mitigation efforts, support agencies have been emphasizing mechanisms to link community forestry to carbon storage and related compensation schemes (WUNDER *et al.*, 2008).

Formally, **public agencies** are responsible for providing rural extension and hence technical rural forestry assistance, but seldom manage to do so due to financial constraints, among other reasons. In Latin America, rural development support, especially relating to forestry, suffers from excessive bureaucracy, corruption and the limited capacities of public sector agencies (SABOGAL *et al.*, 2008^b; CARVALHEIRO *et al.*, 2008; IBARRA *et al.*,



Involving indigenous groups in community forestry is an enormous cultural challenge. This Shipibo-Conibo forest management group process boards with a portable sawmill. They managed to receive FSC certification (see table 1). Community Preferira, Department of Ucayali, Peru. Photograph G. Medina.

2008 ; MARTÍNEZ, 2008). Services provided are often limited to top-down technology transfers and cumbersome administrative procedures. This situation has actually worsened since the 1990s, with the region-wide shift to neo-liberal market mechanisms. Credit programs, if existing at all, are difficult to access for poor families. Public support for rural development generally concentrates on agriculture and, when it addresses community forestry, it is mostly inadequate. Only in some countries, such as Bolivia, Mexico and the states of Acre and Amazonas in Brazil, have governments started to invest in forestry extension. In most countries **NGOs**, supported by international donors, have become the main stewards of community forestry. Compared to government agencies, NGOs are more flexible and have motivated and well-qualified personnel. Donors prefer NGOs, rather than state agencies, as their principal associates to promote community forestry, in particular for establishing pilot experiences and demonstration projects.

In a few cases, **local forest users** have succeeded in forming effective organizations to support families, for instance by developing management plans, negotiating with authorities, carrying out inventories and organizing forest monitoring. Examples are community organizations in Quintana Roo (Mexico) and Petén (Guatemala), or the indigenous association ACICAFOC in Central America (see table I), which help members to solve social and political problems, but also link up the interests of associates and look for external support and resources (TAYLOR, 2001). **Church organizations** sometimes play an indirect role, being present in the majority of rural communities in Latin America, where they are actively engaged in community organization through development and education activities. The role of **universities** with a forestry focus in the promotion of community forestry is generally minimal. Only very few universities have managed to adapt technical and outdated curricula to the changing demands and interests of society and to effectively consider the demands of smallholders.

As a result, few students in Latin America develop the necessary skills to effectively support community forestry (SANTANA *et al.*, 2003). **Commercial companies** are becoming more and more active in community forestry. Companies have started to propose partnerships with communities to gain legal access to communal forest reserves, and also in response to criticisms of predatory timber harvesting, more effective law enforcement and decreasing timber stocks. Generally, in these so-called partnerships, companies take responsibility for forest management plans, logging operations and surveillance against invasion where necessary, while communities are paid for the timber (LIMA *et al.*, 2003). Often communities enter these agreements as the lesser of two evils compared to leaving their forests at mercy of uncontrollable illegal logging operations. The resulting agreements, however, often unfairly serve the companies' commercial interests (MARTINS, 2008).

In general, technical assistance and extension services in Latin America are still based on two questionable premises (MERY *et al.*, 2005): the socio-environmental uniformity of the region, and the top-down transfer of knowledge generated *ex-situ* by experts. Efforts widely ignore the basic rules of effective dissemination of the proposed innovations (ROGERS, 2003) and concentrate on the establishment of pilot experiences through temporary projects. There is little likelihood of replicating these innovations without external support. Some community forestry support organizations have explored ways of matching innovations to local realities by considering local interests and skills, and have adapted local models of forest management that can meet external requirements. The most promising experiences of community forestry (see table I) are those where members of support agencies have fostered mutual respect and valued local capacities. In examples from Mexico and Central America, external agencies have become promoters of local initiatives (TAYLOR, 2001; NITTLER, TSCHINKEL, 2005).

Table I.
Features, achievements and difficulties of some “typical” community forestry initiatives in Latin America.

