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Market-related constraints to non-timber forest product development in Central America: Experiences from the CATIE/Olafo Project

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Abstract

Using a multidisciplinary approach, the CATIE/Olafo project seeks to influence the management, production, and marketing of timber and non-timber forest products in agricultural frontier areas in Central America. This paper describes various products promoted by the project and the methodology used to market these products, and some market constraints facing small producers. Demand factors that affect the marketing include consumer preferences, prices, and seasonal issues, while supply factors include ecological, social and legal issues. The strategies employed by the project to overcome the marketing constraints focus on the production processes, integrating alternatives into the existing production system, market structure and product demand, and organizational structure and training.

Project Overview

The Project for Conservation and Sustainable Development in Central America, a regional conservation and development project, is funded by the Danish, Norwegian and Swedish development agencies, and has been implemented by the Tropical Agricultural Center for Research and Training (CATIE) since 1989. The first phase was from 1989 to 1992, and the second will end in late 1995. Commonly known as Olafo, the project focuses on rural communities' management and harvest of the natural resources from tropical ecosystems in agricultural frontier areas. In an effort to promote sustainability and reduce deforestation the project concentrates on employing traditional and alternative timber and non-timber forest products (NTFPs) within commonly used production systems.

The Olafo Project focuses on 4 different demonstration areas throughout Central America, including mangroves in the Pacific regions of Nicaragua, and humid tropical forests in the Petén, Guatemala, the Talamanca region in eastern Costa Rica, and Bocas del Toro in northern Panama (Annex 1). In agricultural frontier areas, it is the

small farmer who makes the decision to fell forest due to a lack of alternative income (monetary or non-monetary) generating opportunities. Olafo seeks to demonstrate the hypothesis that frontier agricultural groups can improve and diversify their current production systems, improve their income in the short and long term, and therefore, decrease the trend of agricultural expansion and the destruction of forest biodiversity. The project seeks to instill a sense of "ownership" of the natural resource base in the demonstration areas by providing income generating activities from the natural resources present, and promoting an understanding of the personal and long term repercussions of overexploiting the natural forest.

Taking into consideration the different ecological and socio-economic factors present in each area, Olafo evaluates and seeks to improve the use of natural resources by local communities. The project aims include providing a validated model (or approach) that is economically and ecologically sustainable, and applicable to other agricultural frontier areas of Central America. Project strategy is based on the following activities:

- evaluation of the biological diversity of those ecosystems near and influenced by the local population
- evaluation of current production systems and possible alternatives/improvements within the framework of an already established production system
- promotion of local participation in project investigations, management and production schemes
- coordination between local and institutional organizations

To implement these activities, multidisciplinary teams in the areas of biology/ecology, economics/marketing, and sociology have undertaken research and training activities in each of the demonstration areas. This includes research and validation of improved or non-traditional agricultural, forestry, and economic practices, the promotion of participatory community development, and the transfer of technology. Due to the complexity and variability among ecosystems and communities, Olafo uses a research approach at different levels of analysis:

- species
- production system
- ecosystem

This paper focuses on the marketing issues at the species level of analysis, which refers to the investigation and development of each individual product, and at the production systems level, allowing team members to examine the relative importance of a resource in terms of the farm system as a whole. Although important for projections and policy development, Olafo has not yet investigated the market implications at the ecosystem level. In addition, the paper focuses on NTFPs, to the exclusion of other important project areas of interest such as timber species and improved agricultural production systems.

Non-timber Forest Products (NTFPs) Promoted by Olafo

The project promotes the management, extraction, processing, and commercialization of the natural or domesticated resources which are listed in Table 1.

