

Coming down to Earth: a critical analysis of a project for the commercialization of non-timber forest products in a community of the Eastern Amazon

Cristina Herrero-Jáuregui¹, Benno Pokorny², Miguel A. Casado¹

¹Departamento de Ecología, Facultad de Biología, Universidad Complutense de Madrid, 28040 Madrid, Spain

²Albert-Ludwigs Universität, Freiburg, Germany

*Autor correspondente:
cherrero@bio.ucm.es

Index terms:

Brazilian amazon
Community-based forest management
Conservation-development
Non-timber-forest products
Forest dependent people

Termos para indexação:

Amazônia brasileira
Desenvolvimento-conservação
Manejo florestal comunitário
População dependente da floresta
Produtos florestais não madeireiros

Histórico do artigo:

Recebido em 02 dez 2010
Aprovado em 15 jun 2011
Publicado em 30 jun 2011

doi: 10.4336/2011.pfb.31.66.131

Abstract - Many governmental and non-governmental development organisations (NGOs) invest considerable efforts to support forest dependent people for the extraction and commercialization of non-timber forest products (NTFP) to generate income in an ecologically sustainable way. But success so far has been quite modest. Many of the families abandon these initiatives once the external support ceases. This paper critically reflects on the expectations and concerns regarding this kind of development projects by in-depth analysing a project for the commercialization of vegetal oils by the traditional community of Pedreira, situated in the Eastern Brazilian Amazon, which received intensive government-lead support. The study explores the motivations of the participating families, how the project influenced production schemes, and what have been the specific benefits for participating families and the overall consequences for the entire community. Findings indicate that the analyzed NTFP project, on the basis of overoptimistic expectations, strongly invested in the re-organisation of local production schemes without adequately considering the socio-environmental reality, capacities and interests of the community. As a consequence, the proposed social-productive model was not necessarily meaningful to all local people and even had detrimental effects.

Baixando à Terra: uma análise crítica de um projeto de comercialização de produtos florestais não madeireiros em uma comunidade da Amazônia Oriental

Resumo - Muitas organizações governamentais e não governamentais (ONGs) investem esforços consideráveis para apoiar as populações dependentes da floresta, na extração e comercialização de produtos florestais não madeireiros (PFNM), para gerar ganhos econômicos de forma ecologicamente sustentável. Porém, o sucesso destes esforços agora tem sido bastante modesto, sendo que muitas das iniciativas que recebem apoio externo são abandonadas quando o apoio acaba. Este artigo é uma reflexão crítica sobre as expectativas e as preocupações que surgem deste tipo de projetos de desenvolvimento, analisando em profundidade um projeto para a comercialização de óleos vegetais pela comunidade de Pedreira, situada na Amazônia Oriental Brasileira, que tem recebido apoio intensivo por parte do governo. O estudo explora as motivações das famílias que participaram do projeto, a forma como o projeto influenciou nos processos de produção e quais foram os benefícios para as famílias participantes assim como as consequências globais para toda a comunidade. Os resultados revelam que o projeto de comercialização de PFNM analisado, baseado em expectativas exageradamente otimistas, investiu fortemente na reorganização dos esquemas de produção locais, sem considerar adequadamente a realidade sócioambiental, as capacidades e interesses das comunidades. Como consequência, o modelo sócio-produtivo proposto não necessariamente teve efeitos significativamente interessantes para todos os atores locais e até causaram prejuízos para eles.

Introduction

In response to alarming deforestation rates in the tropics, governments and many development and environmental organisations, have promoted the commercialization of non-timber forest products (NTFP) by forest communities to generate forest-based income opportunities and thereby preventing local people from further degrading or transforming remaining natural forests (Nepstad & Schwartzman, 1992; Padoch, 1992; Clay & Clement, 1993; Wollenberg & Ingles, 1998; Neumann & Hirsch, 2000). As an example, in the year 2009, Brazil implemented the national plan for the promotion of products from socio-biodiversity (BRASIL, 2009). Generally, this kind of initiatives aims at the integration of local production in international value chains, in particular 'green' and 'fair trade' markets, to benefit from attractive prices (Clay, 1992; Morsello, 2004). To gain the support of the development organisations necessary to meet the requirements of non-local markets, local families are supposed to abandon traditional management schemes and adopt technical and managerial approaches defined by forest experts. Generally, these initiatives refer to collective commercialization schemes and the development of scientifically based management plans for environmental NTFP use (Hall & Bawa, 1993; Hiremath, 2004; Ticktin, 2004; Shanley et al., 2005).

While some of these initiatives manage to generate a constant source of income to the participating families, some others, in spite of significant input of time and money from all involved actors, similarly to many other rural development initiatives, fail and are abandoned once external support ceases (Marschall et al., 2006). In some cases these projects may even negatively affect communities' social capital by generating conflicts and enhancing existing social gaps (Porro et al., 2008; Pokorny et al., 2003, 2010b). Also critical is the fact that very few families seem to adopt the socio-productive models proposed in these pilot initiatives, if they are not strongly supported with financial and human resources (Pokorny & Johnson, 2008).

Several authors (Ruiz-Pérez & Byron, 1999; Marshall et al., 2006; Pokorny & Phillip, 2008; Pokorny et al., 2010b) have analysed the reasons for the unsatisfactory success of combined development-conservation initiatives, and identified barriers for success such as

market constraints, inadequate technology packages, and bureaucratic impediments provoked by incompatible legal-institutional frameworks. Most studies conclude that these projects lack of a sufficient consideration of local schemes for the management and commercializing of NTFP, referring to both, the way in which local people get organized to manage NTFP as well as with regards to their management practices normally based on their traditional knowledge (Leakey et al., 1998; Lecup et al., 1998; Neumann & Hirsch, 2000). There are general concerns about the market potential of NTFP due to the heterogeneous quality and quantity of production, possibilities for domestication, logistical challenges related to perishability and unfavourable weight-price ratio, unstable markets, among others (Wunder, 2001; Homma, 2005; Marshall et al., 2006; Belcher & Schreckenber, 2007). The potential of NTFP commercialization to improve smallholders' wellbeing may also be constrained by the typically existing lack of information on markets and the possibilities for aggregating value (Santos & Guerra, 2010). Another serious limitation for the success of initiatives for the sustainable management of forest resources by local people may also result from the fact that, although a certain boom of this kind of initiatives, and related research, in the follow-up of the Rio summit in the year 1992 (Heinrich Böll Foundation, 1992), the investments, particularly on the side of governments, have always remained marginal if compared to the support given to other land uses such as cattle ranching and agribusiness.

