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## COMMUNITY FORESTRY FOR SMALL-SCALE FURNITURE PRODUCTION IN THE BRAZILIAN AMAZON

David G. McGrath, Charles M. Peters,  
and Antônio José Mota Bentes

A large proportion of Amazonia is occupied by smallholders who obtain their livelihood through shifting cultivation and the extraction of forest resources. With the rise of the extractivist movement in Brazil in the late 1980s, interest was generated in the potential of these groups for the sustainable management of Amazonian forests (Schwartzman 1989, Allegretti 1995). This movement has been highly successful in pressuring the Brazilian government to pass and implement policies in support of its agenda, and to date twenty-five extractive reserves of various types have been created, covering 3.8 million ha and including 154,000 people (including both extractive reserves and *assentamentos extractivistas* [Jucá, Centro Nacional de Populações Tradicionais, Belém, pers. comm. 2002]).

Unfortunately, these political gains have not been matched by comparable success in consolidating the economic base of extractive reserves or establishing forest management as a viable economic strategy for smallholders. Despite much effort and expense, extractive reserves are still a long way from being economically viable. At the same time, the community forestry approach has come under criticism from economists, who argue that forest extraction does not provide a viable economic base for developing traditional communities (Homma 1989, 1993, Browder 1992, Rice et al. 1997), and from biologists, who argue that traditional extractive activities are degrading forest resources and depleting game species that perform vital ecological roles in forest ecosystems (Redford 1992, Salafsky et al. 1993, Veres 1994, Terborgh 1999, Paltz et al. 2001). Given that the total area in Amazonian reserves

where human presence and use are permitted is 30 percent larger than all the parks and biological reserves combined (da 1999) and six times larger if indigenous reserves are included, successful resolution of these economic and ecological problems is critical to the well-being of an enormous area of Amazonian forest, not to mention the hundreds of thousands of people whose future is inextricably tied to these reserves.

Although criticisms of traditional forest extraction are in some cases valid, this certainly does not imply that forest extraction has no potential for successfully reconciling development and conservation objectives (Schwartzman et al. 2001). The main problem is an overly naive view of the organizational capacity of smallholder groups and the promotion of inappropriate strategies for developing extractive economies (Smith 1995). In a few places in the Amazon and elsewhere in the neotropics, an alternative strategy for developing community-based forestry is emerging that could be called boutique capitalism, in contrast to the commodity capitalism approach that characterizes conventional logging and extraction of non timber forest products such as rubber. This approach combines small-scale production of high-quality finished products for green consumer markets with emphasis on developing the local organizational capacity needed to administer these enterprises.

In this chapter we describe a project in the Tapajós-Arapurus Extractive Reserve in western Pará, Brazil, in which smallholder community groups are managing forest resources to produce wood for small-scale furniture workshops. This project, called the Caboclo Workshops of the Tapajós (Oficinas Caboclas do Tapajós), was designed to facilitate development of group organizational capacity and to promote the production of simple, high-quality hand-made furniture for local and regional markets. Forest conservation was also a key consideration in the design of the project, and all activities of the furniture enterprise ultimately depend on the sustainable management of community forests.

### TAPAJÓS-ARAPURUS EXTRACTIVE RESERVE

The Caboclo Workshops of the Tapajós project is a collaborative effort involving the Amazon Institute for Environmental Research, the Woods Hole Research Center, and the communities of Nova Vista, Niquinã, and Sarrucá in the Tapajós-Arapurus Extractive Reserve (figure 11.1). The project is one outcome of a process that began in the early 1980s when communities of the west bank of the Tapajós River organized to oppose commercial logging in what they considered to be their territory. After several years of conflict and mounting political pressure, the Instituto