TABLE 1: NON-TIMBER FOREST PRODUCTS UNDER INVESTIGATION

USE CATEGORIES OF NON-TIMBER FOREST PRODUCTS	Species	Product	Resource	Demonstration Area
ORNAMENTAL	<i>Reinhardtia gracilis</i>	Seed	Herb	Costa Rica
	<i>Zamia skinneri</i>	Bulb	Herb	Costa Rica
	<i>Chamaedorea spp. (Xate)</i>	Leaf	Herb	Guatemala
MEDICINAL	<i>Quassia amara</i>	wood	shrub	Costa Rica
	<i>Smilax spp.</i>			Costa Rica
	- Zarcaparilla - Cuculmecca	root rhizome	liana liana	
HANDICRAFTS	<i>Philodendrum rigidifolium</i>	aerial root	epiphyte palm	Costa Rica/Panama
	<i>Heteropsis oblongifolia</i>	stems	herb	Costa Rica
	<i>Desmoncus spp. (Bayal)</i>	leaf		Rica/Panama
	<i>Carludovica palmata (semko)</i>			Guatemala Costa Rica
INSECTICIDAL	<i>Quassia amara</i>	wood	shrub	Costa Rica
TREE FORAGE	<i>Hamelia patens</i>	leaf	shrub	Guatemala
FUELWOOD, CHARCOAL, TANNINS, RESINS	<i>Laguncularia spp.</i>	wood	tree	Nicaragua
	<i>Avicennia spp.</i>	bark	tree	Nicaragua
	<i>Manilkara zapota (Chicle)</i>	resin	tree	Guatemala
OTHER ACTIVITIES	Iguanas			Nicaragua
	Apiculture (honey)			Nicaragua/ Guatemala

Olafo promotes three basic types of products which include: 1) known products which are already commercialized in the region or country, but either are new to the demonstration area or include improved sustainable management strategies, 2) alternative products which are already commercialized but the origin of the primary material is different from that typically used in the region, and 3) new products.

- **Known products**

Known products include honey (Guatemala), semko, iguanas, bayal, xate, and chicle.

Xate (*Chamaedorea spp.*) and chicle (*Manilkara zapota*) are NTFPs historically extracted from the Petén, sold to intermediaries at the forest gate, and later exported to the U.S., Europe and Japan. Xate is a palm leaf which is sold internationally for use in floral arrangements. Chicle is a resin which is tapped from the chicozapote tree and sold for use in chewing gum and adhesives.

Bayal (*Desmoncus spp.*) is a vine commonly found in the Petén forests, which although used by the locals previously, its processing and commercialization was not widely adopted. Bayal is similar to rattan (*Calamus spp.*) in morphology and fiber, promoting interest in investigating its use as a fiber on an industrial as well as artesanal level. Olafo trained a group of campesinos to extract and process the fiber and several are currently producing furniture, baskets and other products for sale at the regional level.

While apiculture was previously practiced in the Petén Region of Guatemala, it was not widely adopted by community members. Olafo, through technical assistance and community outreach, created an association of between 10 and 15 members who extract honey from africanized bee hives in addition to their traditional agricultural activities.

The indigenous Kékoldi population in Talamanca, Costa Rica has been trained and is being encouraged to use an abundant fiber known as semko (*Carludovica palmata*) which although commonly used in other regions in Panama and Honduras in handicrafts, is not traditionally used by this tribe. *Philodendrum rigidifolium* and *Heteropsis oblongifolia* are two other fibers which are harvested by the indigenous groups in Talamanca and Panama.

In the Nicaraguan mangroves, instead of capturing iguanas from the natural forest (where overhunting has dramatically diminished the population), campesinos cultivate iguanas in captivity, sell a percentage as pets on the international market and with the rest, repopulate the local mangroves.

- **Alternative products**

The second category that Olafo promotes is based on goods whose uses are known, but the components which make up the products are different from those previously exploited in the region. The common thread for these "alternative" products is not that the needs the product fills are new, but rather that the raw materials used to fill these needs are new to current markets. In Nicaragua, the majority of rural communities depend on fuelwood to satisfy their cooking needs, while country-wide,

approximately 50% of energy needs are supplied by fuelwood (Bianco, 1994). Due to the consistent local and regional demand, *Rhizophora spp.* (red mangrove) are overharvested. Olafo is promoting the use of abundant, less commercialized species, *Laguncularia spp.* and *Avicennia spp.* for fuelwood and charcoal. Olafo is also promoting the production of honey produced in mangroves and preliminary tests have shown that the quality is within an acceptable range of the honey currently on the market.

In a non-market context, the project is promoting agro-silvopastoral management through the use of *Hamelia patens*, a tree forage resource commonly found in the Petén which is used to feed goats. The goats are maintained in modules (raised pens), fed tree forage which is cultivated in fields close to home, providing meat, milk and other dairy products to the family.