	Sindicato de Productores Forestales de los Ejidos de Quintana Roo (SPFEQR), México	Asociación de Cooperativas Forestales del Petén (ACOFOP), Guatemala	Forests of the Chiquitano de Lomerío, Bolivia	Shipibo Konibo community of Calleria, Peru	Reserva Chico Mendes, Seringal Cachoeira, Xapuri, Brazil	Settlers in Pedro Peixoto, Acre, Brazil
General characteristics						
Actor	Indigenous communities	Indigenous communities	Indigenous communities	Indigenous community	Traditional communities (latex tappers)	Settlers
Beneficiaries	8.000 people	14.000 people in 30 communities	28 communities	317 people	30 families	8 families
Management area	110.000 ha	500.000 ha	60.000 ha	4.035 ha	290 ha	100 ha
Products	Strong emphasis on the production of mahogany (<i>Swietenia macrophylla</i>)	Focus on mahogany for the production of saw wood in a collectively owned sawmill	Focus on curupaú (<i>Anadenanthera macrocarpa</i>) processed in a collectively owned sawmill	Production of saw wood with a portable sawmill	Production of round-wood processed and marketed through a State-owned cooperative	Production of saw wood with a portable sawmill
Support Focus						
Focus	Development of a management plan, training, technical assistance, marketing, purchase of machinery	Development of a management plan, training, technical assistance, marketing, purchase of machinery, social organization	Administrative support, training, marketing, social organization	Development of a management plan, training, purchase of equipment including a portable saw mill, technical assistance, social organization	Development of a management plan, training, provision of machinery, marketing, social organization	Development of a management plan, training, technical assistance, marketing, transport, purchase of equipment including a portable saw mill
Duration	25 years	15 years	15 years	5 years	15 years	10 years
Main collaborators	GTZ, WWF, DfID, several Mexican ministries, Ecosur	USAID, GTZ/DED	USAID (BOLFOR), SNV, APCOB	AIDER (funded by several donors)	Government of Acre, GTZ, Amigos de la Tierra, IMAFLORA, IMAZON	EMBRAPA Acre (funded by PPG-7/ProManejo)
Achievements						
	Legal representation of the participants of the association Stable and professional governance mechanisms Provision of forestry technical services Improvement of communication among parties and enduring operation	Slowing down the advance of the agricultural frontier within the Maya Biosphere Reserve Political organization and influence on public policies and relevant decision making processes Establishment of a forest service providing technical assistance FSC certification	Formal recognition of community land claims despite unfavorable political conditions Approval of the forest management plan as a precondition for recognition FSC certification in 1996 Creation of technical capacities	Approval of a management plan Technical capacities and creation of a forest management group Successful start of operations FSC certification	Approval of a management plan FSC certification Start of forestry operations in the first annual management area Participation in a State-organized cooperative supporting administration, logistics and marketing of community forestry initiatives	Approval of a management plan Creation of technical capacities Marketing of saw wood
Difficulties						
	Administrative problems due to frequent staff turnover Internal conflicts over possibilities for managing forests individually Crisis of legitimacy Declining donor support Unsatisfactory income as mahogany harvest was reduced to ensure sustainability Competition from external (cheaper) technical services	Ongoing dependence on external funding Conflicts with supporting environmental NGOs not sufficiently taking local views into account Resistance of communities to adjustment to a more efficient enterprise structure Decreasing financial attractiveness due to a limited stock of mahogany	High dependence on external support to manage the community enterprise Low product quality, difficulties in organizing logging operations, and administrative problems affecting financial viability Cultural incompatibility with the requirements of efficient enterprise management Loss of FSC certification (2001) due to unresolved organizational difficulties, and territorial conflict with a neighboring association	Ending of external support Difficulties in obtaining attractive prices Maintenance of technical equipment (portable sawmill) Strong pressure from timber companies Need to acquire funding for permanent FSC certification	Disappointment as the benefits from timber are much lower than initially expected (and promised) Long delay before receiving payments for harvested timber Traditional uses of Brazil nut and rubber sold for guaranteed minimum prices are more attractive Need to allocate funds to pre-finance costs for sub-contracted machinery Declining financial support from the State Conflicts between participating and non-participating families, and supporting organizations	Financially not attractive without external support Complex logistics for relatively small volumes of timber Decreasing external support No funding available for equipment maintenance (portable saw mill)
Literature						
	TAYLOR, 2001; BRAY <i>et al.</i> , 2003, 2007; BRAY, MERINO, 2004	NITTLER, TSCHINKEL, 2005	MCDANIEL, 2003; MARKOPOULOS, 1998; DE POURCQ <i>et al.</i> , (2009)	CAMPOS, 2009; NALVARTE, 2009; LANGE, 2008	AMOREX, 2002; ZANIRATO, 2003; ARGÜELLES, 2004; MEDINA, POKORNY, 2008	OLIVEIRA, BRAZ, 2006; SÁ, 1998; MEDINA, POKORNY, 2008

Public policies and community forestry

Policies for the conservation and regulation of land and forest use influence peoples' decisions on land use and organization (COLCHESTER *et al.*, 2006). In Latin America, most countries have significantly changed their forest governance since the 1990s. In addition to forest policies, other sector policies also have strong effects on communal forestry. Relevant policies in this sense are those that influence access and property rights to land and forests, policies on technical assistance and technological transfer, financial, fiscal and monetary policies and infrastructure, agricultural development and settlement policies.