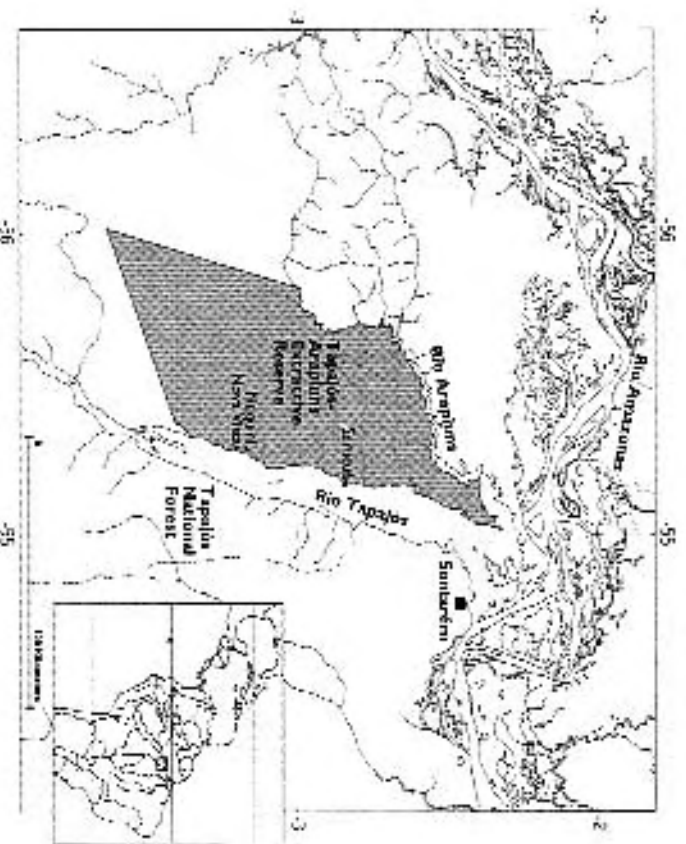


Figure 11.1 The Tapajós-Arapuama Extractive Reserve, Brazil, and location of the three communities involved in the Cadeba Workshops at the Tapajós area.

Nacional de Colonização e Reforma Agrária (NECIA), the government agency responsible for tilling federal lands, granted the communities a 13-km-wide, 64-km-long forest reserve on the western shore of the Tapajós River. The area encompassed the seventeen communities that were most actively involved in the struggle. The communities divided the reserve into two main zones paralleling the river. The first 3 km inland from the river was designated for settlement and agricultural activities, and the remaining 10 km was set aside as a forest reserve.

Ten years later, in the mid-1990s, the Tapajós communities joined with communities of the south bank of the Arapuama River, a tributary of the Tapajós, to lobby for creation of an extractive reserve encompassing the lands between the two rivers (see figure 11.1). In 1998 the 647,611-ha Tapajós-Arapuama Extractive Reserve was created over the fierce opposition of logging companies, local business interests, and the municipal government.

Since 1984, communities of the original forest reserve created by NECIA, now incorporated into the extractive reserve, have had varying

success in restricting agricultural activities to the first 3 km, as originally agreed upon. Especially in the larger communities closer to Santarém, pressure for agricultural land and from commercial loggers has been intense. Many communities in need of new land for farming or income from timber sales have ceded to pressure and permitted farmers or commercial loggers to exploit areas in their forest reserve. However, several communities, including Nova Vista and Niquini, have been largely successful in protecting their forest resources. The existence of these reserves provided the initial motivation for this project.

### COMMUNITY STRUCTURE

Communities along the Tapajós River range in size from 35 to 120 families, with Nova Vista, Niquini, and Santarém having 35, 46, and 86 families, respectively. The local population is typically *caboclo*, of mixed European, African, and Indian descent. Communities tend to have a linear settlement pattern, with houses arranged on either side of one or more roads parallel to the river. Most have well-defined cores with a Catholic church, a community center, and a primary school. As part of the original settlement with NECIA and the logging companies, community territories were defined averaging 4 km frontage along the river and extending inland 13 km. Within this territory, families own current and fallowed agricultural fields, which they obtain from the village council. However, as is typical of communities with fairly abundant forest resources, tenure arrangements are still quite fluid, and there is much lending of land between families. Most fields are located within an hour's trip by bicycle, roughly 5 km from the community center.