- **New products**

Products with a new twist include natural insecticides and several species of ornamental plants. *Quassia amara* is a small tree whose wood, bark, and leaves contain quassina compounds which in small doses possess medicinal characteristics, but in its same form, works as a pesticide. On a local and national level *Quassia amara* is sold as a medicinal aid for stomach ailments. The raw material was sold internationally before the second world war for use as an insecticide, but with the creation of effective synthetic substitutes, interest dwindled in the late 1940s (Brown, 1994). Given changing attitudes toward pesticides and a burgeoning "green" market, an organic product was deemed to have potential and so it is being reintroduced at the national and international level.

The ornamental plants of interest are *Zamia skinneri* and *Reinhardtia gracilis*, the first of which has been listed as endangered and therefore, is protected under the Convention on the International Trade of Endangered Species (CITES). Although these plants are not currently sold on the market, Olafo is promoting the domestication of these plants to compete in the strong national and international trade of ornamental plants.

Each of these products (whether it is the product that is new, the raw material, or the management practices used to transform the resources), can be viewed as substitutes in already defined markets. There are already markets for ornamental plants, insecticides, handicrafts, and fuelwood, for example. Although each product presents a particular set of market limitations, there are basic elements in common to many of the products. What are the markets for these products? To determine the most appropriate market, the project developed an approach to evaluate and test the current and potential supply and demand. Olafo's experience in marketing these resources is described below.

Building a methodology for marketing NTFPs

Owing to the multi-step process of honing and creating markets for non-traditional forest products, the project systematized the methodology in the following manner:

- **Generation of a product idea within the context of community and environment**

At the outset of the project, the project selected products based on the following criteria: biological, cultural and market. The project conducted ethnobotanical studies to determine the local knowledge and traditional uses of various plant species, biological and chemical studies for species not commercially exploited by the local populations, preliminary ecological studies to determine the characteristics of the distribution of the resources in their natural environment, and investigated, in a general manner, the existence of actual or potential markets for the proposed product. Consideration was given to the product type (whether it was a leaf, bulb, trunk, etc.) from the ecological, technical processing, and marketing perspectives. Another important factor which influenced the choice of products included the degree of acceptability to the local community.

In Talamanca 120 different non-timber resources were identified at the outset as possible products, but based on the above-mentioned criteria, this number was reduced to only 9. After several years, the number of resources under investigation lowered to only 5 primary products: *Quassia amara*, *Zamia skinneri*, *Reinhardtia gracilis*, and *Smilax spp.* (Zarzaparilla and Cuculmecca); the project decided to focus on *Carludovica palmaria's* commercial possibilities, but did not launch a biological/ecological investigation (Ammour, et al, 1994). These products represented the most appropriate alternatives based on the ecological, market and social factors.

- **Investigation of the market (local, regional, national and international)**

Market surveys are the primary means of determining market demand and supply for the targeted products. Community members and project professionals use surveys to learn about consumer needs and preferences at the local, regional, national and international level. Personal interviews with different agents provide information on product specifications such as size, quality, quantity, seasonal highs and lows in demand as well as costs, prices, distribution channels, institutional influences, and the relevant competition. The surveys involve sampling a number of each of the various members in the chain of commercialization, including other suppliers, intermediaries, wholesalers, retailers and consumers to determine the buying and selling parameters of each link in the chain. The number of interviews depends on the goals of the study, the number of links in the chain, and the characteristics of the market of interest. With the information gathered the project can make prognostications about how the traditional and non-traditional products the project seeks to promote fit into

the existing commercialization process.

In addition to the collection of primary information, the project uses secondary sources, literature reviews, and contacts with other organizations involved in and around the marketing of the product of interest. For example, interviews with CITES provide valuable information about the legal aspects of the international trade of natural resource products and governmental agencies provide another necessary perspective. In addition to the legal component, other NGOs, development agencies, universities, or investigative networks provide leads and literature that are not always easily attainable in and around the demonstration areas.

- **Investigation and evaluation of product supply within the context of the demonstration area**

It is crucial to find out if it is possible to commercially market a product at a competitive price given the ecological, social and economic criteria which exist in the demonstration areas. Using information on market scale, quality of product demanded, and the distribution patterns commonly used, the project can determine the most appropriate mechanism for marketing the product, in the context of the local community's abilities. Diverse factors affect product supply, including technical issues (growth rates, abundance, management techniques), social factors (degree of community organization, educational levels), economic/financial factors, and legal problems (land tenure, harvesting restrictions). The degree of importance of each of these will determine where efforts should be directed, that is, to local, national or international markets.

