

Cash income from community-based forest management: lessons from two case studies in the Brazilian Amazon

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Logging road in a legal forest reserve, Uruará.
Photograph P. Sist.

RÉSUMÉ

LA GESTION FORESTIÈRE COMMUNAUTAIRE COMME SOURCE DE REVENUS LOCAUX : DEUX ÉTUDES DE CAS EN AMAZONIE BRÉSILIENNE

La gestion forestière communautaire (Gfc) apparaît comme une des voies permettant de protéger les forêts, tout en générant des revenus directs pour les petits propriétaires forestiers. Depuis le milieu des années 1990, les projets de ce type se multiplient en Amazonie brésilienne. Cependant, la plupart se heurtent à de nombreuses difficultés malgré des financements publics conséquents. Deux de ces projets, mis en œuvre dans l'État du Pará (dans l'Est de l'Amazonie), ont fait l'objet d'analyses entre 2008 et 2010 qui visent à mettre en lumière les principaux obstacles s'opposant à leur viabilité financière sur le long terme et à déterminer les revenus de l'exploitation forestière réellement perçus par la communauté. Le premier obstacle majeur à la réussite des projets de gestion forestière communautaire est la lourdeur du processus réglementaire : il faut actuellement deux ans pour aboutir à l'approbation d'un plan de gestion. De plus, l'élaboration et la mise en œuvre d'un tel plan de gestion est un processus onéreux. Aucun des plans de gestion analysés n'aurait réussi sans le soutien financier externe d'agences nationales ou internationales et sans assistance technique. D'autre part, dans le contexte actuel du marché amazonien, le bois n'apporte que des revenus directs limités pour les petits exploitants, alors même que leurs terres sont forestières à 80 %. L'accès aux marchés est très incertain et les groupes de petits exploitants ont beaucoup de mal à vendre leur bois à des prix rémunérateurs. Des garanties publiques assurant un prix rémunérateur minimum pour le bois issu de projets de gestion forestière communautaire, sont sans doute nécessaires pour qu'ils deviennent une source réelle de revenus pour les petits exploitants amazoniens.

Mots-clés : coûts et avantages, revenus directs, gestion forestière, communauté, Brésil.

ABSTRACT

CASH INCOME FROM COMMUNITY-BASED FOREST MANAGEMENT: LESSONS FROM TWO CASE STUDIES IN THE BRAZILIAN AMAZON

Community based forest management (CBFM) is seen as an alternative way of protecting forests while also generating income for small land-holders. Since the mid-1990s, the number of CBFM projects has increased in the Brazilian Amazon. However, most of them face a number of difficulties despite significant public support. Two CBFM projects, located in the State of Pará (Eastern Amazon), were analyzed between 2008 and 2010 to highlight the main obstacles to their long-term financial viability and to assess the cash income that the communities eventually received from logging activities. The first important hurdle in successful CBFM implementation is the complex legal framework: it currently takes at least 2 years to get a plan approved. Moreover, developing and implementing a management plan is a costly process. None of the CBFM plans could have been successfully implemented without external national and international financial support, as well as technical assistance. Otherwise, in the current Amazonian market context, timber harvesting only represents a limited cash income for small farmers, even if forest covers 80% of their landholding. Market access is very uncertain and smallholder communities do not easily succeed in selling their timber at remunerative prices. Public guarantees ensuring a minimum remunerative price for harvested timber from community forest management plans are certainly necessary to make them an effective source of income for smallholders in the Amazon.

Keywords: costs and benefits, cash income, forest management, community, Brazil.

RESUMEN

EL MANEJO FORESTAL COMUNITARIO COMO FUENTE DE INGRESOS LOCALES: DOS ESTUDIOS DE CASO EN LA AMAZONIA BRASILEÑA

El manejo forestal comunitario (MFC) aparece como una de las formas que permite proteger bosques, al tiempo que genera ingresos directos para los pequeños propietarios forestales. Desde mediados de los 1990, los proyectos de este tipo se multiplican en la Amazonia brasileña. Sin embargo, y a pesar de contar con una importante financiación pública, la mayoría de proyectos tropieza con múltiples obstáculos. Se analizaron dos de estos proyectos, emplazados en el Estado de Pará (Amazonia Oriental), para poner de relieve los principales obstáculos para su viabilidad financiera a largo plazo y determinar los ingresos reales que las comunidades perciben del aprovechamiento forestal. El primer obstáculo importante para sacar adelante los proyectos de manejo forestal comunitario es el engorroso proceso normativo: actualmente son necesarios dos años para lograr aprobar un plan de gestión. Además, el desarrollo y aplicación de un plan de manejo es un proceso costoso. Ninguno de los planes analizados habría salido adelante sin la ayuda financiera externa de agencias nacionales o internacionales y sin apoyo técnico. Por otra parte, en el actual contexto del mercado brasileño, la madera sólo aporta limitados ingresos directos a los pequeños madereros, aunque los bosques cubren el 80% de sus tierras. El acceso al mercado es muy incierto y los grupos de pequeños madereros tienen muchos problemas para vender su madera a precios remuneradores. Avaes públicos garantizando un precio mínimo remunerativo para la madera extraída de proyectos de manejo de bosques comunitarios, son sin duda necesarios para concretizar una fuente efectiva de ingresos para los pequeños productores amazónicos.

Palabras clave: costos y ventajas, ingresos directos, manejo forestal, comunidad, Brasil.