Reserve communities have a long tradition of grassroots activism. Most have an elected leadership based on a presidential system that may include a community council. Two other important organizations are the Rural Workers' Union of Santarém (Sindicato dos Trabalhadores Rurais de Santarém) and the Catholic church, both of which have played critical roles in training community leaders and developing local organizational capacity. Most communities also have their own community associations and may participate in one of the two intercommunity associations that provide access to government credit programs for farming and some extractive activities. Communities are serviced several times a week by two or three ferriboats, which provide access to markets and government services in Santarém. Transport costs for passengers and goods tend to be fairly high by local standards, and for more distant communities they constitute a significant barrier to stronger participation in the regional market.

## LOCAL ECONOMY

The major economic activity of the Tapajós communities is farming, and the main crop is manioc, which is processed into *farinha* (meal). Shifting cultivation is the predominant agricultural system. Fields average 1 ha, and the normal sequence involves two plantings of manioc and then fallowing of fields for five or more years. Families produce three to five 50-kg sacks of *farinha* per month, most of which is sold in the community or in Santarém. Farmers cultivate a variety of other crops, the most important being corn, squash, and beans, but none of these contributes significantly to household incomes. Most families also cultivate fruit trees around their homes, but few produce a surplus for market. Animal husbandry is limited and largely subsistence oriented. Almost all families have a few chickens and ducks, and some raise pigs. Large animals, such as cattle and horses, are raised by only a few families. Fishing is the main source of animal protein for most households, followed by hunting. People also exploit a variety of forest products, of which the most important economically is rubber, collected from trees planted in the community and from wild stands in the forest. A processing plant in Santarém and a government price support program for natural rubber are the main reasons for continued interest in this commodity.

## INSTITUTIONAL CONTEXT

With the creation of the Tapajós-Atapitims Extractive Reserve, communities were integrated into a new institutional framework within the Brazilian Institute of the Environment and Renewable Resources (IBAMA), the agency responsible for the federal reserve system. Within IBAMA, extractive reserves are the responsibility of the National Center for Traditional Populations. The official governing body of the reserve is the Director Council, composed of representatives of reserve communities, various government agencies, and local nongovernmental organizations working in the reserve. However, the reserve-wide organization, Tapajósara, whose leadership is elected by reserve residents, is responsible for governing the reserve, with the Director Council simply ratifying its decisions.

## CABOCLLO WORKSHOPS OF THE TAPAJÓS PROJECT

The Cabocllo Workshops of the Tapajós project began in 1998 in the communities of Saracá and Niquini and was later joined by a third community, Nova Vista. By coincidence, the first contact with the com-

munities was made during a regional meeting held in Niquini to plan efforts to wrest the area that would later become the extractive reserve from the two logging companies that controlled much of the land inland from the communities. A representative of a logging company also attended the meeting and presented a proposal to purchase timber in the Niquini forest reserve. The fact that community members were at least willing to listen to the logger's offer was evidence of their concern over the poor condition of community infrastructure and their recognition that the timber resources they had guarded for so long were more than sufficient to address their needs. As one community member put it, "We've preserved this forest for all these years for what?" The Tapajós furniture project was developed to answer this question by finding a way in which communities could tap the resources they had so zealously guarded without depleting the productive potential of their forest.

The project's approach is to develop sustainably managed community forest reserves to supply wood for local furniture workshops. Artisans use locally available hand tools to produce simple pegged furniture designed to bring out the natural beauty of Amazonian hardwoods. At present, furniture is sold locally, with plans to expand into national and possibly international markets as production increases.

The furniture workshop and forest reserve contribute directly and indirectly to community development. The enterprise contributes directly by generating employment for participating artisans and indirectly via investment of part of the workshop's profits in a community development fund for improving community infrastructure, both social and economic. As the enterprise grows in both employment and sales volume, the fund will become an increasingly important source of support for community development initiatives.

Cabocllo Workshops was designed to be consistent with local technology and ways of doing things. However, it should be emphasized that the enterprise itself, including the workshops, furniture, forest management system, and organization needed to manage the overall business, is entirely new to the community members involved. There is no local or regional precedent for Cabocllo Workshops that could serve as a model and source of experienced advisers.