- **Product concept test**

Once the product has been defined and readied for market, the concept test should take place. This involves bringing product samples to the targeted market to determine the buyers' response. Olaf typically brings the product to local or regional consumers, or to regional or international intermediaries. In addition to basic information such as prices and quantities demanded, issues related to perceptions of product quality, performance in relation to substitutes, transport survival rates, and other factors are determined. Results from the test are useful to make adjustments to the product concept or changes in the production process so as to make it more acceptable to the consumer.

- **Financial/Economic Analysis**

The financial/economic analysis is used to determine the short and long term contribution of income to the communities. Taken from the perspective of the group or individual responsible for the production, it is used to evaluate the costs and benefits (both monetary and non-monetary) using actual market values. This analysis is completed from several angles: one to determine the financial feasibility of a particular product, and then, to determine how the product fits into the production

system or farm. The project undertakes two types of analyses, ex-ante and ex-post. Using actual cost data from the local area and making projections about the production process, the preliminary analysis is used to determine if the product or component covers its costs and what are the benefits relative to alternative opportunities. After an activity has been adopted, the benefits and costs are monitored on a regular basis for later use in analyzing the financial and economic efficiency of the activity and their effect on the production system.

- **Definition of manufacturing and marketing plans**

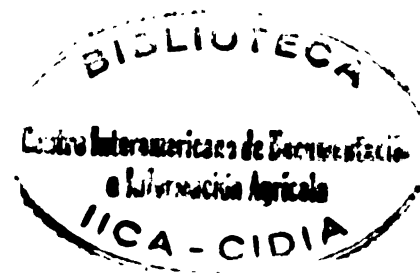
Once it is determined that the product is commercially viable, that is the ex-ante financial/economic analysis is favorable, the market tests show a demand for the product, and the members of the community indicate interest in continuing the activity, an action plan is formulated. This involves choosing the target market, mapping out a production calendar, determining the production activities, defining the tools and equipment required to achieve production goals, setting prices, defining the channels of distribution, and formalizing the legal recognition of organizations by creating associations or cooperatives. In addition, formal recognition and permits may be required to sell products at the regional, national or international level. This part of the process ensures that the product supply meets the market requirements.

- **Product market tests: small scale commercialization**

This phase involves visualizing, testing and modifying the variables in the commercialization plan. It is a practice run to check on the efficiency of the manufacturing and production plans. The communities or individuals who will be marketing the products begin the process and complete each of the activities on a small scale. It is here that the realities of the market are discovered. Prices promised by intermediaries or consumers are actualized, information on product consistency, and true costs are revealed as the commercial reality takes place. Small scale commercialization allows the producer to take stock of the market, make adjustments where necessary, and evaluate the marketing plan on a smaller scale, therefore diminishing risk.

- **Commercialization**

If the product survives the previous steps, the producers should be sufficiently informed on potential consumers, and trained to bring a product to market. Full scale commercialization involves making decisions about quantities supplied, distribution, pricing and the promotion of products. This step requires a stable and long term commitment on the part of the producer. The formality of this depends, of course, on the chosen market, be that local, regional, national or international.



Market-related constraints

Demand Constraints

Defining demand involves first identifying the agents and the consumers, and determining the processes which influence their decision making process. The project has found that the demand constraints which affect the marketing of Olafo products are a function of 3 themes: 1) preferences, likes and basic needs of consumers, 2) prices, and 3) seasonality. Within the context of each of these, the conditions of demand depends on whether the market is local, national, regional, or international.

- **Consumer preferences**

The consumer demand for the NTFPs promoted depends on the type of product, that is, a familiar product, a substitute or a completely new product, as well as on the type of market. International markets typically have exacting quality standards as well as strict requirements for product consistency. In addition, they often require large quantities of product in order to meet the capacious demand of a large market. Requirements in regional or national markets are not as rigorous, but usually demand higher quantities and consistency than the local market which is often more willing to accept raw materials, natural defects and a smaller quantity.

- **Prices**

In many cases the ecological scarcity or degradation of the raw material sold or used in the NTFPs is not immediately reflected in the market price. Current prices paid for NTFPs do not consider sustainable management styles, but instead favor those production systems with the cheapest, most efficient means of extracting the resource in the short run. Olafo, on the other hand, bases its work on the premise that the resource base should be managed to allow sustainable harvests into the future; hence a value is placed on the future availability of a resource. In practical terms, this means that the immediate costs incurred in managing a resource sustainably are usually higher than traditional practices.