However, despite ambivalent experiences, many governmental and non-governmental organisations are still attracted by the win-win promise of combined development-conservation initiatives, and continue investing efforts in the implementation of projects focused on the sustainable management and commercialization of NTFP by traditional communities. This article seeks to critically reflect on the expectations and concerns regarding this kind of projects by in-depth analysing a case study from the Brazilian Amazon. This study was oriented to answer the following research questions: (1) who is participating in the project and why; (2) to what degree the project participants changed their traditional management schemes; (3) what are the benefits of local efforts; and (4) what are the consequences for the community?

The case study

This study analysed in-depth a NTFP project implemented in the community of Pedreira, in the municipality of Belterra, State of Pará, in the centre of the Brazilian Amazon (Fig. 1). As some families in the community continued with their traditional NTFP practices, this case study also offered the possibility to compare local production schemes with those implemented by the project.

The community of Pedreira, located 50 km south of the city of Santarém near the Tapajós River, is composed by 41 families descendent from rubber tapers who settled in the region at the end of the nineteenth century, and were actively involved in rubber tapping until the first half of the twentieth century mainly to supply the tire factories of Henry Ford in the USA (Grandin, 2009). Pedreira is situated within the protected area of the Tapajós National Forest, created in 1974. In the community, each family individually owns a productive unit (*roçado*), and the right to use the forests as common property. The Brazilian government acknowledged traditional access rights for an area of 6,200 ha also imposing management restrictions. Thus, the families have to ask for permission to establish new farming land within the forests and are controlled by the federal governmental agency IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) once a year.

Around 20 years ago, most families gave up their traditional livelihoods as rubber tapers, due to a dramatic decline of the rubber price, and became farmers sustaining themselves mainly from selling manioc flour at local markets. Frequently, also temporary jobs and governmental payments for retired people and children contribute to the household income. Fishing, hunting, growing rice and maize, cattle ranching and chicken breeding are practiced for subsistence. Also gathering of NTFP is still a common activity among some families. Unlike most of the unsupported communities located outside the Tapajós National Forest, most families of Pedreira stayed in their community. This indicates acceptable living conditions partly resulting from the support they received from several governmental and non-governmental organisations on course of actions related to the National Park.

Most relevant for the community has been a governmental-driven project for improving the production and marketing of vegetal-oils from the natural forest species *copaiba* (*Copaifera* spp.) and

andiroba (*Carapa guianensis* Aubl.), which started in 2002, as part of the International Pilot Programme for the Conservation of the Brazilian Rain Forest (PPG7) sub-program 'ProManejo'. The project was executed by the Association of Mini and Small Producers along Piquiatuba-Revolta Tapajós River Right-Bank - ASMIPRUT with a 68,000 USD funding from the *Brazilian Foundation for Biodiversity* -FUNBIO. ASMIPRUT was founded in 1994 with the objective of representing the associates and assist them in the commercialization of their products. By paying monthly fees, families can become member of the association. ASMIPRUT was the main interlocutor with the external institutions and responsible of raising project funds. Thus, to participate in the that project of vegetal oils, it was compulsory being associated to ASMIPRUT. Funding was mainly spent for material and equipment, the establishment of infrastructure, training courses and technical assistance to conduct the inventories and set up the management plan required by law.

Methods

Based on the findings of the EU-funded research project ForLive (Pokorny et al., 2010b) and own field observations, the study departs from the hypothesis that the local families participating in the project were supposed to adjust their behavior to externally defined expert models, and that this potentially generated conflicts within the community and dependencies to external support. To test this hypothesis the study followed a sequence of four research questions: (1) What were the motivations of the families to participate, respectively to not participate in the project? (2) What were the differences between the projects' and the traditional production and commercialization schemes? (3) What individual benefits has the project generated? and (4) What have been the social consequences of the initiative?

The information to answer these questions was gathered in two phases: During 2006 to 2007 the researcher stayed several months in the community to learn about the people and families, their institutions and livelihood activities, the forests, in particular the ecology of *copaiba* and *andiroba* as the locally most relevant NTFP species (Herrero-Jáuregui, 2009), as well as the project. The gained insights were used to develop a questionnaire, which then was applied in form of semi-

structured face-to-face interviews at the end of the year 2007 to 29 of the 41 families living in the community. The interviews included: (1) the families still participating in the project (10 out of 10 families), (2) the people actively engaged with NTFP commercialization but outside the project (5 out of 5); (3) those families who once were involved in NTFP activities but gave them up (8 out of 8) and, finally, (4) those who had never collected NTFP (6 out of 18). Additionally, open interviews were conducted with four key informants, known for their outstanding knowledge about the history of NTFP extraction in the community. Each interview of around 1.5 h was immediately followed by memo taking, which then, within the next two days, was deductively structured in search of statements and information confirming or denying the working hypothesis firstly set up during the first field phase and then continuously adapted and respectively consolidated on the course of the research.

Parallel, publications and “grey literature” including records of IBAMA about previous research made in the region were profoundly analyzed before, during and after the fieldwork. In particular, the insights from some outstanding publications of MSc and PhD research projects about the topic (Freire, 2001; Dias, 2001; Gonçalves, 2001; Ioris, 2005; Guerra, 2008; Couly, 2009) have been intensively used to critically reflect on the findings from the field analysis.

Results

Who is working with NTFP and why?