The initial vision for the project was largely that of the two project coordinators, an American geographer and a locally born Brazilian sociologist, who have been working in the region since the early 1990s. They proposed the project to the communities and, once communities had confirmed their interest, sought external funding for the initiative. However, neither project coordinators nor community members had

prior experience in community forestry, so development of the project has been a learning experience for all those involved. Through this process, local artisans are acquiring the skills and experience they need to transform the project into a self-sufficient business.

Project staff consists of three full-time and two part-time members, including specialists in community organizational development, community management of natural resources, agricultural extension, and woodworking. Funding for the project has been provided by the U.S. Agency for International Development, Ford Foundation, and Umbio, a Brazilian funding program supported by the Global Environmental Facility. The annual budget for the last three years has averaged US\$70,000. Work during this period has focused on four main areas: organizational development, furniture production, forest management, and marketing.

### **Organizational Development**

Cabocho Workshops operates at three interdependent organizational levels: the community workshops, the Cabocho Workshop association, and the communities in which each workshop is located. The main focus of project activity thus far has been on organizing the community workshops. Workshops began with fifteen to twenty members each. Over the course of the first year, membership declined, stabilizing at six to twelve, depending on the community. Most are men, and ages range from twenty to fifty. Only one group has significant participation by women. Groups are responsible for all phases of local forest management and furniture-producing activities, and thus far most capacity building and organizing activities have taken place at this level. Each group has an elected coordinator and vice-coordinator responsible for organizing workshop activities and representing the workshop in regional meetings and other activities.

Although workshops are independent organizations within each community, the two are closely linked through the design of the project in which workshops are intended to serve as a vehicle for community development. A fundamental link between workshop and community is that the furniture enterprise exploits community forest resources. Communities have granted workshops the right to exclusive use of timber resources in a designated management area. In return, each workshop contributes part of its profits to a development fund managed by community leadership.

Influence of the project on the community extends further than negotiating use rights. Furniture projects grew out of broader discussions of

the value of community forest resources and development options. Communities take pride in being the home of workshops and in having established formal forest management areas. In fact, several people who are not members of the workshops but support the idea participated in the forest inventories. The success of the workshops has also helped move discussion of forest resources out of the abstract realm and has encouraged communities to be more concerned with conservation. For example, there is a notably stricter adherence to the rules regulating the location of agricultural activities in collaborating villages, and several community fire prevention programs have been developed to protect forests.

The Cabocho Workshop Association is the least developed organizational level thus far. The association will have a two-tier structure consisting of community workshops and the regional association. The actual division of labor between these two levels will be worked out as the organization develops, but the plan is for workshops in each community to operate as largely autonomous management and production units within the association, with local members responsible for managing their own workshops and forest resources. The Regional Workshop Association will be responsible for furniture marketing, overall logistical support, financial management, and institutional relations.

At this point, most of the logistical and organizing activities are still undertaken by project staff, but with increasing participation of workshop members. With the workshop level increasingly consolidated, emphasis is turning toward development of the regional organization. Efforts are now focused on developing and implementing a business plan to guide the process of structuring the workshop association to take responsibility for marketing furniture in major national markets such as Rio de Janeiro and São Paulo, and all that implies in terms of business operations. Although a coordinating group composed of representatives of the community workshops will oversee operations, it is likely that an outside administrator will be hired to manage day-to-day activities associated with marketing, financial administration, and logistical support. As group members with administrative talent emerge and acquire business management skills, they will assume greater responsibility, perhaps replacing the outside manager.

### **Production**

Development of community workshops began with a series of two-week training sessions in which artisans acquired woodworking skills, experimented with different furniture designs and types of wood, and developed



Figure 11.2. Furniture workshop in the village of Macaú, Tapajós, Amapá, Amazonas, Brazil.

the basic production system followed today. Artisans locate fallen trees in the forest and agricultural fields, cut them into boards and other pieces with chainsaws, and carry them back to the workshop on bicycles. Pieces are worked with hand tools, including hand saws, brace and bit, hand adze, chisels, and plane (figure 11.2). Furniture is simple in construction, and pieces are pegged and glued together. Designs seek to take advantage of the shape, grain, knots, and holes of each piece. Pieces are finished with paste wax and branded with the Caboclo Workshop logo.