Introduction

The expectations from Community Based Forest Management (CBFM) – defined here as collective forest management involving several families or communities for commercial purposes – are significant when one considers the current worldwide trend towards devolution of forestlands to local communities (WHITE & MARTIN, 2002). Since the mid-1990s, the attempts to implement sustainable CBFM have increased due to the efforts of international donors and environmentalist NGOs. However, only a few tropical countries have experienced favourable conditions for a sufficiently long time to enable their development (BRAY *et al.*, 2003).

Several studies have explored some of the conditions that have enabled or prevented successful outcomes of CBFM projects (SCHERR *et al.*, 2003; MOLNAR *et al.*, 2007; HUMPHRIES *et al.*, 2012; MEDINA & POKORNY, 2011; PORRO *et al.*, 2008; LOUMAN *et al.*, 2008). The on-going experiences still face many difficulties. Regulatory frameworks in many countries disadvantage CBFM and greatly reduce their potential profitability. Many case studies are found in Africa and Asia and most of them conclude that household incomes derived from CBFM are limited (MAHANTY *et al.*, 2009), too low to have an observable impact on households assets (SCHRECKENBERG & LUTTRELL, 2009).

In the Brazilian Amazon, according to the Brazilian Forest Code, 50% to 80% of all landholding must be conserved in forest, where it is only allowed to implement sustainable management of timber and non-timber forest products. Discussion in technical and scientific forums often highlights that understanding costs and benefits is central to developing fair benefit distribution arrangements, and assessing whether the net benefits gained from CBFM are sufficient to encourage on-going community commitment. However, few studies detail this specific issue. This paper aims thus at completing the issue through a detailed historical and cost-benefit analysis of two CBFM projects in the Brazilian Amazon. Studies focus only on cash income communities and households may expect for timber management of their forest reserves, an issue poorly documented, even if some other benefits may exist. The second part of the article presents the CBFM context in the Brazilian Amazon and the conclusion of two recent published financial analyses. The third part describes methodological steps. The part presents the results and the fifth part summarizes the most relevant insights and suggests some necessary reforms in public policies aimed at enhancing CBFM profitability in Brazil.



Small portable sawmill, Lucas Mill, Uruará.
Photograph P. Sist.

CBFM financial viability in the Brazilian Amazon

The Brazilian Forest Service estimates that at least 40 million hectares of forest are distributed amongst several types of smallholders' settlements and could potentially be productive through CBFM (SFB, 2009). Currently, smallholders in the Amazon sell timber to loggers both legally and illegally in order to reduce immediate cash constraints. Some authors advocate that sustainable forest management of smallholders' legal forest reserves could support more equitable development on forest frontiers (AMACHER *et al.*, 2009).

The public incentives to promote CBFM in Brazil started in the mid-1990s. The Promanejo Program (Program to support the Sustainable Forest Management in the Amazon), as a component of the PPG-7 (The Pilot Program to Conserve the Brazilian Rainforest), has supported several so-called "Promissory Initiatives". Between 1997 and 2007, eleven CBFM initiatives in four Brazilian States have been supported (Acre, Amazonas, Rondônia and Pará). According to official data, there were 127 timber CBFM projects registered in the Amazon in 2010 (PINTO *et al.*, 2011), 48 in Para, 36 in Amazonas, 23 in Acre, 16 in Rondônia and 4 in Amapa. However, most of them were under analysis and only 53 plans were active in 2010 (PINTO *et al.*, 2011). In the states of Acre and Amazonas, elaboration and submission of CBFM plans have been financially supported by public and NGO funds (WWF, IUCN...). In Para State, most CBFM plans in agricultural settlements have been submitted through partnerships between private timber companies and communities.