Communities practicing sustainable management have a difficult time competing with those who do not have these management costs. Current demand decisions are based on the final product, not the source. When faced with the choice of paying a price for unmanaged goods versus those extracted and produced in a sustainable manner, intermediaries and household consumers opt to pay the lower price. As a result, products have to be sold at the price of non-managed forest products in order to compete.

- **Seasonality**

Demand for certain products fluctuates depending on the time of year. Xate (*Chamaedorea spp.*), although available throughout the year, experiences an increase in demand between March and June (Remmelt, 1991). Charcoal is used to satisfy basic cooking needs when the supply of fuelwood is lacking, and also as a luxury good, for parties or recreational activities. The advantage to charcoal is that the product can be stored until demand rises and prices improve - local demand increases during the rainy season, and regional/national demand increases during vacations and holidays.

Quassia amara

Quassia amara is an interesting example because there is a current and a potential demand for the product and it is commercialized at each market level. The local demand for the bitterwood tree as a medicinal product is consistent but quite small. *Quassia* is sold as a raw material in the central markets in Costa Rica, and it is purchased directly by consumers. Only a few shopkeepers carry the product on a regular basis and the quantity sold is limited to several kilos per month. The regional and national firms use pulverized wood or an extraction of the bitterwood tree to make herbal teas or medicinal drops which are sold in supermarkets, healthfood stores, and pharmacies. Of the five national businesses who sell *Quassia amara*, only one sells the product abroad. There are few intermediaries in this market, typically only one between the extractor and the producer. Those producers who sell teas and medicines to the local market only demand between 5 and 100 kilos of quassia per month, and this market is not expected to expand in the future (Ammour, et al., 1994; Montero, 1994).

Due to limits in the medicinal market of *Quassia*, and the fact that the management of the resource is not financially justified for such a market, Olafo aimed to commercialize in the international pesticide market. The project is currently selling 500 kilos of unprocessed *Quassia* a month to a private business which is testing the product on a national and international level. Although preliminary research and testing shows that *Quassia* has potential as a pesticide, there are still factors which are unknown, such as product efficiency, dosages, and residual effects. Given the rigidity of the international regulations, the testing and promotion of the product has been limited. Preliminary results from the international market research indicate that if the product is successfully introduced as a pesticide, quantities demanded could be far beyond that which can be sustainably supplied by the project, which, for an area of approximately 100 hectares, was set at approximately 1.5 metric tons per year.

The Kékoldi indigenous community in Talamanca has a short-term contract (approximately 1 year) which guarantees them a unit price per kilo for raw material delivered to their warehouse. Of that price, approximately 13% is paid to APPTA

(Asociación de Pequeños Productores de Talamanca), a cooperative of small producers who acts as the intermediary and handles administrative details. A financial analysis of the extraction of Quassia shows that if only monetary costs are considered, the price paid to the community yields about an 11% profit, but if manual labor is included, only 65% of the costs incurred in extracting Quassia from the natural forest are covered. However, it is essential that the community cover their opportunity costs of labor if the activity is to be continued in the medium to long run.

Supply Constraints

Factors influencing the supply of NTFPs include 1) the production potential of the natural resource and ecosystem and 2) the local community's ability to manage the production and commercialization process.

- **Ecological Constraints**

The extraction of resources from tropical forests is subject to the inevitable predators and the vagaries in well as the edaphic, climatic and geographic conditions found in natural ecosystems. The quality and consistency of the resource extracted is a function of these ecological factors. Often, the natural abundance of the product determines the type of market sought for commercialization. If a product is not available in appropriate quantities, and at a reasonable density per unit area of land given the available labor and other costs, it is not financially feasible to solicit a market which requires a large supply. Additional considerations such as accessibility to the resources, seasonal availability and ease of reaching the point of sale affect supply. Given the influence of these variables, the successful marketing of a product requires a basic understanding of the resource's biological and ecological factors.