Thus far, workshop output consists primarily of stools, coffee tables, and cutting boards of varying design, although a number of other types of furniture and kitchen implements are produced in smaller quantities. Groups are constantly experimenting with new designs and, once accepted, standardize measurements for each. The number of wood species used has not yet stabilized and varies from workshop to workshop, depending on local availability. Thus far, groups have worked with roughly twenty species each, for an overall total of thirty-four species for the three communities.

Productive activities are organized in terms of individual effort rather than productivity. The authorship of individual pieces is not recorded, and in many cases pieces are the product of several members' efforts. However, the group keeps a record of the amount of time each member works, and individual shares of workshop sales are calculated on the basis of time worked in the previous period. Workshops also keep track of the amount of time consumed in making each piece to provide a basis for estimating costs and productivity.

Although workshops are now functioning on a regular basis, they are a part-time activity so as not to interfere with other important economic activities such as farming. The groups started out working one week per month and plan to increase their time commitment to two weeks. This period covers all activities associated with the workshops, including locating and removing wood from the forest. Groups produce an average of ten to twelve pieces per month of all types. The total volume of wood used is surprisingly small, even when wastage is included. Average monthly consumption is around 0.2 m<sup>3</sup> per workshop, or 2.5 m<sup>3</sup> annually. The small volume of wood and number of pieces reflects both the fact that only five to ten days per month are dedicated to all workshop activities, including obtaining wood in the forest, and to low labor productivity resulting from the use of simple hand tools. We expect the volume of wood consumed to increase significantly as workshops systematize furniture production, possibly introduce some electric tools, and increase the amount of time in operation.

### Forest Management

In contrast to the approach usually taken to timber management projects, groups began by producing furniture and only a year later began research for developing forest management plans. During this year groups worked with wood from fallen and dead trees found in the vicinity. This approach was largely fortuitous, the result of ad hoc responses to immediate chie-

es, but in retrospect it turned out to have been an effective way of developing the project. The decision to start this way was made because we had the project staff to train people in producing furniture and to organize the workshops, but we did not have a forester to coordinate forest management activities. To avoid tinkering with a forest that we knew very little about, we decided to use waste wood scavenged from active and abandoned sawmills.

By concentrating on furniture production, groups tackled something they could easily understand and incorporate into their lives. Producing and selling furniture, artisans acquired a detailed understanding of what they would be managing the forest for—the kind of wood and the quantities they would need to sustain furniture production. Starting with dead wood also makes sense in retrospect. There is quite a lot of it in the vicinity of communities, and from a furniture-making perspective it is of excellent quality. The wood is still hard, and as a result of aging, there is much less danger of joints shrinking and splitting than there would be with conventionally dried wood. We will incorporate this natural aging into our management plan.

The management strategy involves selective felling of the annual increment of desirable furniture woods in the forest and conscientious monitoring of regeneration levels after harvest as a basis for silvicultural treatment. Management planning is based on quantitative, diagnostic information, and these data are collected in a participatory fashion by the villagers themselves. Although the exact timing and sequence of operations were modified slightly between villages, the forestry activities initiated in Nova Vista, Nuquini, and Surucua include delineation of management area, species selection, quantitative forest inventory, growth and yield studies, definition of allowable cut, and monitoring.

#### *Definition of Management Area*

A specific tract of forest to be used for producing furniture woods was designated by each community. Nova Vista and Nuquini each set aside areas of 200 ha, whereas Surucua, which is closer to Santarém and has smaller, patchier tracts of undisturbed forest, set aside a 100-ha management area. The management areas for Nuquini, Nova Vista, and Surucua are located 4, 6, and 10 km, respectively, from the village. All three tracts are (mostly) accessible by bicycle, which is how the wood, bucked into small bolts for easy transport, will be removed from the forest.

#### *Species Selection*

Initial meetings were held in each community to discuss the concept of sustainability, forest management, and the importance of collecting

baseline information on the density and abundance of desirable wood species. After this discussion, a list of preferred wood species was compiled. Most communities also included several non timber forest resources (e.g., edible fruits, medicinal plants, and oils/seeds) on the list, in anticipation of the day when management activities would also extend to these important resources.