Decisions concerning the management of NTFP and the participation in the project were strongly individual, based on each family's specific interests and characteristics, but it was not possible to identify general personal features or socio-economical conditions explaining individual decisions. Generally, when commercialization of rubber stopped being lucrative, only some families continued working with NTFP either for the generation of complementary income, in particular taking advantage of the seasonal offer of certain seeds or fruits, like *andiroba* seeds, or, in emergency situations, for example by harvesting available *copaiba* oleoresin or lianas.

At the time of the study, most families were not interested in commercializing NTFP. This had several reasons such as the lack of knowledge necessary for harvesting and processing the product, a general lack

of interest in the “forest issue” and a low abundance of commercially interesting NTFP species combined with unattractive market prices in view of elevated transport costs. Despite these general constraints, the NTFP-project, by holding out attractive financial prospects of an “effective” NTFP commercialization, managed to mobilize some families to become involved in the project. At the time of the research, 10 families actively participated in the project. Only two of them had previous experiences in collecting and commercializing NTFP: an older man who was personally invited by the project to help the group in finding the trees in the forests, and a younger man not native from the community but experienced in collecting Brazil nuts (*Bertholletia excelsa* Humb. & Bonpl.). All other participants as were never involved in NTFP collection had unrealistic expectations about the volume and consistency of annual harvest quotas and joined the group expecting regular cash incomes. A statement of the former president of the group illustrates this situation: “...we thought it [*andiroba*] produced every year and that we would get a good income...”. Since the year 2002, 12 families had withdrawn the project for not having perceived the initially expected benefits.

In five families, there were individuals traditionally dealing with NTFP, but not participating in the project. These local NTFP experts learnt from their parents, but also gained a lot of experience by their own. In two of the families, the family patriarch disposing on a profound knowledge about NTFP strongly influenced their sons. These people resisted the project, because they feared of being exploited by the other inexperienced participants. In fact, they had general objections against external projects (“...projects are people's anaesthesia...”), and also criticised the “laziness” of their neighbours (“...you will be lucky if you find five people who work here...”). Two other local NTFP experts whose livelihoods strongly relied on NTFP and hunting lived so far away that they rarely participated in any activity of the community. Finally, one family involved in the collection of *cumarú* seeds (*Dipteryx odorata* Aubl (Willd.)) within their individually managed properties did not expect to receive significant benefits from joining the project.

Beyond the 10 families in the project and the five families involved in the commercial use of NTFP, many other households collected NTFP for subsistence, or for occasional commercialization, in particular *copaiba*

oilresin and *andiroba* and *cumarú* seeds for medicinal use. Two of the poorest families in the community belonged to this category. Three other people had commercialized these products, but stopped when they got older and received pensions. Two people, one of them being a 'homeless', collected *titica* vine roots (*Heteropsis* spp.) for handicrafts, as for example broomsticks. Another 18 families reported to collect thatch (*Atallea* spp.) for their roofs. Generally, it was the elders using NTFP, seldom passing their knowledge to their children who were not interested. Medicine from NTFP, for example, had been widely substituted by western medicine, which was monthly provided by the NGO "Saúde e Alegria".

Differences to the traditional production and commercialization schemes

Traditional NTFP collectors as well as the project focused on three products: *andiroba* seeds (93% of the families), *copaiba* oil-resin (73%) and *cumarú* seeds (53%), but the management schemes proposed by the project strongly differed from traditional extraction of NTFP on common property resources.

Regarding *copaiba*, the collector tap the trees whenever extra cash is needed. Mostly this is done alone or, in some cases, with one trustable partner. Often, this activity is combined with hunting. The collectors test the productivity of trees of above 50 cm diameter breast height (dbh) by doing several taps, and, if promising, drill with a driller or cut with a machete one or two holes at breast height - sometimes another one at 10 cm above ground - and collect the out flowing liquid. Once the stream runs dry, the hole is closed with a piece of wood in order to allow later returns. Other more destructive techniques to extract the oil have been reported such as felling the tree or seriously injuring it with a machete or chainsaw (Plowden, 2001), but none of these were observed in the study site.

In contrast to *copaiba*, gathering *andiroba* and *cumarú* seeds is limited to the irregular and short disseminating season of the seeds, February-April for *andiroba*, and August-November for *cumarú* (Dias, 2001; Latchford, 2002). Naturally, collecting efforts only start if sufficient harvest is to be expected. Then collectors gather as many seeds as possible and carry them on their backs out of the forest. Generally, *cumarú* seeds are collected from trees nearer to the village, while distances to the *andiroba* trees are longer.

Typically, the seeds, as well as the oil, are processed at home by the women and children. Finally, the processed products are sold at local markets mostly to those traders paying the best price. Only one family stated that they sold exclusively to one trader guaranteeing a fixed price. The families receive immediate cash. Despite the long history of using NTFP, no evidence was found that *copaiba* or *andiroba* trees were planted, though this was not clear regarding *cumarú* trees (Herrero-Jáuregui, 2009).

In contrast to the traditional NTFP management schemes, the project foresaw a profound planning process, which was, however, not always fully complied. Firstly, a management plan was developed under the guidance of external technicians, and all *copaiba* and *andiroba* trees were inventoried in formerly selected areas of the collectively owned natural forests. In the case of *andiroba* and *cumarú*, in the beginning of the harvesting season, a smaller group checked the quantity of available seeds in the forest. If sufficient seeds were found, the entire project group came together in several meetings to define the general working schedule and plan their activities. Although every year the group intended to also collect *cumarú* seeds, harvesting so far had been limited to *andiroba* and *copaiba*. For security reasons, collection was organized in groups equipped with helmets and boots. These groups were asked to leave at least 5% of the seeds under the tree, but in the interviews it became obvious that nobody felt committed to this rule perceived as useless. The groups also didn't use small trolleys provided by the project for the transport of the seeds. Instead they carried the harvest on their backs. All collectors were supposed to carefully document the weight of the seeds and relevant details about the trees as a basis for monitoring and control by using a notebook. However, by the time of the research, all notebooks including the entire set of already processed data were lost. This may indicate a lack of interest and commitment of the participants to the proposed monitoring schemes. Doubtlessly, the data would have been of great importance to document and illustrate the project performance.