Zamia Skinneri

Local nurseries have been interested in *Zamia skinneri* as an ornamental although it is considered endangered, and is commercially restricted under CITES. As a result of these restrictions and the commercial interest, the project is currently investigating the sustainable management and most appropriate commercialization for the product. The plant is distributed in patches in low to medium altitude heights in the Atlantic Zone of Talamanca (70-1100 meters above sea level) and natural forest density was found to be between 15-231 plants/ha (Barrantes, et al., 1994). In terms of natural regeneration, the plant seeds approximately every 6-8 years and requires 4-6 growth years in the forest before it is of commercial size. In comparison, wholesale ornamental plant dealers noted that they require between 100,000-150,000 plants of a particular species per year to satisfy the international market. Growth rates of ornamental plants currently sold on the international market are often less than three months (Castiglione, 1994). In addition, the blemishes caused by insects and fungi affect the physical attractiveness of ornamental plants and severely curtail their ability

to compete in the national and international market.

Despite the general knowledge of ecological information on these plants, there is still little known about the response to management or domestication. The lack of information about the plant response in their natural and domesticated environments as well as to shipping (handling and changes in temperature), have postponed their entering the national and international ornamental plant markets.

- **Social Constraints**

In addition to the ecological/biological factors which present obstacles in extracting NTFPs from the natural forest, the human element is consummately important in ensuring the supply of the commerciable product. The community who controls the production process, normally including extraction through the commercialization, needs a basic understanding of the technical aspects of the production cycle, the costs and benefits, as well as the market channels. They need to understand how to provide a good or a service so that it meets the chosen market demand.

There are common "organizational" threads which affect the supply of these NTFPs to the various markets: 1) a knowledge of production techniques, processes, and markets and 2) an ability to develop and work within organizations. Supply failures also result from the fact that community members, whether working individually or in cooperatives, often do not adequately plan the production process, organize their labor and time, ensure a basic consistency in the quality of a product, nor meet demand requirements on a regular basis. If local groups cannot provide a consistent and quality product at a competitive price, the medium and long-term demand for the product diminishes and transaction costs increase.

Carludovica palmata

Carludovica palmata (semko) is a natural fiber used in handicrafts such as baskets and other adornments. It was introduced as a non-traditional product to the indigenous people of Talamanca, who did not traditionally work with this resource or handicrafts. Olafo trained a group of Kékoldi in weaving techniques and they began to produce products. The group built a small hut at the entrance to the reserve where these and other products could be displayed and sold. Due to a convenient location and the high rate of tourism in the region, the members have had difficulty keeping the store adequately supplied. Despite a robust demand for the product, individuals supply handicrafts when they feel the need for additional cash income. There are several reasons for this. The Kékoldi are primarily dependent on agroforestry systems and when necessary, find salaried employment in the banana plantations or work related to tourism. It is not surprising that supply does not meet the demand considering that there are viable income alternatives available, handicrafts have not been part of their recent cultural tradition, and the Kékoldi society is a predominantly self-subsistence society which is not entirely dependent on cash income.

- **Legal Constraints**

The marketing of NTFPs is influenced by two basic types of legal constraints, 1) land tenure issues and 2) import/export regulations of natural resources. Olafo works in agricultural frontier zones, which, in some cases, are located near or within natural resource reserves, for example, in the Maya Biosphere Reserve in the Petén, and the buffer zone of the Parque Amistad, a reserve which includes both Costa Rica and Panama. As is well-documented in the natural resource economics literature, open access/common property problems resulting from the lack of land tenure in such areas has led to resource degradation. The decisions which these campesinos make about the use of the forests given the marginality of their situation are based on short-term goals and do not typically favor the conservation of the resource base.

CITES internationally regulates the commercial sale of endangered flora and fauna. The project is currently working with two products which are under the auspices of this accord, iguanas and *Zamia*. The requirements for importing or exporting CITES plants requires that the plant production be controlled in a nursery, using the natural forest as a gene bank, producers have property title or a rental contract to their land, that the producers document the reproductive methods used, and follow through with the permits required to export or import the plants. Given these regulations, supply, and demand constraints, the production of *Zamia* and iguanas is organized in a nursery rather than in the natural forest. As is common with legal matters, knowledgeable people are needed to complete the process and the transaction costs to the local population are high.