Regarding **land policies**, in the 1980s social movements had already secured the beginnings of formal acknowledgement of traditional ownership rights by many governments in Latin America (Hall, 2000). In the 1990s, countries began granting tenure and access rights over broad forest areas to indigenous groups and traditional communities, such as *ejidales* in Mexico, community concessions in Guatemala, and indigenous land tenure schemes in Nicaragua and Colombia. In Bolivia, in 1996, the government created the legal status of indigenous territories (*Tierras Comunitarias de Origen*) and implemented legislation for communal properties of up to 500 ha per family (Ruiz, 2005). Brazil earmarked huge forest areas as extractive reserves in combination with several other forms of recognition of local property rights. Peru allocated user rights over equally substantial forest lands to indigenous groups (CHIRIF, GARCÍA HIERRO, 2007). The dramatic increase in formally acknowledged ownership rights of single families and communities over forest lands is one of the reasons for the emerging interest in collaborative natural



Many families in the region process timber from their forests with chainsaws. The use of guide rail for chainsaw (marco-guia) could significantly enhance efficiency. This farmer in Ecuador is storing boards from his own small forest area. Province Morona Santiago, Ecuador. Photograph F. Tandazo.

resource management between local forest users and timber enterprises (FISHER, 1995). Nevertheless, land policies in many countries still favor agro-industries, cattle ranchers, and energy and mineral companies. More and more national governments try to reconcile large large landowners and smallholders and local community property rights, but so far with limited success.

Agricultural policies generally encourage agricultural production promoting the conversion of forests to free up agricultural lands. **Environmental policies**, at the other extreme, tend to aim to protect forests by restricting forest use, or prohibit it altogether. Forest authorities are often linked to environmental ministries, a fact indicating that many countries interpret **forest policies** as a kind of environmental policy. The regulations and norms for legal forest management are usually complicated, difficult and costly to comply with. More often than not, they constitute bureaucratic hurdles and thereby discourage communities from legally using their forests (KAIMOWITZ, 2002). For example, the restraint that many

countries impose on the use of chainsaws for cutting timber is detrimental to community forestry, because for most local families this is the only affordable technology. Smallholders do not have the capital to invest in means of transportation or portable sawmills (MEDINA, POKORNY, 2008).

Another widely applied policy approach strongly influencing forest management schemes is **decentralization**. Here, responsibilities for authorization and control are transferred from the central level to lower levels of government, like municipalities. The new division of powers strongly affects the way forests are managed for the wellbeing of the families depending on these resources (LARSON *et al.*, 2006). However, the many efforts have seldom been accompanied by transfers of sufficient financial resources and have not adequately strengthened the capacities of municipal governments. Only in some cases have decentralization processes allowed the establishment of mechanisms for social participation, so that smallholder representative organizations can exert major influence in decision-making proces-



Plantation programs are found all over the region. This nursery of a small local farmer produces Balsa seedlings (*Ochroma* sp.). Community El Edén, Province Morona Santiago, Ecuador (Shuar ethnic group). Photograph B. Pokorny.

Experiences with community forestry

Technical capabilities

Community forestry aims to change the way families use forests. This often implies that the number of harvested products decreases while the harvest intensity for some products may increase. To avoid over-exploitation and ensure optimum effectiveness, community forestry provides for a series of measures such as the demarcation of the forest management areas, forest inventories, preparation of management plans as a basis for legal authorisation and control, planning and execution of low-impact harvesting, silvicultural treatments, as well as operational and forest monitoring.

Most community forestry initiatives start with the **demarcation of the area dedicated for forest management**, which usually turns out to be a complex task due to often missing formal land titles, conflicts between families and with outsiders about access rights, as well as differing perspectives about future land use strategies. However, in particular this activity proved the potential to generate highly positive outcomes for the communities. Participatory mapping of resources and future uses may help to clarify the tenure situation facilitating subsequent efforts for formal acknowledgment of traditional user rights, establish effective mechanisms to negotiate conflicting views on resources and future land-uses, and thereby generate a basis for a more effective and sustainable use of available resources (CRONKLETON *et al.*, 2008).

One persistent challenge of **forest inventories** in tropical forests is correct species identification, especially where it concerns rare species or those with complex reproductive characteristics (ROCKWELL *et al.*, 2007). Despite systematic attempts to actively include locals in forest inventory teams, forest inventories have

ses. In other cases, however, these processes have increased red-tape, opened new possibilities for corruption and reinforced the position of powerful local elites (RIBOT, 2002). Even when local groups have increased their political influence, this has seldom translated into improved access to forest resources and even less to financial and physical assets (LARSON *et al.*, 2006).