As in the traditional management scheme, it was also the women who processed the seeds, but they, in contrast, disposed on a specific place built for this purpose. There have been also some attempts for producing refined products such as candles, soaps and fancy looking 100ml flasks of oil. However, at the time

of the study these products had been exclusively sold to some few tourists that visited the community or the project office in Santarem mainly to learn about the project. Commercialization was organized through a cooperative which retained 5% of the gross profit for their services including exploration of markets, negotiation with potential buyers and compliance with the bureaucratic requirements necessary to legally sell the products outside the National Forest. In fact, in contrast to the traditional collectors, the project worked in accordance with a management plan authorized by IBAMA. By the time of the study, the cooperative, with strong support of the project, had managed to make business with international buyers at prices much higher compared to those achievable at local markets. However, due to more complex logistics, it took relatively long time before the families received the cash. The receipts were divided among the project participants according to their individual time input.

With regard to *copaiba* oil, the group gave up the production after the first harvest attempt, as they did not manage to find a buyer paying sufficiently attractive prices. In addition they had difficulties in identifying the productive trees, as they disregarded the traditional way of testing the trees' productivities. Also the tapping techniques were different from the traditional ones, as they only drilled one hole at breast height and only considered trees above 40 cm diameter at breast height (dbh).

Individual benefits

From those families who were occasionally commercializing NTFP, only the two poorest families acknowledged a certain contribution of these activities to their livelihoods: "...we need the money, run to the forest and gather a liana to sell, or some temporary job that appears...manioc flour is not suitable for an emergency, since the roçado is not prepared...". None of the other families, not even those participating in the project, mentioned the commercialization of NTFP as a relevant source of income. Within the project, NTFP contributed in average less than 4% to yearly household incomes. Only the one family responsible for selling the NTFP collected in the project, reported yearly revenues of up to 600 USD. In fact, at the time of the research, the project had managed to sell oil from *copaiba* and *andiroba* twice to international markets, at a price of about 27 USD for one litre (4.5 times higher than local prices). However, buyers had been hard to contact, and

they insisted in a more constant supply of higher quality. According to the project participants, this, however, is difficult to achieve due to ecological constraints of the species under exploitation. The majority of *copaiba* trees in the region belong to the same species (*Copaifera reticulata* Ducke) but the chemical variability of the oleoresin is significant. In fact the chemical variability of the oil within species is as high as that among different species (Herrero-Jáuregui et al., 2011). Therefore, most of the contacts established with international buyers had broken down or remained rather occasional. In general, it took a long time to receive the payments from the buyers and in all cases the receipts were significantly lower than initially expected.

The traditional NTFP collectors were hardly able to quote the annually generated cash income from selling *copaiba*, *andiroba* or *cumarú* seeds, but indicated rather moderate revenue. Even the family which managed to generate a regular income from *titica* vines stated that it would be easy to have the same revenue by doing other activities. Thus, most families outside the project continued collecting NTFP as a custom rather than to satisfy an existing demand. From all used NTFP, the most relevant benefit was the production of thatches for the roofs from the leaves of the *curuá* palm (*Atalea* spp.). This product provided a source of income in particular for the poorest families.

A more profound analysis of the cost-benefit ratio of the different NTFP activities revealed that experienced collectors needed at least one day to harvest a quantity sufficient for a meaningful commercialization effort. Those families participating in the project, in addition had to invest significant time in group meetings. Considering local market prices of 6 USD for one litre of *andiroba* or *copaiba* oil and, 2.3 USD/kg of *cumarú* seeds, the revenue was about 1 USD per invested working hour. However, this ratio was limited to the harvesting season, respectively to the availability of reasonably productive *copaiba* trees, two variables, which, according to extractivists, are impossible to predict: "...andiroba and cumarú produce fruits some years a lot and some years a few...copaiba is difficult for us to get and years have to pass by [for the tree to recover]...", "...it takes about 8 years for a copaiba tree to produce oil again...and what should I do during that time?..." The extractivists also mentioned the lack of information about highly variable market prizes as a significant barrier for more effective commercialization.

As a consequence of these difficulties, for most of the families, the production of manioc flour, although a low-price product, was more attractive in the long run due to its stable prices and solid commercialization schemes that don't require any bureaucracy: "...[Generally] it's hard to look for buyers. Manioc flour is cheaper, but is readily sold. Here it's difficult to find a buyer [for NTFP] and besides it must pass IBAMA's approval...". In addition, manioc as principal component of the families' diet directly contributes to food security.

As a consequence of the limitations and difficulties to commercialize NTFP for attractive prices, 70% of current project participants stated that their initial expectations had not been fulfilled. Instead of investing intensively in NTFP activities, most of the interviewed families (62%) would increase the production of manioc flour, if extra money needed, while others would sell game or livestock (20%), borrow money (17%) or search for temporary jobs (13%). In fact, only 6% of the interviewed families would opt for the commercialization of NTFP. In accordance with these observations, only a forth of the families participating in the project stated cash income as an important benefit from the project. In contrast, they referred to infrastructure (53%), training in ecology and forest management (20%) and improved organization (13%).

Social consequences of the project

The main goal of the analysed project was the generation of local income from the sustainable management of NTFP to improve local livelihoods and valorise the conservation of the forest resources. However, the project also had strong impacts on the social system. In particular, the project's requirement to set up a formal management plan generated a conflict between the project participants and the traditional collectors about the question of who owns the NTFP in the common forest areas. Project participants adopted the discourse of the project technicians that the NTFP should only be harvested on the basis of a sound inventory and a management plan and that consequently only those families actively participating in the project should harvest NTFP. In contrast, the families traditionally engaged in the use of NTFP for subsistence and commercialization insisted on their understanding of forests as an open access resource and continued with their activities in their traditional areas. A traditional NTFP collector stated that "...the [project] group wanted us to prohibit extracting copaiba and andiroba, and I

was against it. It [the area] belongs to the community; it's not private...". Some of the traditional collectors even tried to sell NTFP oil to the families engaged in the project but were rejected.