There was a surprising degree of overlap in the species lists produced by each village. There are apparently forty to fifty species of desirable furniture woods in the forests of the Tapajós-Arapiuns Extractive Reserve, and at least thirty of these species occur in the management areas of each community. The furniture woods compiled from the village surveys are listed in table 11.1.

#### *Forest Inventory*

The forest inventory design for use in the Calcedo Workshops of the Tapajós project was based on several considerations. The method had to be sufficiently transparent to be understood and faithfully replicated by local field crews. The sample intensity had to be large enough to provide a statistically reliable assessment of species abundances and size distributions yet small enough that the field work could be completed in a time frame agreeable to a group of people who had other things to do. Finally, the placement of sample units had to facilitate forest typing and mapping of species volumes and provide a permanent means of access for periodic entry into the area.

For these reasons, a systematic strip sample based on 10-m-wide, parallel transects was used to sample the wood resources in each management area. The distance between transects was fixed at 100 m, yielding an overall sample intensity of 10 percent. Each transect was 1 km long and composed of fifty 10- by 20-m segments, or plots; the results for each plot were tallied separately. Slope corrections, although rarely needed, were applied as necessary.

In each plot, the crew carefully searched a 5-m belt on either side of the line, and every tree on the species list at least 5 cm in diameter at breast height (dbh) was tallied and measured with a diameter tape. For plots that contained at least two tall trees, one tree was selected and its height measured using a clinometer. Although even small branches can be used for making furniture, height to the first branch was used to provide a conservative estimate of wood volume. Each crew was composed of a compass person, two *materos* ("ones who know the woods") to look for, identify, and measure trees, one person to tally the data, and one or two people to pull the transect rope and brush the line. Three to five crews performed the inventory work. Depending on the





**Table 11.2** Basic Inventory and Growth Projection Results from the Caborcá Workshop of the Espolés Project, Iapajá-Surucú and Extractive Reserve, Brazil.

Community	Management Area (ha)	Merchantable Trees/ha	Standing Volume/ha (m <sup>3</sup> )	Dead Wood/ha (m <sup>3</sup> )	Mean Annual Increment (m <sup>3</sup> /ha/yr)
Maquini	230	12.25	36.42	1.24	0.50
Nova Vista	230	17.90	51.19	4.90	0.32
Surucú	100	25.7	114.25	3.79	1.54

Volume calculations based on diameter, corrected height, and a taper factor of 0.8 for merchantable species and 0.1 for dead.

to the furniture initiative, the total volume of dead wood available is also presented.

The forests at Surucú have the largest number of merchantable trees per hectare, contain the most volume per hectare, and have the highest mean annual increment. Although the Surucú management area is only half the size of those at Maquini and Nova Vista, the former site contains a higher total volume of furniture wood. Nova Vista exhibits the highest volume of dead wood per hectare, followed by Surucú and then Maquini. The large volumes of dead wood recorded probably also are a result of recent forest fires.

To put these numbers in perspective, it is useful to translate them into quantities of furniture that can be manufactured. Given a knowledge of the specific gravity of certain woods and the weights of different types of furniture, rough estimates of the wood needed for different products can be calculated. Based on these calculations, 1 m<sup>3</sup> of wood contains about 1000 cutting boards, 190 stools, or 50 coffee tables. Stated another way, the 200-ha management area at Nova Vista produces 184,000 cutting boards, 34,960 stools, and 9200 coffee tables each year. This bodes well for the sustainability of the management effort because these quantities exceed by a large margin what the workshops can consume. Suffice it to say that there is a lot of room for the Caborcá Workshops market to grow.

#### Monitoring

Cutting only the growth from a forest is just one parameter in the sustainability equation. If the harvest species are not regenerating, even a conscientious, controlled level of use felling can gradually lead to over-exploitation. To avoid this, the management plans for all three communities include procedures for monitoring the growth response of residual trees (which could actually increase the allowable cut), the overall health

the composition of the forest, and the impact of logging on the regeneration and establishment of important tree species. These observations will be collected from a network of permanent continuous forest inventory plots established in each management area.