Economic policies make up another decisive group of policies influencing market and investment conditions. **Exchange policies**, for example, affect the competitiveness of timber exports and, consequently, the income of forest managers, while **monetary policies** influence national consumption of domestic timber for example, which is particularly relevant to the bigger countries such as Mexico and Brazil. **Tax policies** have a direct influence on the attractiveness of community forestry as they affect the prices of products and thereby influence profit margins. For example, high taxes on forest products can discourage communities from managing their forests in accordance with legal requirements and thus stimulate illegal harvesting or conversion to other land uses. Finally, inadequate **social policies** on the provision of health, education and food security in rural areas are

alleged by families as one of the main reasons for abandoning land. Without these basic social services, a significant percentage of families tend to abandon their plots after harvesting the products of the first slash-and-burn crop.

Generally, it can be observed that most national governments in Latin America have now recognized local families as important forest users and broadened relevant policies to address rural development and forest conservation. However, the current legal frameworks still emphasize procedures that complicate rather than facilitate legal forest use among forest dwellers (KAIMOWITZ, 2002). Economic and agricultural policies systematically favor activities that compete with community forestry, and environmental policies discourage locals from managing their own forests. Some countries have already started to reform and simplify the legal requirements for community forestry. However, policies outside the forest sector mostly continue to give preferential treatment to agro-business, cattle ranchers and energy and mineral companies, contributing to the expansion of agricultural frontiers. In fact, governments in Latin-America have by no means fully explored the existing potential of setting up adequate fiscal, commercial and social policies.



Tree growing is part of many innovative production systems promoted by development agencies. A farmer participating in the project “Roça sem queimar” (Agriculture without burning) is planting a cocoa seedling in an experimental plot. Medicilândia, Transamazonian highway, Brazil. Photograph L. Hoch.

few possibilities for real participation due to the complexity of their design and, even more so, the methods and procedures of analysis. Communal forestry can only succeed if local capabilities and information requirements can be met through capacity building and simplification of procedures.

The legal requirements to prepare **management plans**, and to plan and document interventions as a basis for assessment by authorities, remains a huge challenge to local families. Management plans require good maps often implying the use of sophisticated technologies such as geographical information systems. Technical procedures and scientific or legal jargon generally makes the cooperation of approval from qualified forest engineers necessary. Several countries have simplified the legal requirements for smallholders to manage their forests, but even the simplified guidelines still exceed existing local skills and capacities.

Many communities in the region have experience with **timber harvesting**. However, the transportation of heavy timber logs presents an enormous logistical challenge. Traditionally, timber harvesting was limited to riverside areas, where flooding rivers enabled the transport of logs during

the rainy season. If logs are cut in the forest, time consuming and demanding hand or animal skidding is necessary, even when portable sawmills are used (GATTER, ROMERO, 2005). Because of this, local communities often collaborate with professional operators or timber companies which have skidders, tractors and trucks at their disposal. But if communities engage in these collaborations on their own, they often have to accept below market prices for the timber and lose control of the operations.

Although local populations often have a long history of forest management, **silvicultural requirements** related to community forestry present a completely new challenge. In contrast to the traditional practice of occasionally favoring certain trees or natural regeneration (HOCH *et al.*, 2009), community forestry demands more intensive measures to ensure the regeneration of commercial species, requiring scientific analysis and long-term experiments to generate the necessary knowledge (SNOOK, 2005). The wide diversity of tree species in most tropical forest conditions complicates the acquisition of this knowledge. GALVÁN *et al.* (2006), for example, demonstrated that treatments used for one tree

species growing under certain conditions do not necessarily work for other species or for the same species under different conditions.

Monitoring of operations and forest dynamics is necessary to assess the performance and impacts of ongoing forest operations. Information produced during monitoring activities may also help communities in negotiations with companies and other external organizations. But forest monitoring related to certification efforts reveals that locals, like many companies, do not fully or adequately implement the relatively complex monitoring mechanisms suggested by experts, which require regular assessments of environmental, economic and social parameters (POKORNY *et al.*, 2007). The legally required establishment, assessment and data management of permanent sample plots to monitor forest dynamics tend to lie beyond the capacities, let alone the interest, of local forest managers. As a consequence, monitoring often becomes too costly, while yielding unreliable information, which is of little use to improve management schemes (LOUMAN *et al.*, 2001).

Competitive disadvantages

Community forestry links local forest users to the rules of international markets with their high standards of quality, and dominant negotiation and trading habits imposed by powerful interest groups. Local forest users have to compete with companies and negotiate with traders who are more experienced, hold more capital, and rely on qualified personnel. Most communities have difficulties in meeting market demands and ensuring the long-term profitability of their operations, even after having received training (MEDINA, POKORNY, 2008). Managerial capacities of communities participating in community forestry initiatives are still incipient, and this is reflected in low yields and profits. New tasks remain major challenges, such as purchasing or renting

equipment or services, handling sub-contracts and long term planning to ensure sufficient cash flow to allow timely payment of running costs.