Within the project, the distribution of costs and benefits was the most visible source of conflicts, particularly related to two questions: how to distribute generated income and how to use an engine bought by the project to generate electricity. Those families, who had received less, were not happy with the current mode of distributing profits. They complained that some participants had more rights than others, and that they used their power to receive a higher share of benefits such as income, training courses, travelling, etc. Many of those families that had abandoned the group mentioned distrust and misbalance of benefits as reasons: "...I think that the counting was not right. They sold the oil and didn't share the money fairly..."; "...it's bad because those who work in the group coordination get the money and we don't see it. If the coordination changed and at the end of the extraction the [money] sharing was clear, it would be different...".

Another undesirable consequence of the project resulted from the enforcement of a collective working approach that widely ignored the existing heterogeneity and preferences of the participating families. In fact, the project intended to convert an activity traditionally realized by a single family into a collective one. More than a half of the interviewed families, in view of the elevated time input and conflict potential, explicitly would have preferred more individualized working schemes. The following statements reflect this: "...without ProManejo people would have done as before: they joined 2-3...it was a familiar [activity]. It had more chances of going right...", "...I would only participate in projects if they financed individual work..."; "...I prefer individual work...it is better because we know what we are earning...". As a consequence, the relationships between the families participating in the project suffered and the level of confidence and interaction drastically reduced: "...conflicts [among families] were because of the project...".

Another serious effect was that the families lost their initial enthusiasm and commitment to the project and, even more concerning, their interest and willingness to get involved in possible future initiatives proposed by externals. The limited profits, the enormous efforts invested in the group activities, and the latent level of

conflict about distribution of costs and benefits strongly demobilized project participants. More than 90% of the interviewed families also claimed that the coordinators did not communicate enough with the other participants. As a consequence, during the six years of the project, more than half of the initially participating families (12 families) withdrew from the project, which corresponds to a loss of about 2 families per year. In view of this, the absence of visible efforts for improvement is remarkable. According one of the group participants: *"...people are afraid of stating their opinion...if it's just one or two who talk, it's useless...during group meetings they stay quiet, ashamed!..."*.

Most critical was the fact that the project created a certain level of *dependency* to external support. Instead of using own capacities for social organisation, many families decided to wait for externally initiated projects, since they had adopted the participation in such initiatives as their "way of development". When asked on the need of future projects for the community, one of project participants stated: *"...Yes, they [the families of the community] need [projects] a lot. After project leaves, all communities stop. There is a lack of interest. When there is people from outside coming, people become more active..."*. Even experiencing the modest benefits generated by the here analysed NTFP project and despite similar experiences with other projects in the past (like for marquetry and chicken nursing), most families did not see a perspective for development without continued further support by projects. In fact, 86% of the families were interested in receiving more projects. However they would prefer projects for the technical and financial support of manioc processing and selling (36%) and timber extraction (28%). Only one person mentioned NTFP as a promising option.

Discussion

The analyzed NTFP project aiming on the combination of social and environmental goals, although generating benefits in particular for some of the directly participating families, suffered from a limited financial attractiveness and even provoked negative social consequences. It departed from overoptimistic expectations and strongly invested in the re-organisation of local production schemes without adequately considering the socio-environmental reality existing capacities and interests of the community.

Methodological constraints

For the interpretation of these findings, some severe methodological constraints of the study should be taken into account. First, it should be considered that only one case study was analyzed. This case study, however, represents a typical NTFP development project providing financial, technical and institutional support even above average if compared to similar projects in the region (Porkony et al., 2010). This ensures the feasibility of the case study for the qualitative analysis of the local viability of such development approaches. The second critical aspect is related to the fact that the interviews were made mainly to the so-called "head" of the families and key informants, not necessarily reflecting the opinions of other groups, in particular the women and socially marginalized families. In fact, the women and children participating in the interviews, often simply agreed to what the men said. This consensus might reflect subordination rather than agreement (Fontana, 2001). On the other hand, all information and statements were carefully counter-checked by triangulation including own observations and informal talks during the extended field periods, which guarantees the validity of the presented information. Thirdly, the study strongly focussed on financial issues of NTFP collection, and only insufficiently considered the wide variety of other forest benefits generally of huge importance for local people (Campbell & Luckert, 2002).

Limited attractiveness of the selected NTFPs

The limited financial attractiveness of some NTFP collected in natural forests due to either marketing constraints and/or the particular ecological characteristics of species has been confirmed by a number of other studies (Newmann; Hirsch, 2000; Marshall, 2006). The study also observed the same ecological constraints hindering an effective commercialization of NTFP found by previous studies, particularly regarding the unpredicted quantity and quality of production. Neither the production of *andiroba* seeds is constant among years, nor is it possible to develop commercialization plans for *copaiba* oil, due to the high variation in its productivity (Martins et al., year forthcoming) and chemical composition (Herrero-Jáuregui et al., 2011). Also, despite the project's efforts, the marketing chain was not sufficiently solid and transparent to satisfy producers, provoking excessive storing of products, delays in the payments and not overcoming the variable demand.

As in the study, there is a general tendency of the families, particularly of those that are better-off, to disregard the use of NTFP without alimentary use, as implying too much work for too low returns, increased access to “cheaper” substitutes and the emergence of more attractive opportunities for income generation (Gort, 1989; Shanley & Rosa, 2004; Singh, 2008). Also other factors might play a role such as cultural depreciation and loss of knowledge (Brassiolo, 2001). Obviously, Amazonian smallholders in their decisions do not only consider the financial return, but also the risk and regularity of cash flows (Hoch, 2009; Newmann & Hirsch, 2000). Overall, the observed concerns of the families, in particular of the most experienced NTFP collectors, against a more intensive engagement in the NTFP business seem to have a solid basis. However, it is worth mentioning that throughout the Amazon more successful experiences for the commercialization of NTFP can be found, for example for Brazil nut (*B. excelsa*), açai (*Euterpe oleracea* Mart.) and bacuri (*Platonia insignis* Mart.).