Defining the market

When defining the market of interest, the agents, that is, the producers, consumers and intermediaries who fuse the supply with the demand, must be evaluated. Often the distribution chain is complex and littered with intermediaries. In some circumstances eliminating the intermediary increases the benefits to the local producer without a significant cost, while in others, an intermediary is a necessary link in the chain. However, removing a link can require adjustments to the production process (such as infrastructure, equipment or training) which may or may not be appropriate for the local community involved. To compete effectively it is necessary that the small producers are prepared to analyze market dynamics in terms of the costs and benefits of including intermediaries.

Rural communities who are combining auto-consumptive needs with small-scale NTFPs for market, are price takers in the reality of today's market. They do not have the ability to negotiate market prices, quantity demanded or the quality of product accepted; rather they must take what is offered. Therefore, project efforts are dedicated to breaking down some of those supply constraints so campesinos are prepared to be critical of market demands and offer a more competitive product. The major constraints the communities have in the marketing of NTFPs include the lack of

information on technical operations problems, basic financial analysis, accessing markets and information, and social organization. The strategies the project has adopted to confront these constraints are discussed in the next section.

Project strategies to overcome marketing constraints

Project strategies related to marketing NTFPs can be divided into four different segments: 1) production processes 2) activities based on existing production system 3) market structure and market demand, and 4) organization and training

- **Production Processes**

Given the constraints mentioned above, the project has had to adjust its strategy to focus on ex-situ conservation strategies (nurseries, semi-captive environments) versus in-situ conservation strategies (natural forest extraction). The viability of extracting resources directly from the forest versus the domestication of the genetic resources outside the forest gate is a function of the diversity of the forest, the density of resources per unit of area, the cost of manual labor, and the quality/consistency factors demanded in the targeted market. In forests where the vegetative biological diversity is relatively low and the supply is adequate given market demands, the promotion of the sustainable use of products such as bayal, semko, *Laguncularia spp.* and *Avicennia spp.* remains in-situ. However, in situations where there is a scarcity, a low density per unit area of land, or a consistency problem, resources such as *Zamia skinneri* and iguanas can be managed more effectively as domesticated resources.

The production process begins with the management, extraction of the raw material, the transformation, storage, packaging and finishes with the commercialization of the product. An efficient production system requires an investment in some infrastructure (nurseries, enclosures, workshops), in technical equipment (tools, chainsaws, protective gear), and in transportation (oxen, trucks, boats). Because of the investments involved, the project promotes the use of production and manufacturing plans which allow producers to anticipate costs, save for replacements, and to plan for the unexpected. Plans help increase the efficiency and the sustainability of an activity.

As an aid to meeting production needs, the project provides rotating funds. A local community is given seed money for investment in equipment (tools, sacks, infrastructure), and proceeds from the activity are reinvested in that activity or others within the community. The community is responsible for the management of the rotating fund, and they can use it for working capital or improve technology if necessary (Martinez, 1994).

Olafo looks beyond the individual NTFPs to determine the context of the overall production system. It is not appropriate, for example, to promote a product requiring

large amounts of maintenance if it conflicts with the cultivation of basic subsistence grains. The project promotes activities which complement the main production systems, such as goats which are fed local tree forage and only require care in the morning and the evening and by children. Similar examples are xate, which is usually collected when there is a lull in the agricultural production season, and the extraction of *Quassia* which employs 6-7 people only one day a month.

Risk of failure in one or several products is diminished by increasing the number of resources used. An additional factor which helps to spread a family's risk, both seasonal and market, is that the project promotes disparate products such as tree crops, fauna, and agricultural crops. Olafo's strategy is to improve or augment the existing production systems by taking advantage of the natural resources available.

• **Market Structure, Product Demand and Financial Efficiency**

To avoid being underinformed, the project uses investigation and market surveys to determine the structure of the market and general demand. The information gleaned from these surveys satisfies several of the producers' needs: it allows one to make decisions about the various marketing opportunities available, directs the production process in a way to meet demand more effectively, and helps to establish contacts. The producers, to effectively exploit the commercial opportunity available, should know who the final consumers are, when they buy the product, why and in what final form. This information aids in the decision of which market, be that local, regional/national or international, is the most appropriate given the quality and quantity of NTFPs produced. A producer who is accustomed to asking the appropriate questions will be in a better position to exploit opportunities as they arise and adapt strategies to compete more effectively. The surest way to determine what is sought in the market is to maintain networks and links to other agents.