Experiences with community forestry show that professional administration schemes which are typical for hierarchically organized companies do not necessarily coincide with community cultures characterized by more horizontal structures based on family units and with a strong emphasis on social aspects of cooperation. Community enterprises are liable to be uncompetitive due to high social costs, for example, and because of fluctuations in the management framework and related loss of competence, large numbers of employees, and relatively high salaries (Medina and Pokorny, 2008). In Latin America and elsewhere there is a persistent practice of communities working with traders on the basis of agreements that favor the traders more than community members. Replacing these practices with new managerial structures to strengthen negotiation skills requires long-term interventions from external organizations and a conducive environment. Without this, local users often have no other choice than to concede less favorable terms of agreements.

Promising examples of community enterprises are found in Mexico and Guatemala, where families have managed to create their own enterprises, are members of trade associations, or have established strategic marketing alliances (ANTINORI, BRAY, 2005; NITTLER, TSCHINKEL, 2005). These cases of successful professionalisation, however, demonstrate the difficulties of combining social and economic goals, as many families tend to become dissatisfied with their level of participation and benefit-sharing, as indicated by the emergence of a new elite of enterprise managers. Formally established community organizations rarely manage to achieve broad participation in decision-making and until today it has remained unclear to what extent company managerial structures are compatible with communal schemes of cooperation.



Non-timber forest products often contribute to the livelihoods of traditional communities. A ribereño (traditional communities living by a river) is harvesting fruits of an asá palm for auto-consumption (*Euterpe oleracea*). Community Santa Luzia, Porto de Moz, Pará, Brazil. Photograph G. Medina.

Social outcomes

Community forestry, from a sociological point of view, represents intervention by external organizations to introduce innovations within a social system composed of local families and other more peripheral stakeholders (ROGERS, 2003). In general terms, organizations promoting community forestry aim to adapt local institutions and production schemes to the needs and opportunities of the modern world in order to enable local forest managers to use the commercial potential of their forests more effectively to improve their well being and conserve natural resources. In this sense, community forestry initiatives require local families to learn

new technical, organizational and managerial skills to successfully absorb technologies, engage with new markets and comply with regulations. Community forestry initiatives require certain members of the community to exercise new tasks, activities and functions that did not exist before. This affects historically grown social structures and changes power relations (MEDINA *et al.*, 2009), which, depending on the specific situation, may have positive or negative consequences for the families. Positively, community forestry projects may strengthen local governance structures, for example by integrating women and younger people (POISSONNET *et al.*, 2006). In Latin America, community forestry also provided



For many families living in remote areas, rivers are the only transport way. Locals are loading a boat with their Brazil nut harvest. River Beni, Pando, Bolivia. Photograph C. Quiette.

many families with the opportunity to rupture the historically unfair relations to company agents and traders. The many initiatives have also contributed to the formal recognition of traditional land and forest rights. Promoters of FSC certification schemes also highlight positive effects of training, capacity building and closer contact with external players. They point out that communities have learned to deal with the challenges and possibilities of markets and can participate more effectively in public policy-making (HUMPHRIES, KAINER, 2006).

Development agents, however, tend to suffer from “innovation bias” and highlight the success of the proposed innovations rather than systematically searching for negative effects that are often only indirect and visible in the long term (ROGERS, 2003). Negative consequences of these changes may be that new leaders or traditional elites strengthen their social positions and capture a larger share of the benefits, while the poorer segments of communities fall behind even more. Community forestry interventions thus may induce or aggravate conflicts, for example over the differentiated distribution of costs and benefits between genders and generations, and among families of diverse backgrounds. The installation or formalization of organi-

zational structures does not necessarily mean that they are recognized and accepted by all segments of the community. As many traditional economies in the region are based on diversified production to supply domestic consumption needs and trade in local markets, community forestry also clashes with these traditionally more integrated forms of land use and thereby weakens or replaces – in the medium or long term – traditional patterns of production and social organization. As a consequence, the ability of families to govern their resources as a cohesive and organic collective with a proper social identity may decrease. The reallocation of local labor to forest activities may also affect the performance of the other productive activities, in particular agricultural land-use, usually the central pillar of local livelihoods.

For communities, possibilities for adapting to the timeframes, institutions and instruments enforced by community forestry initiatives normally depend on continuous and intense external support from government agencies or NGOs. But when external support ceases, the generated capacity at local level is often not sufficient for communities to continue the initiative on their own, and families end up being more vulnerable than before.