Externally imposed activities not compatible with local realities

The analyzed project, like many other similar initiatives, widely ignored the concerns, experiences and preferences of the families in Pedreira, as well as the need to adequately consider the product diversity of Amazonian forests as a basis for meaningful commercial management by locals (Arévalo, 2009; Sist, 2009). On the contrary, convincing the families to invest efforts in the NTFP activity, not perceived as a priority, the project made unrealistic promises about financial returns and workloads exclusively focussing on two of the most popular Amazonian oleaginous NTFP, based on a market study carried on in the region (Gonçalves, 2001). For most of the participants, the possibility to benefit from material and infrastructure was more important to join the project than the outlook to work with NTFP. Interestingly, these project inputs were used for other purposes. This lack of participation in setting up the projects’ priority areas and goals has been identified as one of main reasons for the limited success of such initiatives (Nyong et al., 2007). Beyond being excluded from setting the goals, project participants are often forced to strongly adjust themselves to externally defined requirements, despite the general postulation for incorporating traditional knowledge in development projects (Woodley, 1991). In the case of the analyzed

project, for example, it was widely ignored that NTFP collection is traditionally based on clearly separable individually managed units (Chirif, 2010) although the trees themselves are perceived as common pool resources (Tedder et al., 2002). In fact, the frequent meetings, the enforcement of collective action and the profound process of planning implied for the families enormous transaction costs and provoked conflicts and failures. This became particularly obvious regarding the projects’ efforts for establishing monitoring mechanisms generally seen by experts as a priority to ensure sustainability. In fact, within the analysed project all proposed mechanisms were not supported by the families. This strong contradiction of externally defined management schemes with local realities and capacities is typical for many development initiatives in the region (Pokorny et al., 2010a).

Negative consequences of external interventions

The analyzed NTFP project, like any other external intervention affected daily routines and power relations within the social system of the community and thereby provoked unpredicted and negative consequences besides the intended positive impacts (Rogers, 2003). The unrealistic expectations raised at the beginning of the project, for example, beyond demobilizing people to invest in personal efforts in attempts for improving their often precarious situation, also shaped their understanding on how collaboration with external development agents functions. In this context, Medina (2008) points out that community forestry initiatives as currently practiced in the region tend to weaken local capacities to search for own ways of development, thereby creating dependency on external support. The findings of this study support this observation. In accordance with studies in different contexts (Dove, 1993; Medina, 2008; Pokorny et al., 2010a), it was observed that in particular the concentration of projects’ benefits on a relatively small group of people within the community was provoking undesired consequences. In this sense, many of these projects tend to enhance existing social gaps between local poor and local rich, either by benefiting those that already had more, or those that disposed on the capacities and willingness to adjust their behaviour to external requirements. The analyzed project also provoked massive conflicts about access rights between traditional extractivists and the project group. Ironically, the projects’ approach for collective action resulted in the exclusion of those few traditional

NTPF collectors and thereby worsened their situation. This seriously affects the social capital developed over generations (Freire, 2001).

Conclusions

The analyzed NTPF project envisaging the commercialization of two vegetal oils did not fulfil the high initial expectations. Instead, the project widely ignored local production schemes and social settings and thereby contributed to the deterioration of existing social capital and the families' capacity to manage their resources in accordance to their own capacities and interests. In accordance with experiences from more successful attempts to commercialize NTPF for local benefits, the study confirmed the importance of adequately considering the specificities of the social system as well as the ecological features of the forest products with a commercial potential. In particular, it deems crucial to ensure the active participation of the families in the initial phase of development projects to ensure compatibility with local interests and capacities. It is also important to depart from a realistic understanding on eventually existing potentials, and to carefully observe and reflect on the indirect, often undesired consequences of such initiatives. Better approaches for the promotion of forest based development are necessary, more consciously taking into account the demands, capacities and knowledge of local people.

Acknowledgements

We thank the families of Pedreira, Tapajós National Forest, Brazil, for their participation in this study, and their welcome at their houses during the two years of research. This work is the result of a cooperation between the Universidad Complutense de Madrid (contract number YOSC000121) in Spain, the University of Freiburg in Germany, the French Agency for Agricultural Research and Development (CIRAD) and the Brazilian Agricultural Research Organisation Embrapa Amazônia Oriental. It was funded by the French Fund for Global Environment (FFEM) through the project 'Floresta em Pé'. Two post-doctoral research contracts through the program REMEDINAL-2 (S2009/AMB-1783) and the Real Colegio Complutense in Harvard enabled the finalization of this manuscript. We thank three anonymous reviewers for their comments, which

significantly improved the first manuscript.