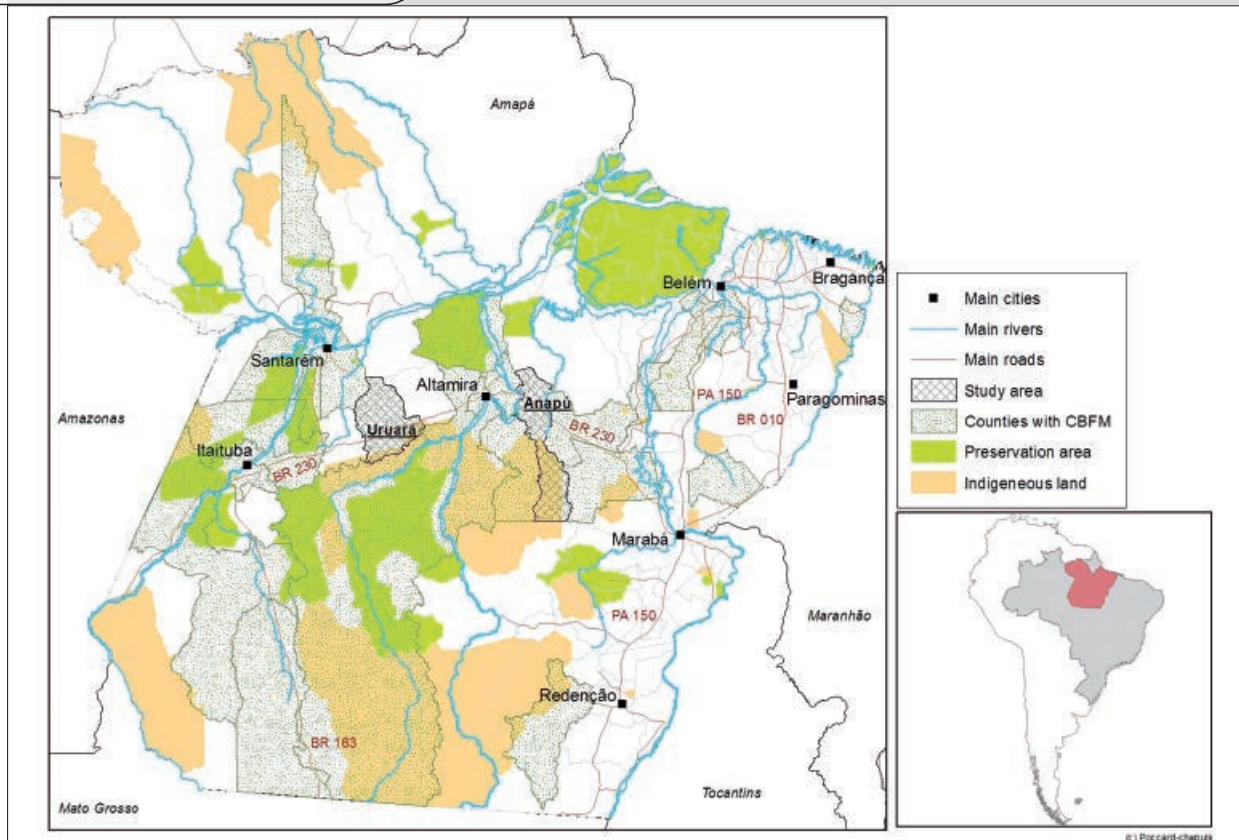


Figure 1.

Pará case studies.

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Source: IMAZON with data from IBAMA, IBGE, FUNAI.

The current Brazilian CBFM experiences still face many barriers. HAJJAR *et al.* (2011) have analysed three case studies in the Brazilian Amazon between June and October 2008. The challenges faced by the three communities are very similar.

Besides the financial requirements, the long and bureaucratic process involved in obtaining the correct legal documents is a hindrance to many community members unfamiliar with the system. The operational phase is also costly. A community can decide whether to harvest timber on their own or to sub-contract a timber company. Both decisions have advantages and disadvantages. In the first option, the building and maintenance of physical infrastructures (*i.e.* roads, equipment, secondary processing machines, etc.) is very costly. In most cases, when external financial support comes to an end, timber sales have decreased. In agricultural settlements, building a partnership with a timber company helps to overcome these difficulties but decreases the potential economic return for the community. None of the three models studied in this paper has succeeded in developing into a self-sufficient enterprise independent from an external agent and support.

Without subsidies, few initiatives can cover operational costs. Moreover, the attempts to enhance profit margins by the use of “appropriate technologies” which comply with legal requirements have often implied high costs and are finally not always successful (POKORNY & JOHNSON, 2008; DRIGO & PIKETTY, 2010).

HUMPHRIES *et al.* (2012) published a detailed financial analysis of three CBFM projects based on the results of a one year exploration. Two of them had profitable annual harvest but their financial viability remains fragile and all of them need new subsidies or better credit access to cover their fixed cost of salaries. Contrary to other existing studies, the authors included the cost of technical assistance and concluded that subsidizing technical assistance may boost CBFM financial viability. Improving access to low interest loans is also recommended in order to decrease the dependence on buyer financing. Investing in wood processing does not necessarily appear as the best option for small scale CBFM financial viability but may translate into larger employment and salaries. Some main limits of this study are that the results are based on a one year exploration and as pointed by the authors themselves, cost and benefits may greatly vary from one year to the other. Moreover, the authors do not detail extensively the income level communities may expect from CBFM in the largest portion of their landholdings.

It is quite clear that CBFM in the Brazilian Amazon would probably lose any profitability without external support. Therefore, the following analysis does not aim at improving the estimation of production cost by including expenses that communities do not support, such as technical assistance. The remaining costs supported by the communities and the cash income finally derived in such a context have been rather considered.

Table I.
The logging scenarios of CANOR and Virola Jatobá Association in 2008.

Projects	CANOR	Virola Jatobá
State/City	Pará/Uruará	Pará/Anapu
Participants	Smallholders	Smallholders
Number of participants	6	183 families settled 12 directly involved
Property regime over land	Individual	Concession granted by government on a long time basis
Total legal forest reserve of the project	364 ha	23,000 ha
Annual area harvested	74 ha (separated parcels)	500 ha (first year-2008) 1,000 ha (for the next years)
Exploitation model	Community and mechanized	Enterprise mechanized
	Plan submitted in 2004 Approved in 2008 First exploitation in 2008	Plan approved in 2005 First exploitation in 2008
	No partnership with industrial timber enterprise	Partnership with an industrial timber enterprise
	10-year cutting cycle	25-year cutting cycle
	15 m ³ /ha	16 m ³ /ha
Benefits sharing	Individual	With all families

Elaborated by authors.

Methodology

Case study selection

This paper focuses on two CBFM initiatives in the Eastern Brazilian Amazon, located in the state of Pará (table I). Both cases are communities living in official settlements projects, administrated by the National Land Reform Institute (INCRA). The cases selected represent two different forest management models. The main features of each plan in 2008 are presented in table I.