Conclusions

Community forestry in Latin America faces significant challenges for the future. Success depends on the existence and accessibility of stable attractive markets, simplified bureaucratic procedures, long-term tenure and access rights to forests, financial incentives and effective law enforcement to stamp out illegal resource appropriation. However, almost all pilot initiatives meet with considerable difficulties and have only been able to carry on as long as external support could continue. Supporting organizations have significantly underestimated the scale and duration of the input required, and tended to ignore the need of minimal institutional and political conditions to guarantee the competitiveness of local population. Community forestry, as currently promoted in the region, does not sufficiently match local people’s realities. There is a dilemma between respecting traditional cultural configurations that accept structurally limited competitiveness on markets controlled by players in the globalized economy, and attempts to replace them with an enterprise culture that may bring undesired negative social and environmental effects.

Considering the limited profit margins of sustainable forest management, there is no alternative to putting the forests in the hands of local populations, who, in contrast to commercial players, are not only able but also interested in giving value to the multiple benefits of forests. But to guarantee local viability requires a shift of underlying paradigms: away from a simple transfer of externally defined technology packages and managerial models and towards strategies that offer local families conditions in which they can develop their own management schemes in accordance with their capacities and interests. In addition, sufficiently proactive and coherent actions are needed to establish policy frameworks favoring local initiatives against large landowners, agro-industries,

cattle ranchers and timber enterprises. To achieve this, outsiders must gain a better understanding of local realities and learn to value local knowledge and capacities. This should help to develop a more practical vision of the future of tropical America including a more realistic assessment of the potential role of forests and local forest managers.

References

- AMOREX, 2002. Plano de manejo florestal simples. Rio Branco, BR: RESEX Chico Mendes.
- ANTINORI C., BRAY D., 2005. Community forest enterprises as entrepreneurial firms: economic and institutional perspectives from Mexico. *World Development*, 33 (9): 1529-1543.
- ARGÜELLES M., 2004. Manejo florestal comunitário no estado do Acre: visão estratégica, análise e perspectivas. In: POKORNY B., SABOGAL C., KRÄMER F., (eds.). Forum sobre florestas, gestão e desarrollo: opciones para Amazonía. Belém, BR: CIFOR. 114-129.
- BEBBINGTON A., 1999. Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty. *World Development*, 27 (12): 2021-2044.
- BRAY D. B., MERINO-PÉREZ L., NEGROS-CASTILLO P., SEGURA-WARNHOLZ G., TORRES-ROJO J. M., VESTER H. F. M., 2003. Mexico's community-managed forests as a global model for sustainable landscapes. *Conservation Biology*, 17 (3): 672-677.
- BRAY D. B., DURÁN E., MERINO L., TORRES J., VELÁZQUEZ A., 2007. Nueva evidencia: los bosques comunitarios de México protegen el ambiente, disminuyen la pobreza y promueven la paz social. Informe de Investigaciones. México D. F., ME: Consejo Civil Mexicano para la Silvicultura Sostenible, 23 p.
- BRAY D. B., MERINO Y. L., 2004. Community forests of Mexico. Achievements and challenges. México D. F., ME: Consejo Civil Mexicano para la Silvicultura Sostenible, 32 p.