References

- ARÉVALO, V. **Chakras, bosques y ríos: el entramado de la biocultura amazónica**. Quito: Abya-Yala, 2009. 137 p. (Publicación miscelánea, 148, INIAP).
- BELCHER, B.; SCHRECKENBERG, K. Commercialization of non-timber forest products: a reality check. **Development Policy Review**, n. 25, p. 355-377, 2007.
- BRASIL. Portaria interministerial MDA e MDS e MMA n. 239, de 21 de julho de 2009. Estabelece orientações para a implementação do Plano Nacional de Promoção das Cadeias de Produtos da Sociobiodiversidade, e dá outras providências.
- BRASSIOLO, M. **Diagnóstico socioeconómico y de uso del suelo en la Zona de amortiguamiento del Parque Nacional Copo**. [S.l.]: Consultoría, Administración Parques Nacionales, 2001. 122 p.
- CAMPBELL, B. M., LUCKERT, M. K. (Eds.). **Uncovering the hidden harvest: valuation methods for woodland and forest resources**. London: Earthscan Publications, 2002. 278 p.
- CHIRIF, A. El otro sendero (despistado) de Hernando de Soto. Servicios en Comunicación Intercultural Servindi, sept. 2009. Disponible en: <<http://www.servindi.org/actualidad/opinion/16603>>. Acces at: 20 set. 2010.
- CLAY, J. Why rainforest crunch? **Cultural Survival Quarterly**, n. 16, p. 31-46, 1992.
- CLAY, J.; CLEMENT, C. **Selected species and strategies to enhance income generation from Amazonian rainforests**. Rome: FAO, 1993. 227 p.
- COULY, C. **La biodiversité agricole et forestière des Ribeirinhos de la Forêt Nationale du Tapajós (Pará, Brésil): usages, gestion et savoirs**. 2009. 400 f. Thèse (Doctorale en Ethnobiologie) -Muséum National d'Histoire Naturelle - École doctorale Science de la Nature et de l'Homme, Paris; Université de soutenance Universidade de Brasília - Centro de Desenvolvimento Sustentável, Brasília.
- DIAS, A. da S. **Consideraciones sociales y silviculturales para el manejo forestal diversificado en una comunidad ribereña en la Floresta Nacional do Tapajós, Amazonia Brasileira**. 2001. 125 f. Tesis (Magister Scientiae)- Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba.
- DOVE, M. R. A revisionist view of tropical deforestation and development. **Environmental Conservation**, v. 20, n. 1, p. 17-56, 1993.
- FONTANA, A. Postmodern trends in interviewing. In: Gubrium, J. F., Holstein, A. (Ed.). **Handbook of interview research, context and method**. Thousand Oaks: Sage, 2001. p. 167.
- FREIRE, R. M. **Sistemas locais de apropriação dos recursos e suas implicações para projetos de manejo comunitário: um estudo de caso numa comunidade tradicional na Floresta Nacional do Tapajós-PA**. 2001. 188 f. Dissertação (Mestrado em Ciências Florestais) - Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, Piracicaba, SP.

- GORT, E. Changing traditional medicine in rural Swaziland: the effects of the global system. **Social Science & Medicine**, v. 29, n. 9, p. 1099-1104, 1989.
- GRANDIN, G. **Fordlandia: the rise and fall of Henry Ford's forgotten jungle city**. New York: New York, 2009. 416 p.
- GONÇALVES, V. A. **Levantamento de mercado de produtos florestais não madeireiros**. Santarém: IBAMA; ProManejo, 2001. 65 p.
- GUERRA, F. G. P. de Q. **Contribuição dos produtos florestais não madeireiros na geração de renda na floresta Nacional do Tapajós-Pará**. 2008. 133 f. Dissertação (Mestrado em Ciências Florestais) - Universidade Federal do Paraná, Curitiba.
- HALL, P.; BAWA, K. Methods to assess the impact of extraction of non-timber tropical forest products on plant population. **Economic Botany**, v. 47, p. 234-247, 1993.
- HEINRICH BÖLL FOUNDATION. World Summit on Sustainable Development (WSSD). 2002. Available in: <<http://www.worldsummit2002.org/index.htm>>. Accessed: 16 Nov. 2010.
- HERRERO-JÁUREGUI, C. **Gestión integrada de los recursos forestales en la Amazonía Oriental: ecología de dos especies de uso múltiple**. 2009. 227 f. Tesis PhD (Doctoral en Ecología e Medio Ambiente) - Universidad Complutense de Madrid, Madrid.
- HERRERO-JÁUREGUI, C.; CASADO, M. ^a; ZOGHBI, M. G. B.; MARTINS-DA-SILVA, R. C. Chemical Variability of *Copaifera reticulata* Ducke, **Chemistry & Biodiversity**, v. 8, n. 4, p. 674-685, Apr. 2011. doi: 10.1002/cbdv.201000258
- HIREMATH, A. J. The ecological consequences of managing forests for non-timber products. **Conservation and Society**, v. 2, p. 211-216, 2004.
- HOCH, L. **Do smallholders in the Amazon benefit from tree growing?** 2009. 103 f. Tesis (Doctor Rer. Nat.) Albert-Ludwigs-Universität Freiburg im Breisgau, Freiburg.
- HOMMA, A. K. O. Amazônia: como aproveitar os benefícios da destruição? **Estudos Avançados**, v. 19, n. 54, p. 115-135, 2005.
- IORIS, E. M. **A Forest of Disputes: struggles over spaces, resources and social identities in Amazonia**. 2005. 326 f. Dissertation (Doctor of Philosophy) - University of Florida, Florida.
- LATCHFORD, R. **A Monograph of the neotropical tree *Dipteryx odorata* (Aubl.) Willd.** 2002. 93 f. Thesis (Magister Scientia) - Rebecca Latchford Oxford Forestry Institute, Oxford University, Oxford.
- LEAKEY, R. R. B.; TIMU, A. B.; MELNYK, M.; VANTOMME, P. **Domestication and commercialization of non-timber forest products in agroforestry systems**. Rome: FAO, 1998. 298 p.
- LECUP, I.; NICHOLSON, K.; PURWANDONO, H.; KARKI, S. Methods for assessing the feasibility of sustainable non-timber forest product-based enterprises. In: WOLLENBERG, E.; INGLES, A. (Ed.). **Incomes from the forest: methods for the development and conservation of forest products for local communities**. Bogor: CIFOR, 1998. p. 85-106.
- MARSHALL, E. SCHRECKENBERG, K., NEWTON, A. C. (Eds.). **Commercialization of Non-timber Forest Products: factors influencing success. lessons learned from Mexico and Bolivia and policy implications for decision-makers**. Cambridge: UNEP World Conservation Monitoring Centre, 2006. 140 p.
- MEDINA, G. **Moving from dependency to autonomy: an opportunity for local communities in the Amazon frontier to benefit from the use of their forests**. 2008. 107 f. Thesis (Doctoral) - Albert-Ludwigs-Universität Freiburg im Breisgau, Freiburg.
- MORSELLO, C. Trade deals between corporations and Amazonian forest communities under common property regimes: opportunities, problems and challenges. In: THE COMMONS IN AN AGE OF GLOBAL TRANSITION: CHALLENGES, RISKS AND OPPORTUNITIES, 10. Proceedings... Oaxaca: The International Association for the Study of Common Property, 2004.
- NEPSTAD, D.; SCHWARTZMAN, S. Non-timber products from tropical forests: evaluation of a conservation and development strategy. **Advances in Economic Botany**, v. 9, p. 143-146, 1992.
- NEUMANN, R. P.; HIRSCH, E. **Commercialization of non-timber forest products: review and analysis of research**. Bogor: CIFOR, 2000. 176 p.
- NYONG, A.; ADESINA, E. F.; OSMAN ELASHA, E. B. The value of indigenous knowledge in climate change mitigation and adaptation strategies in the African Sahel. **Mitigation and Adaptation Strategies to Global Change**, v. 12, p. 787-797, 2007.
- PADOCH, C. Marketing of non timber forest products in Western Amazonia: general observations and research priorities. **Advances in Economic Botany**, v. 9, p. 43-50, 1992.
- PLOWDEN, J. C. **The ecology, management and marketing of Non-Timber Forest Products in the Alto Rio Guamá indigenous reserve (Eastern Brazilian Amazon)**. 2001. 264 f. Dissertation (Ph.D. in Ecology) - Penn State University, University Park, Pennsylvania.
- POKORNY, B.; CAYRES, G.; NUNES, W. Participatory analysis of heterogeneity: an approach to consolidate collaborative initiatives at community level. **Forests, Trees and Livelihoods**, v. 13, n. 2, p. 161-175, 2003.
- POKORNY, B.; PHILLIP, M. Certification of NTFP. Concluding comments. **Forest, Trees and Livelihoods**, v. 18, n. 1, p. 91-95, 2008.
- POKORNY, B.; JOHNSON, J. Community forestry in the Amazon: the unsolved challenge of forests and the poor. **ODI Natural Resource Perspectives**, v. 112, 4 p. 2008.
- POKORNY, B.; GODAR, J.; HOCH, L.; JOHNSON, J.; DE KONING, J.; MEDINA, G.; STEINBRENNER, R.; VOS, V.; WEIGELT, J. **A produção familiar como alternativa de um desenvolvimento sustentável para a Amazônia: Lições aprendidas de iniciativas de uso florestal por produtores familiares na Amazônia boliviana, brasileira, equatoriana e peruana**. Bogor: CIFOR, 2010a. 174 p.
- POKORNY, B.; JOHNSON, J.; MEDINA, G.; HOCH, L. Market-based conservation of the Amazonian forests: Revisiting win-win expectations. **Geoforum**, 2010. doi:10.1016/j.geoforum.2010.08.002. 2010b.