#### Marketing

In contrast to the wholesale marketing strategy typical of many community forestry initiatives, the strategy being developed here concentrates on retail sales to the urban consumer. As in other aspects of the project, we have taken an incremental approach in marketing furniture, beginning with the local Santarém market and later expanding to larger urban markets elsewhere in Brazil. Thus far, the major share of sales has occurred during local trade and craft fairs in Santarém, although people are increasingly coming to the project office to buy furniture. This arrangement has given artisans the opportunity to sell what they have produced, generating some income but without becoming involved in commitments that the workshops are not yet ready to assume. The experience of representing the workshops at fairs and talking to customers has also been of great importance in building artisans' confidence in the value of their work and the potential of the project. We have used this time to concentrate on developing standard designs for a product line and systematizing production techniques and measurements.<sup>1</sup> Groups are now setting monthly production targets for their main designs.

The groups are increasingly ready to consider marketing their output outside Santarém. If the project is to grow in volume of output and sales, it will be necessary to develop markets in the major urban centers of the south, where consumers are willing to pay more. This will necessitate substantial improvement in the organizational capacity of the workshops because it involves not just much larger volumes and tighter production schedules but also mechanisms for quality control, customer relations, shipping logistics, and financial administration. The main logistical problem is transport. The furniture is sturdy and exceptionally heavy because of the dense woods used, and it is quite bulky. Direct highway connection to the south is precarious, and alternative routes involve shipment by riverboat to Belém and then overland by truck to markets elsewhere in Brazil. As a result, transport logistics are a significant factor in a national marketing strategy.

To a large extent the decision to begin developing a national-scale marketing strategy was precipitated by articles in three national magazines highlighting the Oficina's products. In response to this publicity, requests

for information on products sourced, as have orders from all over Brazil. Unfortunately, this free publicity came before the workshops were adequately structured, and they must move quickly to take advantage of the opportunity before interest fades. Toward this end, a consulting firm that provides business assistance to community-based initiatives has been contracted to work with the project to develop and implement a business plan for the workshops.

The project plans to obtain some kind of internationally recognized certification for the workshops that recognizes the fact that furniture is made from wood obtained from forests that are sustainably managed by community groups. However, we do not see the market for certified products as necessarily absorbing much of the workshop's production.

## EVALUATION

Earlier we identified several concerns in assessing the potential of community forest management initiatives such as this one: resource constraints, financial returns, organizational capacity, and overall applicability. Although many important components of the project are not yet fully operational, the experience does provide sufficient information for a preliminary evaluation.

### Resource Availability

One of the major concerns in tropical forest management is whether resource productivity is sufficient to ensure economic viability at sustainable harvest levels. The 120 m<sup>2</sup> of wood available from each 40-ha plot in Naquimil, for example, is almost sixty times the current level of consumption. If we narrow the number of species down to the number being exploited at present, the volume of wood available is half that of the total inventory but still almost fifteen times current consumption levels. Furthermore, the ecological integrity of the managed forests is unlikely to be affected by the volume of wood that will be removed under the proposed management plan. In fact, the proposed cut of 0.6 m<sup>3</sup>/ha for Naquimil is well below the maximum cut permitted without a management plan under Brazilian law.

### Financial Returns

A second criticism of community forestry has focused on the low economic returns to labor of extractive activities. Although it is not yet possible to undertake a complete financial analysis of the workshops be-

cause several major components of the enterprise such as forest management and business administration are not yet functioning, we do have enough information on labor inputs, production volumes, and sales to obtain a rough idea of the economic viability of workshops in their present state of development. In general, artisans devote five to ten days per month to workshop activities, including removal of wood from the forest and furniture production, for a total monthly labor input of thirty person-days per workshop. The value of monthly production at current prices is estimated at 300 reais. Because of project subsidies in the form of tools, some supplies, and staff support for sales and financial management, it is not yet possible to accurately estimate average monthly costs. Partial information available indicates that they average roughly 10 percent, or 30 reais, so the net monthly return to labor is 270 reais. This corresponds to 4.3 reais per person per month for the six workshop members, about two-thirds the average cash income per family from *fabela* production. This return corresponds to slightly less than the legal minimum wage. Although there is undoubtedly room to increase the efficiency of the workshops, workers will have to increase the productivity of labor through use of some electric tools and obtain higher prices for furniture than is possible in the Santarém market if they are to significantly increase incomes.<sup>2</sup>