The Agro-Extractivist Cooperative of “Novos Rumos” (CANOR) is a cooperative of small landholders. CANOR’s members were settled at the beginning of the 1970s in the municipality of Uruará in the Transamazon region (figure 1). On average they hold a 100 ha plot for which they are entitled to have an individual title, though many have not yet received it. The Brazilian Forest Law requires that they maintain 80% of their plot in forests. They can exploit the timber and non-timber forest products of their legal forest reserve under an approved forest management plan. On the remaining 20%, cattle’s ranching is the main relevant income source, and farmers also produce corn and rice, mainly for subsistence.

Shifting cultivation is common among settlers. The CANOR initiative is one of the few examples of a community with separate forest plots that tried, with the technical and financial support of several entities, to build together a forest management plan and to conduct themselves forest exploration.

The second case is the Virola-Jatobá Association initiative. The Virola-Jatobá case is a special category of settlement, located in Anapu, Transamazon region (figure 1). The settlement was created in 2003 and covers 29,000 ha. In this case, the legal forest reserve area is continuous, communal, and covers around 23,000 ha (80% of the settlement area). The remaining area is divided in individual plots of 30 ha each, on average, where farmers can raise cattle and cultivate crops. The available official data register 183 families living in this settlement. But, according NGOs and settlers, many families have already abandoned their plots and some new families have arrived to occupy these plots without official permission. The settlers do not have individual land title: the Association signs a concession contract with the government that guarantees long term user rights over land and forests under specific rules. The Virola-Jatobá initiative is an example of CBFM in which the community initially decided to subcontract the exploitation of their common forest reserve to a timber company, a scheme often found in Pará State (AMARAL NETO *et al.*, 2011).



Log harvested from a smallholder forest reserve, Uruará.
Photograph P. Sist.

Data collection and analysis

Production cost supported by the communities, selling negotiations and benefits were monitored during the years 2007, 2008 and 2009 through a research–development project financed by an international fund (Floagri project, European Fund; SIST *et al.*, 2010).

Fieldwork was thus conducted in 2008 and 2009 and some information was updated in 2011-2012. Using a qualitative approach, the conducted interviews aimed at collecting data on costs and benefits among the beneficiaries of the two projects. Individual interviews were performed with family members involved in the forest management plan. Two participative workshops in each community were organized to gather information about the production scenarios considered by the community members involved in the CBFM projects. Interviews were also conducted with the forest engineers responsible for the forest management plans, the NGO members, technicians that worked directly with the community members, the local and regional sawmill owners, and the governmental authorities at Uruará and Anapu townships (total of 49 interviews). The interviews also enabled to understand in more detail the different barriers the communities had to face before succeeding in their first exploration in 2008.

Reported costs are only those supported by the communities. For Virola Jatoba, timber was sold standing and the harvesting costs of the timber company were not assessed as they were not supported by the community. The detailed costs supported by the communities are thus only available for CANOR and have been distributed amongst: administration covering the annual spending to accompany the annual licensing plan process and all regularization procedures for the association (trips to the state capital, accountancy services); pre-exploratory phase covering road/patio opening for the parcel to be harvested during the year; harvesting phase covering equipment rentals and labor costs for logging, skidding, cubage; transport costs to the mill.

Potential family income derived from each project comes from two main sources: the net benefits of exploration, *i.e.* gross benefits from timber selling minus production costs supported by the community, and salaries for community members involved in forest exploration. It thus means that part of the production costs are transferred through some community members as additional incomes. The distribution of benefits amongst the communities' families depends on each scheme since in some cases, as in Virola-Jatobá, the benefits are not distributed but rather invested in collective goods. However it was decided to distribute the net benefits amongst all the families of the plan in order to fully discuss the potential cash income a family can expect from such CBFM plan. For all calculations the following dollar exchange rate is used US\$ 1,00/ R\$1,97 in 2008.

Results

CANOR history

In 2004, twenty members of CANOR decided to start a CBFM project. The first financial support came from Promanejo. The Rural Union of Uruará and the FVVP Foundation (Fundação Viver, Produzir e Preservar) were the local organizations involved. From 2007 to 2009, the CANOR initiative received the support of the Floagri Project. The forest management plan of CANOR has faced serious problems since its conception. First of all, the forest management plan was submitted in 2004 but it was approved only in 2008. One of the reasons was that part of the settlement area was overlapping an officially designated Indigenous Land. Thus, 18 families initially involved in the forest management plan faced a tenure problem. The cooperative, with the support of a NGO, attempted to show that the tenure conflict was due to a government mistake during the indigenous land delimitation process but the situation could not be resolved. The forest management plan had started with 24 participants covering almost 1,500 ha, but in the end only six families could be legally included. Moreover, at the beginning of 2008, the Public Federal Ministry of Pará (a regional agency of the Ministry of Justice) decided to freeze all CBFMs because of fraud, with suspicion that involved settler associations, loggers and governmental agents of INCRA. The CANOR was not involved in any corruption scheme but the licensing was nevertheless delayed. Finally, CANOR obtained its harvest license in August 2008.

There are legal and administrative costs at all phases of the execution of a forest management plan. In the initial phase, the legal and administrative costs include the cost to prepare a technical plan, to elaborate an annual operational plan and all the follow up process related with the approval of these documents. The final outcome of this process is a license to harvest, called AUTEF (Authorization to Harvest). As environmental agencies are located in the State capital, community members often have to travel in order to register their documents. The Cooperative received around US\$ 231,000 in 2004 as a donation from Promanejo.