- PORRO, N.; GERMANÁ, C.; LÓPEZ, C.; MEDINA, G.; RAMÍREZ, Y.; AMARAL, M.; AMARAL, P. Capacidades organizativas para el manejo forestal comunitario frente a las demandas y expectativas oficiales. In: SABOGAL C.; DE JONG, W.; POKORNY, B.; LOUMAN, B. (Ed.). **Manejo forestal comunitario en América Tropical**: experiencias, lecciones aprendidas y retos para el futuro. Bogor: CIFOR, 2008. p. 163-201.
- ROGERS, E. M. **Diffusion of innovations**. New York: Free Press, 2003. 519 p.
- RUIZ-PÉREZ, M.; BYRON, N. A methodology to analyse divergent case studies of non-timber forest products and their development potential. **Forest Science**, v. 45, p. 1-14, 1999.
- SANTOS, A. J., GUERRA, F. G. P. Q. Aspectos econômicos da cadeia produtiva dos óleos de andiroba (*Carapa guianensis* Aubl.) e copaíba (*Copaifera multijuga* Hayne) na Floresta Nacional do Tapajós-Pará. **Floresta**, v. 40, n. 1, p. 23-28, 2010.
- SHANLEY, P.; ROSA, N. A. Eroding knowledge: an ethnobotanical inventory in Eastern Amazonia's Logging Frontier. **Economic Botany**, v. 58, n. 2, p. 135-160, 2004.
- SHANLEY, P.; PIERCE, A.; LAIRD, S. **Além da madeira**: certificação de produtos florestais não-madeireiros. Bogor: CIFOR, 2005. 153 p.
- SINGH, S. K. K. **Traditional knowledge of the environment and natural resource management**: the Jakun of the South-East Pahang Peat Swamp Forest, Malaysia. 2008. 357 f. Thesis ((Doctor of Philosophy 0 Environment and Resource Studies) - Faculty of Graduate Studies, Mahidol University, Bangkok, Thailand.
- SIST, P. Integrar o manejo florestal nos sistemas de produção agrícola na Amazonia. **Revista Amazônia**, ano 4, n. 14, p. 26-29, 2009.
- TEDDER, S.; MITCHELL, D.; HILLYER, A. **Property rights in the sustainable management of non-timber forest products**. Victoria: British Columbia Ministry of Forests; Forest Renewal BC, 2002. 140 p.
- TICKTIN, T. The ecological implications of harvesting non-timber forest products. **Journal of Applied Ecology**, v. 41, p. 11-21, 2004.
- WOLLENBERG, E.; INGLES, A. **Incomes from the forest**: methods for the development and conservation of forest products for local communities. Bogor: CIFOR/ IUCN, 1998. 227 p.
- WOODLEY, E. Indigenous ecological knowledge systems and development. **Agriculture and Human Values**, v. 8, p. 173-178, 1991.
- WUNDER, S. Poverty Alleviation and Tropical Forests: What scope for synergies?. **World Development**, v. 19, n. 11, p. 1817-1833, 2001.