- CAMPOS P., 2009. Societal change in Amazonian communities as a consequence of the intervention of development organizations: results from the study of the indigenous community of Callería in Peru. M.Sc. thesis. Freiburg, DE: University of Freiburg, 62 p.
- CARVALHEIRO K., SABOGAL C., AMARAL P., 2008. Análise da legislação para o manejo florestal por produtores de pequena escala na Amazônia brasileira. Freiburg, DE: CIFOR/University of Freiburg, 98 p.
- CHIRIF A., GARCÍA-HIERRO P., 2007. Marcando territorio: progreso y limitaciones de la titulación de territorios indígenas en la Amazonia. Copenhagen, DK: IWGIA.
- COLCHESTER M. M. B., CONTRERAS-HERMOSILLA A., GATTO F. D., DEMPSEY J., LESCUYER G., OBIDZINSKI K., POMMIER D., RICHARDS M., SEMBIRING S. N., TACCONI L., VARGAS M. T., WELLS A., 2006. Justice in the forest: rural livelihoods and forest law enforcement. Bogor, ID: CIFOR.
- CRONKLETON P., GÖNNER C., EVANS K., HAUG M., DE JONG W., ALBORNOZ M. A., 2008. Towards well-being: Helping local governments respond to forest dependent people; Experiences from the Northern Bolivian Amazon. In: FISHER B., VER C., MAHANTY S. (eds.). Poverty reduction and forests. Tenure, markets and policy reforms. Proceedings of an international conference. 3-7 September 2007. Bangkok, TA: RECOFTC. Paper 5.
- DE POURCQ K., THOMAS E., VAN DAMME P., 2009. Indigenous community-based forestry in the Bolivian lowlands: some basic challenges for certification. *International Forestry Review*, 11 (1): 12-26.
- FISHER R. J., 1995. Collaborative management of forests for conservation and development. Gland, CH: IUCN/WWF.
- GALVÁN O., LOUMAN B., GALLOWAY G., OBANDO G., 2006. Efecto de la iluminación de copa en el crecimiento de *Pentaclethra macroloba* y *Goethalsia meiantha*; implicaciones para la silvicultura de los bosques tropicales húmedos. *Recursos Naturales y Ambiente*, 46-47: 117-126.
- GATTER S., ROMERO M. R., 2005. Análisis económico de la cadena de aprovechamiento, transformación y comercialización de madera aserrada provenientes de bosques nativos en la región centro-sur de la amazonía ecuatoriana. Macas, EC: Servicio Forestal Amazonica, 29 p.
- HALL A. (ed.), 2000. Amazonia at the crossroads: The challenge of sustainable development. London, United Kingdom, Institute of Latin American Studies, London University.
- HOCH L., POKORNY B., DE JONG W., 2009. How successful is tree growing for smallholders in the Amazon? *International Forestry Review*, 11 (3): 299-310.
- HUMPHRIES S. S., KAINER K. A., 2006. Local perceptions of forest certification for community-based enterprises. *Forest Ecology and Management*, 235 (1-3): 30-43.
- IBARRA E., ROMERO M., GATTER S., 2008. Análisis del marco legal para el manejo forestal por pequeños productores rurales en la Amazonia ecuatoriana. Freiburg, DE: CIFOR/University of Freiburg, 88 p.
- IBGE – Instituto Brasileiro de Geografia e Estatística, 2007. Censo Agropecuario 2007.
- KAIMOWITZ D., 2002. Pobreza y bosques en América Latina: una agenda de acción. *Revista Forestal Centroamericana*, 39-40: 13-15.
- LANGE N., 2008. Contribution of medicinal plants to the primary health care of indigenous communities; case study of two Shipibo-Conibo communities in the Ucayali region, Peru. B.Sc. thesis. University of Freiburg, 72 p.
- LARSON A., PACHECO P., TONI F., VALLEJO M., 2006. Exclusion and inclusion in Latin America forestry: whither decentralization? Bogor, ID: CIFOR, 29 p.
- LIMA E., LEITE A. A., NEPSTAD D., KALIF K., AZEVEDO-RAMOS C., PEREIRA C., ALENCAR A., SILVA JR. U. L., MERRY F., 2003. Florestas familiares: Um pacto sócio-ambiental entre a indústria madeireira e a agricultura familiar na Amazônia. Belém, BR: IPAM, 106 p.