According to the CANOR manager, about 50% of this amount was used to pay for the delimitation and forest inventory of the 24 parcels (a pre-requisite to prepare a technical forest management plan), the elaboration of the forest management plan and of the first operational plan by a forest engineer. The other 50% was used for physical infrastructures (*i.e.* a building for the cooperative within the settlement; computers and software; two motorcycles; and an office downtown). Thus, when the license to harvest was finally released to six parcels only, the cooperative was completely deprived of capital.

Each settler decided to manage around 10 hectares per year. The initial plan was to harvest the maximum volume allowed (a total of 2,119 cubic meters or around 29 m³/ha, meters per hectare). The CANOR members also intended initially to saw all their own timber and thus acquired a Lucas Mill sawmill, still with the support of public funds. For timber transport, they initially planned to combine animal traction with tractors to transport the sawn wood out of the forest. The transportation of the sawn wood to the buyers would be done in rented trucks. The idea was to sell all the sawn timber in local and regional markets.

However, the cooperative had to give up this scenario when they started logging in 2008. Instead of harvesting 29 m³/ha, they agreed to harvest an average of 15 m³/ha (around 1,048 m³ of round timber). Three main interrelated reasons explain this decision.

First, the cooperative members assessed that they were likely to lack the time to harvest all the volumetric before the beginning of the rainy season. Indeed, in order to respect the law requirements, timber harvesting had to be completed before the first heavy rains (December) which means that CANOR members had only four months to complete harvest operations. Secondly, they were not sure to find a buyer for all species. The CANOR manager, with the support of the FLOAGRI project participants, tried to negoti-

ate a sales contract before harvesting but the potential buyers wished to buy few species or very specific processed products. Moreover, the time to find a buyer before starting exploration was also too short. Thirdly, without any additional capital or sales arrangements, the families had to advance the production costs (fuel, machinery rent, transport...) using their limited personal funds and feared to lack financial resources to cover exploration costs.

The community also had to partially abandon the idea of selling sawn wood because a new regulation was set in 2008, requiring that they obtain a license to saw timber and sell sawn wood, a license that the community could not obtain rapidly. This new regulation was introduced by the State Environmental Monitoring Agency (SEMA/Pará) in order to prevent the selling of illegal sawn timber. Only the three species with most value were thus planned to be sawn through a subcontract with an industrial sawmill. In the end, it could not be finalized and the timber harvested was sold as round timber. The price negotiated for round logs was US\$ 58 per cubic meter.

Operational costs and benefits of CANOR

The data collected shows that CANOR spent US\$ 47 per cubic meter of round timber to harvest 1,048 m³ (table II).

The administrative costs cover the last trips to the state capital required to follow up on the release of the license to harvest, legal annual fee payments and accountancy services required in order to have the conditions for the Cooperative to sell timber.

The pre-exploratory costs cover only building of internal roads since the annual forest inventory and POA elaboration and submission costs were fully supported by external funds. Internal roads are opened only in the forest units to be explored during the year and costs are thus supported every year.

All logging operation tasks were performed by community workers, and then part of this cost was returned as family income (see below). Skidding represents the largest share of the exploration cost. A skidder was rented and its rental rate alone represents 70% of the skidding cost.

The transportation costs reached US\$ 29 per cubic meter (62% of total cost, table II). Timber loading and transport were subcontracted. Indeed, such cost may seem prohibitive, but it is necessary to remind that roads are in a very bad condition. The Transamazon highway was never completely paved. The Federal government does not provide the minimum maintenance services in order to keep these roads viable to traffic. Consequently, trucks break down frequently. Inside settlements, the situation is even worse. In general, the legal forest reserve areas are located in the deepest areas of the settlement's land. Thus, round logs have to be transported over several kilometres of very bad internal roads to a common yard. This transport cost is also particularly high because each plot is isolated from the others.

The gross benefit expected from the sale of the total volume harvested was around US\$ 60,784. Total costs reached US\$ 49,256. Thus, the total net benefit could have been US\$ 11,528. Equally distributed among the six families, it would have meant a benefit of around US\$ 1,921 per

Table II.
Production costs supported by CANOR in 2008.

	US\$	%
Administration	8,376	17
Pre-exploratory	2,360	5
Exploration	7,189	15
Skidding	4,797	
Transport	31,008	63
Certification		
Association		
Total	48,933	100
M ³ harvested	1,048	
Cost/m ³	47	

family. However, each family's net benefit varies because the distribution of the species among plots is not homogeneous and some family members were directly involved in forest management activities and remunerated as subcontracted workers (table III). On average, CANOR families with members directly involved in forest management earned an additional income of US\$ 373.

The data updated during 2009 and 2010 shows slightly different results. In fact, the total timber volume sold until 2010 was only 551 cubic meters. The CANOR gross benefit in the first year reached only US\$ 31,958 and the cooperative remained for some time with a negative balance (US\$ -17,298). AMARAL NETO *et al.* (2011) reported that CANOR total net benefit was in the end about US\$ 12,690 (what was expected).

Despite all these problems, the CANOR experience showed that each family finally succeeded in gaining small annual cash income from harvesting their forest reserves. Nevertheless, some root factors (uncertainty of tenure rights; government inefficiencies to analyse and approve forest management plans; difficult access to markets) imposed serious delays threatening the fragile financial viability of the project. Moreover, a maximum of US\$ 2,217 + US\$ 373 (salaries), *i.e.* US\$ 2,597 was earned by each family, or US\$ 216 per month and per family, which corresponds to one Brazilian minimum salary (US\$ 210/month in 2008).