There is also room to expand the scale of the enterprise. Based on earlier estimates of the available volume of wood and the income figures presented earlier, the gross value of furniture that could be produced at current prices ranges from 90,000 to 180,000 reais per workshop per year, depending on the number of species used. Even doubling current levels of wood consumption, the existing management area could provide employment for up to forty-five half-time workers, or at least one member of each family in the average-sized reserve community. In this case, gross monthly income would be between 84 and 168 reais for half-time workers.

### Organizational Capacity

The third issue is local organizational capacity to operate a successful business. In this regard, although the project is still developing and far from ready to function independently, there is reason to believe that the group will be able to achieve this objective, although a professional manager may be needed for some time. The experience thus far confirms that reported from community forestry initiatives in Mexico (Klooster 2000). Organizational capacity is not something to be taken for granted, nor is it some intangible quality. Rather, through a systematic educational process

geared to the level of the participants). It is possible to develop the organizational capacity needed to effectively manage community-based enterprises. We designed this project to take this problem into account in five ways: selection of communities with an initially high level of organizational capacity; simple organizational demands; an incremental approach to project development; a major investment in developing group awareness and organizational skills; and a transfer of responsibility for running the operation from project staff to workshop members that is in pace with development of local capacity.

### Potential Applicability of This Approach

Finally, although it is too early for a definitive answer, we believe that the approach to forest management taken here has widespread applicability as a forest management strategy for smallholder communities elsewhere in the Brazilian Amazon. First, the small volume of wood used and the high added value of furniture production mean that resource availability is unlikely to be the limiting factor in most situations. In fact, this approach is especially attractive for those whose forests have been degraded by logging, forest fires, or clearing for agriculture because these are all situations in which there is likely to be an abundant supply of dead wood. Second, because of the simple, low-cost technology used, capital and skill thresholds are low. In this regard, the main issues are wood-working skill and aesthetic sense, both of which can be instilled through training programs. Products are also suitable for a fairly wide range of markets, regional, national, and international, so that demand is not likely to be a limiting factor initially. Although economic returns are fairly low in the early stages, there is the potential for major increases in income as workshops develop, invest in more productive equipment, and tap into larger urban markets. Finally, for all these reasons, this approach has the potential to make an important contribution to community development, providing not only jobs but also funds for improving community infrastructure and services.

### CONCLUSION

Despite the criticisms leveled by many conservationists, community-based forest management can be an effective strategy for reconciling the conservation and development of tropical forest resources. Although many difficult challenges must be addressed, in most cases they can be resolved. In fact, the number of successful community-based manage-

ment experiences throughout the tropics is increasing. The main problem in many cases has been the choice of inappropriate economic strategies that do not take into account the organizational capacities of smallholder communities. Rather than rejecting the model because of earlier mistakes, what is needed now is a renewed effort that draws on lessons from past successes and failures to develop management strategies that take advantage of the enormous potential of community forestry for the conservation of tropical forests. Managed forests are an essential complement to parks and reserves, and the much larger total area now occupied by traditional peoples and colonists is critical to a region-wide conservation strategy for the tropics. Any realistic conservation strategy for tropical forests must be based on recognition of the critical role to be played by forest management.

### NOTES

1. At the time of writing, furniture prices are as follows: stools, 40–60 reais; animal stools, 50–100 reais; chairs, 60–85 reais; coffee tables, 100–150 reais; breadboards, 10 reais. One real is worth us\$0.33 at prevailing exchange rates.
2. The productivity of furniture production alone is fairly high by local standards, about twice the average daily wage. The problem is that about half their time is devoted to support activities, bringing down the average return per day.

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