- LOUMAN B., PINELO G., CARRERA F., MORALES J., 2001. Informe de avances en el monitoreo de la dinámica del bosque en Petén, Guatemala. Informe interno preparado para CONAP, CONAP/CATIE/NPV. Turrialba, CR: CATIE. 30 p.
- MARKOPOULOS M. D., 1998. The impacts of certification on community forest enterprises: A case study of the Lomerío community forest management project, Bolivia. Oxford, UK: IIED/OFI.
- MARTÍNEZ M. J. A., 2008. Marco legal para el manejo forestal por pequeños productores y comunidades en las tierras bajas de Bolivia. Freiburg, DE: CIFOR/University of Freiburg, 100 p.
- MARTINS D., 2008. Novos caminhos e antigas práticas: acordos de comunidades com empresas para o manejo florestal. O caso da reserve extrativista Rio Preto-Jacundá em Machadinho d'oeste-RO. MSc thesis. Belém, BR: Núcleo de Ciências Agrárias e Desenvolvimento Rural, Universidade Federal do Pará, 182 p.
- MCDANIEL J. M., 2003. Community-based forestry and timber certification in Southeast Bolivia. *Small-Scale Forest Economics, Management and Policy*, 2 (3): 327-341.
- MEDINA G., POKORNY B., 2008. Avaliação financeira do Manejo Florestal Comunitário. Compendium. Freiburg, DE, IBAMA/University of Freiburg. 217 p.
- MEDINA G., POKORNY B., 2008. Avaliação financeira do manejo florestal comunitário. Brasília, BR: Pro-Manejo/IBAMA, 215 p.
- MEDINA G., POKORNY B., CAMPBELL B., 2009. Loggers and development agents exercising power over Amazonian villagers. Accepted by *Development and Change*, 40: 745-767.
- MERY G., ALFARO R., KANNINEN M., LOBOVIKOV M. (eds.), 2005. Forests in the global balance – Changing paradigms. IUFRO World Series, 17, Helsinki, FI: IUFRO, 318 p.
- NALVARTE J. G. A., 2009. Impacto del manejo forestal con fines maderables aplicado en la Comunidad Nativa Callería, Región Ucayali-Perú. MSc thesis. Lima, PE: National University La Molina. 50 p.
- NITTLER J., TSCHINKEL H., 2005. Manejo comunitario del bosque en la reserva de la Biosfera Maya de Guatemala: protección mediante ganancias. Washington DC, US: USAID, 32 p.
- NITTLER J., TSCHINKEL H., 2005. Community forest management in the Maya Biosphere Reserve of Guatemala: Protection through profits. Athens, United States, USAID/SANREM/University of Georgia, 32 p.
- OLIVEIRA M., BRAZ E., 2006. Estudo da dinâmica da floresta manejada no projeto de manejo florestal comunitário do PC Pedro Peixoto na Amazônia Ocidental. *Manaus: Acta Amazônica*, 36 (2): 177-182.
- PALM C. A., VOSTI S. A., SANCHEZ P. A., ERICKSEN P. J., JUO A. S. R. (eds.), 2005. *Slash and burn: the search for alternatives*. New York, US: Columbia University Press, 463 p.
- POKORNY B., CAYRES G., NUNES W., 2007. Testing the limits of criteria and indicators in the Brazilian Amazon. In: GUIJT I. (ed.). *Negotiated learning: collaborative monitoring in forest resources management*. Washington DC, US: Resources for the Future, 25-34.
- POISSONNET M., PARAMANTIER A., WYNGAARDE B., BIFANE ELLE E., DEMENOIS J., LESCUYER, G., 2006. Espoirs et difficultés du transfert de la gestion forestière à deux communautés de Guyane et du Cameroun. *Bois et Forêts des Tropiques*, 289(3): 5-16.
- POOLE N., 2004. Perennialism and poverty reduction. *Development Policy Review*, 22 (1): 49-74.
- RIBOT J. C., 2002. Democratic decentralization of natural resources: institutionalizing popular participation. Washington D.C., United States: World Resources Institute, 30 p.
- ROCKWELL C., KAINER K. A., MARCONDES N., BARALOTO C., 2007. Ecological limitations of reduced impact logging at the smallholder scale. *Forest Ecology and Management*, 238: 365-374.
- ROGERS E. M., 2003. *Diffusion of innovations*. 5th ed. New York, The Free Press, 550 p.
- RUIZ S. A., 2005. Institutional change and social conflicts over forest use in the northern Bolivian Amazon. *Freiburger Schriften zur Forst- und Umweltpolitik* 10. Remagen-Oberwinter, GE: Dr. Kessel, 245 p.
- SÁ, C. 1998. Custo de produção do manejo do manejo florestal em áreas de reserva legal de pequenas propriedades em projetos de assentamento. Embrapa Comunicado técnico, 95: 1-3.
- SABOGAL C., DE JONG W., POKORNY B., LOUMAN B. (eds.), 2008. *Manejo florestal comunitario en América tropical: Experiencias, lecciones aprendidas y retos para el futuro*. Belém, BR: CIFOR-CATIE. 294 p.
- SANTANA A. C., GOMES S. C., FERNANDES A. R., BOTEHLO M. N., 2003. Perfil do profissional de ciências agrárias formado na Universidade Federal Rural da Amazônia: empregadores, graduados e instituições correlatas. Belém, BR: UFRA, 306 p.
- SNOOK L., 2005. Aprovechamiento sostenido de caoba en la Selva Maya de México de la conservación fortuita al manejo sostenible. *Recursos Naturales y Ambiente*, 44: 9-18.
- STOIAN D., 2005. La economía extractivista de la Amazonía norte boliviana. Bogor, ID: CIFOR, 452 p.
- SUNDERLIN W. D., HATCHER J., LIDDLE M., 2008. From exclusion to ownership? Challenges and opportunities in advancing forest tenure reform. Washington DC, US: Rights and Resources Initiative, 54 p.
- TAYLOR L. P., 2001. Community forestry as embedded process: two cases from Durango and Quintana Roo, Mexico. *International Journal of Sociology of Agriculture and Food*, 9 (1): 59-81.
- WUNDER S., BORNER J., TITO M. R., PEREIRA L. S., 2008. Pagamentos por serviços ambientais: perspectivas para a Amazônia Legal. Brasília, BR: Ministério do Meio Ambiente (MMA), 136 p.
- ZANIRATO F., 2003. Levantamento do custo de produção e análise da viabilidade econômica do projeto de manejo florestal comunitário, da associação dos moradores e produtores do projeto de assentamento agro-extrativista Chico Mendes, Epitaciolândia – AC. MSc thesis. Piracicaba, BR: USP, 32 p.