Virola-Jatobá

The CBFM plan of Virola-Jatobá Association started in 2005. It was the last initiative supported by Promanejo. The present survey registered twelve families directly involved in forest management activities. The main features of the plan are found in table I.

The most distinctive features of this arrangement are that the legal forest reserve is continuous, the property regime over the legal forest reserve is common property and there is a strong social organization in the community supported by several local entities (the Rural Union, NGOs, the Pastoral Land Commission...). Moreover, the association members invested in building a community-enterprise partnership. In 2007, they succeeded in signing a contract with

a tropical wood flooring company, located in Belém, the capital of Pará State. The contract length is 15 years (2008-2023). During this period, the firm is in charge of all production activities and supports all logging costs. 120 families are formally included in the contract.

The price per cubic meter for each species (received by the community) had been previously negotiated between the enterprise and the Association. In 2008, the average price negotiated reached US\$ 26 per cubic meter. The Virola-Jatobá Association, with the assistance of their sponsors, negotiated some other social and economic clauses to enhance benefits to the community. For instance, one of the contract clauses states that the enterprise has to employ some community members. The enterprise must also maintain the internal settlement roads. The contract, quite favourable for the community, has been negotiated with the help of a local NGO.

As for CANOR, the Virola-Jatobá members did not support the costs of the initial phase of the forest management plan. The forest inventory and the preparation of the forest management and annual operational plan were supported by the Promanejo fund. As reported by the Association director, the inventory and forest management plan costs reached US\$ 121,000, a value of the same order as the CANOR case.

The year 2008 was the first year of exploration and can thus be considered a learning period. The timber production was much lower than expected. Instead of harvesting 8,000 cubic meters in 500 ha, the enterprise harvested only 4,000 cubic meters of round timber. The reason for such a discrepancy was the overestimation of the timber potential by the previous forest inventory: some trees marked to be harvested were located in preservation areas, and thus could not be removed, and there was a high occurrence of hollow trees. The gross benefit for the Association reached US\$ 112,000.

The Virola-Jatobá Association had to pay administrative and legal costs, mostly license fees, the annual legalization costs of the Association (federal and state fees and taxes, accountant services). These costs reached US\$ 5 per cubic meter of round wood logged. The total cost supported by the community was thus US\$ 20,000 and the net benefit received was US\$ 92,000.

Table III.
Net benefit per family (wages not included) – CANOR.

Family	Area exploited (ha)	Total volume harvested (m ³)	Net benefit per family (US\$)
1	12	207	2,277
2	12	187	2,057
3	20	184	2,024
4	12	192	2,112
5	12	185	2,035
6	6	93	1,023
Total	74	1,048	11,528
Elaborated by authors.			

Table IV.
Net benefit per family – VIROLA-JATOBÁ – 2008 (US\$).

	Number of family	Net benefit distribution	Salary	Total per family
With member as permanent worker for the timber company	2	503	2,520	3,023
With member as temporary worker for the timber company	10	503	3,042	3,545

Conclusion-discussion

How was this economic benefit shared? As presented earlier, the total number of families settled in the settlement is uncertain. To avoid internal conflicts and also to respect the specific rules of such settlements that forbid to individually distribute the benefits of logging in the communal forest reserve, the association decided to invest the entire benefit to acquire physical goods for the Association. They acquired a tractor and its implements and a machine to process the rice cultivated by families. If one considers that such a large forest reserve should benefit all the families settled, the first year benefit gives a net family income of US\$ 503, or less than US\$ 45 per month and per family.

Some family members were employed by the timber company. Ten families had one member employed in forest operations during six months with a monthly salary of US\$ 507 and two families had one member permanently employed at a minimum salary (US\$ 210 per month), which resulted in a significant additional income for these twelve families (table IV).

For the following years, the Virola-Jatobá members planned to harvest 1000 ha. The timber volume expected was 16,000 cubic meters of round logs. The cost distribution between the association and the enterprise remained almost the same, but the Association intended to pay also part of the forest inventory costs. The motivation behind this managerial decision was to get more control over the knowledge of the forest stock and conditions.

According to AMARAL NETO *et al.* (2011), in 2009 the planned exploitation scenario was implemented and the Virola-Jatobá Association would have received a net benefit of US\$ 337,563 or the equivalent US\$ 1,845 per family and per year, still much lower than a minimum salary per family. However, the authors also stressed that the Association had problems to receive this amount because the enterprise delayed the payments. According to the engineer in charge of monitoring the management plan, the community did finally receive this amount.

The two case studies highlight and confirm that CBFM initiatives in the Amazon still faces huge challenges to secure long term economic viability. First of all, it is very clear that initial costs (*i.e.* inventory costs; preparation of forest management plans and annual operational plans; costs to start the bureaucratic process of approval and follow up) are prohibitive for the communities. Although both communities can poorly inform these costs, in both cases they seem to have exceeded US\$ 100,000. One can argue that community members could be betrayed by unethical professionals who overestimated the price for their services, particularly once they knew that public funds were available. However, it is also true that contracting the services needed to elaborate a forest management plan in the Amazon region is expensive. There are few forestry engineers and technicians available and their honorariums are usually high. Besides such services, the Community members have to spend money in travelling to register documents in the State capital. In 2010, a new INCRA regulation may make the forest management plan approval process even more complicated. Forest management plans in settlements shall be evaluated by INCRA to get full approval, which means a double approval process. Unfortunately, in Brazil, very little data exists on the cost of elaboration of a forest management plan, even for private companies (SABOGAL *et al.*, 2006). The smaller the volume available for harvesting the higher the weight of this fixed initial cost. As stated by CRONKLETON *et al.* (2012) from an analysis of CBFM in Bolivia, Guatemala and Philippines, co-management of forest resources should be seen as a process of negotiations and dialogue between governmental and community stakeholders. Some flexibility needs to be introducing in regulatory frameworks. Until now, in the Brazilian case, forest management regulations remained quite rigid.

Such initial costs could be decreased with a more efficient administrative system and the possibility to register forest management plans without travelling to the State capital. Moreover, as such a phase is systematically paid through public funds for CBFM, one can wonder if a public institution or an organization directly paid by a public institution should not be entirely in charge of the elaboration and submission of CBFM plans. For example, in the Acre State, the State government implemented a bidding system to contract forestry services in charge of the elaboration, submission and monitoring of

CBFM management plans. In some cases of community-enterprise partnerships, the timber company supports the costs to legalize the forest management plan (for example: MAPFLOPS case in Santarem; AMARAL NETO *et al.*, 2011). But one can expect that such experience will remain limited to communities with large forest reserves or, as has already happened, when the timber company just plans to have access to the resource legally and harvests once only without taking care of post-silvicultural treatments (AMARAL NETO *et al.*, 2011).

Moreover, market conditions are still unfavourable to CBFM projects running without a partnership. Despite the federal government's effort to fight illegal logging, local sawmills still can be supplied by illegal schemes. Indigenous lands and settlement areas continue to supply many sawmills, with or without the cooperation of indigenous people and settlers. The timber prices are pushed down in such a situation. Besides, buyers still prefer to purchase the most valued species. It is also difficult for communities to reach other markets without NGOs' or donors' assistance. The buyers of the central (Brasília) and south-east regions of Brazil (São Paulo) demand sawn wood that is costly and risky to produce. It is also true that they demand high quality timber. The communities are neither equipped nor prepared to saw high quality timber. Once again, the community-enterprise partnership as is the case of the Virola-Jatobá Association seems to be an "interesting option". Timber companies are often more skilled at processing logs and finding appropriate markets for final products. However, the community members of Virola-Jatobá Association claimed the enterprise tried to harvest also the most valued species to the detriment of other species the community was interested in selling.

Given the initial fixed cost and market uncertainty, it is also very important to enhance community knowledge about the real timber stock in their legal forest reserves. In general, each community supported by its donors managed to perform the inventory of the first parcel to be harvested. But an extensive inventory in the entire forest reserve could prevent false expectations regarding potential benefits and avoid investing in the elaboration of a plan with very limited financial viability. Furthermore, a full forest inventory can allow settlers and communities to better plan future timber sales. It is also necessary to develop markets for the less valued species, which are always difficult to sell (*i.e.* for example *Cedrelinga catenaeformis* (cedrorana) and *Enterolobium schomburgkii* (orelha-de-macaco)).

Contrary to HAJJAR *et al.*'s statement (2011), securing market access at prices that make CBFM plans financially viable may be the first step to really enhance CBFM potentialities in the Amazon and avoid wasting of scarce public funds. Timber prices vary in the Amazon and depend largely on sales negotiations between communities and their potential buyers. In 2009, PEREIRA *et al.* (2010) assessed from a survey of 714 timber firms that round timber prices varied between US\$ 81/m³ (for less valued species) up to US\$ 177/m³ (high valued species). Such values easily could have covered the CANOR production cost (US\$ 47/m³). However, it was impossible for the Cooperative to negotiate such values.

Some public involvement in markets could be experimented. For instance, the local or regional governments could preferentially buy timber from CBFM plans at guaranteed prices to build schools, medical centers, social housing projects, etc. The current procurement mechanisms do not allow such scenarios because the supplier chosen is usually the one offering the minimum price. Indeed, this is a barrier to overcome. Furthermore, establishing an official list of minimum prices for timber from CBFM projects may help the CBFM managers to reduce speculation while negotiating with buyers. Another market access support initiative could be sought through public bidding systems. For example, in the case of a CBFM based in a Public Forest (CRUZ *and al.*, 2011), in 2008, an average price of US\$ 107 per cubic meter was reached by the Comflona cooperative in Santarem and at the project door, whereas the same year the CANOR cooperative had to sell its timber at a medium price of US\$ 58 /m³ and to pay for timber transport to the city.

The bad conditions of the internal settlement roads and external roads raise transportation costs significantly. The CANOR case is critical but the situation would probably be the same for all smallholders with separate plots willing to invest in CBFM. If road improvements may in some cases accelerate forest frontier colonization and deforestation, it remains a necessity as their bad conditions impose high costs to sell any of the settlers' produce, including timber.

Finally, even with large subsidies, the cash income from forest management for timber production is relatively low when one considers that 80% of the land capital is frozen, and is not sufficient alone to sustain a family. Higher levels occur only for the community members directly employed by the private timber company as in the case of Virola-Jatobá. Such findings highlight the necessity to invest in research-development activities to support the implementation of sustainable cattle ranching and agricultural activities in the limited area allowed being deforested.

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Bibliographical references

- AMARAL NETO M., CARNEIRO M. S., MIRANDA K. F., 2011. Análise de acordos entre empresas e comunidades. Belém, Brazil, IIEB, 98 p.
- AMACHER G. S., MERRY F. D., BOWMAN M. S., 2009. Smallholder timber sales decisions on Amazon frontier. *Ecological Economics*, 68: 1787-1796.
- BRAY D., MERINO-PEREZ L., NEGREROS-CASTILLO P., SEGURAWARNHOLTZ G., TORRES-ROJO J., VESTER H., 2003. Mexico's community-managed forests as a global model for sustainable landscapes. *Conservation Biology*, 17 (3): 672-677.
- CRUZ H., SABLAYROLLES P., KANASHIRO M., AMARAL M., SIST P. (ORG.), 2011. Relação empresa/comunidade no contexto do manejo florestal comunitário e familiar: uma contribuição do projeto Floresta em Pé. Belém, Brazil, IBAMA, 318 p.
- CRONKLETON P., PULHIN J. M., SAIGAL S., 2012. Co-management in Community Forestry: How the partial devolution of management rights creates challenges for forest communities. *Conservation Society*, 10 (2): 91-102.
- DRIGO I. G., PIKETTY M.-G., 2010. Custos e benefícios da implementação de dois planos de manejo florestal comunitário na região da Transamazônica, Estado do Pará. Belém, Brazil, MKT JZ comunicação, 66 p.
- HAJJAR R., MCGRATH D. G., KOZAK A. R., INNES J. L., 2011. Framing community forestry challenges with a broader lens: Case studies from the Brazilian Amazon. *Journal of Environmental Management*, 92: 2159-2169.
- HUMPHRIES S., HOLMES T., KAINER K., GONCALVES KOURY C. G., CRUZ E., MIRANDA ROCHA R., 2012. Are community-based forest enterprises in the tropics financially viable? Case studies from the Brazilian Amazon. *Ecological Economics*, 77: 62-73.
- LOUMAN B., GARCIA-FERNANDEZ C., SABOGAL C., EHRINGHAUS C., SALAZAR M., VILLACRES D., 2008. Capacidades técnicas y desafíos del manejo forestal comunitario. *In: Sabogal C., de Jong W., Pokorny B., Louman B. (Eds). Manejo forestal comunitario en América Latina: Experiencias, lecciones aprendidas y retos para el futuro.* Belém, Brazil, CIFOR-CATIE.
- MAHANTY S., GUERNIER J., YASMI Y., 2009. A fair share? Sharing the benefits and costs of collaborative forest management. *International Forestry Review*, 11: 268-280.
- MEDINA G., POKORNY B., 2011. Avaliação financeira do manejo florestal comunitário. *Novos Cadernos NAEA*, 14 (2): 25-36.
- MOLNAR A., LIDDLE M., BRACER C., KHARE A., WHITE A., BULL J., 2007. Community-based forest enterprises: their status and potential in tropical countries. IITO technical series 28. ITTO/RRI/Forest Trends, 75 p.
- PEREIRA D., SANTOS D., VEDOVETO M., GUIMARAES J., VERISSIMO A., 2010. Fatos florestais da Amazônia 2010. Belém, Brazil, AMAZON, 124 p.
- PINTO A., AMARAL P., AMARAL NETO M., 2011. Iniciativas de manejo florestal comunitário e familiar na Amazônia. Belém, Brazil, AMAZON-IIEB, 86 p.
- POKORNY B., JOHNSON J., 2008. Community forestry in the Amazon: The unsolved challenge of forests and the poor. London, United Kingdom, ODI, *Natural Resource Perspectives* 112, 4 p.
- PORRO N., GERMANA C., LOPEZ C., MEDINA G., RAMIREZ Y., AMARAL M., AMARAL P., 2008. Capacidades organizativas para el manejo forestal comunitario frente a las demandas y expectativas oficiales. *In: Sabogal C., de Jong W., Pokorny B., Louman B. (Eds). Manejo forestal comunitario en América Latina: Experiencias, lecciones aprendidas y retos para el futuro.* Belém, Brazil, CIFOR-CATIE.
- SABOGAL C., LENTINI M., POKORNY B., BERNARDO P., MASIHI F., SOBRAL L., SILVA J. N. M., ZWEEDE J., BOSCOLO M., VERÍSSIMO A., 2006. Manejo Florestal Empresarial na Amazônia Brasileira: Restrições e Oportunidades para a Adoção de Boas Práticas de Manejo. Relatório Final. Belém, Brazil, CIFOR-AMAZON-EMBRAPA-FFT, 107 p.
- SCHRECKENBERG K., LUTTRELL C., 2009. Participatory Forest Management: a route to poverty reduction? *International Forestry Review*, 11 (2): 221-238.
- SCHERR S., WHITE A., KAIMOWITZ D., 2003. Making markets work for forest communities. *International Forestry Review*, 5 (1): 67-73.
- SFB (SERVIÇO FLORESTAL BRASILEIRO), 2009. Plano Anual de Manejo florestal Comunitario e Familiar, 2010. Brasília, Brazil, SFB, 99 p.
- SIST P., DRIGO I., BARBOSA T., MAZZEI L., PIKETTY M.-G., 2010. Populations rurales et préservation de la forêt amazonienne brésilienne. *Le Flamboyant*, 66-67 : 42-45.
- WHITE A., MARTIN A., 2002. Who owns the world's forests? Forest tenure and public forests in transition. Washington, DC, USA, Forest Trends, Center for International Environmental Law, 30 p.