Project experience shows that, in general, consumers are not willing to pay more for sustainably managed products, as is the case for iguanas in Nicaragua. In fact, in the short run, the small scale producers with whom Olafo works do not have control over changing consumer preferences. In those cases where the quantity, quality and consistency of the NTFPs promoted by Olafo is not equivalent to that generally demanded in the national and international markets, the project has begun to seek out niche markets which are more accepting of the product variability and require less quantity. Product tests of the ornamental plants *Zamia* and *Reinhardtia* are currently underway in various nurseries in Costa Rica in order to pre-determine if this plant can successfully tap the collector niche market and therefore, command a higher price. From a practical perspective, seeking out existent markets has proven much more realistic than transforming consumer attitudes.

Considering that markets do not typically consider sustainable management costs, activities must be as financially efficient as possible. In an effort to address this, the project uses financial analyses to determine the relationship between benefits and costs. Strategies used to reduce costs and facilitate the supply of materials include the

adoption of native materials to construct infrastructure or the investment in transport or equipment which will not require hard to find replacement parts (for example, oxen versus a truck). Other examples include constructing hives from waste wood and, rather than buying overripe fruit in the local market to feed the iguanas, community members gather tender leaves from the nearby forest. Of course this strategy's utility depends on the product, the opportunity cost of labor as well as the incremental benefits gained.

- **Organizational/Legal Structure and Training**

Once the targeted market has been determined, the project encourages the formalization of working groups. Organizations allow individuals to aggregate their efforts, and become a more powerful force in meeting the minimum quantity and quality standard demanded on the regional/national and international markets. In Guatemala, honey producers depend on associations at two levels: local producers joined forces to harvest in a more cost-effective way (in addition to sharing transport and equipment costs, the time required to harvest the product decreases), and, at a national level, are members of a honey cooperative which sells the accumulated quantity of honey at a higher price on the international market. As is the case with most cooperatives, these associations allow individuals access to equipment, information, and to compete in markets which would normally be beyond the means of an individual.

The organization of associations helps break through legal barriers which are often obstacles to extraction. For example, Olafo aided the community of San Miguel in the Petén to establish a concession with the Guatemalan government. This accord provides the community with legal recognition of their right to manage timber and NTFPs in a portion of the Maya Biosphere Reserve. The project seeks to establish a long term commitment to the management of the natural resources on both sides by creating a formal link between rural communities and government institutions.

In addition to improving market links and legal rights, the project provides training to overcome the technical, social and economic constraints in NTFP extraction, production, and marketing. Individuals should understand the basics of the biological and ecological aspects of the product under management (for example, ensuring that the caretakers are knowledgeable enough in managing iguanas, ornamental plants, etc. so as to provide a healthy, unblemished product to the destination market). A basic understanding of how to organize a business, keeping track of inputs and outputs, bank accounts, and investing in the future is imperative if one is to effectively manage natural resources in a sustainable manner.

Conclusions

There is a gap between the supply and the demand for NTFPs. Olafo has been more influential on the supply side and in fact, has worked its strategies around the demand side constraints, given that they are relatively fixed. Influencing demand by changing consumer preferences, prices and seasonal demand are often beyond the scope of the small producers. NTFP producers can seek out niche markets, become more efficient by slimming down costs, and complement their production system with more than one alternative to make up for a lack of continual demand. However, implicit factors in their production system are in direct contradiction to most demand requirements. Individuals in agricultural frontiers produce on a small scale and in diversified systems, which are often appropriate for local markets. Yet, the national and international markets demand consistent products on a large scale and efficient administration.

Given the weakness in influencing demand, Olafo implements strategies which aim to mitigate some of the technical, marketing and organizational/legal problems on the supply side in order to improve access to the already available demand. Integrating products into the existing production system, mixing ex-situ strategies with in-situ strategies, planning production processes and the provision of seed funds are the means used to lessen the gaps created by technical limitations in the production process. In addition to finding niche markets, community members are encouraged to use locally available materials to lower costs and obstacles of acquiring inputs. To overcome social constraints, the project focuses on organizing work groups, strengthening ties to national institutions, and formalizing land tenure. Olafo uses training, capacity building, and community participation as its primary methods.

Although these strategies are useful for making the supply more efficient, they only go so far to remove market inefficiencies. CATIE/Olafo is an investigation and conservation project, and while interdisciplinary in approach, does not have extensive expertise in commercialization processes. While there is a plethora of investigative type of studies on the biological, ecological, and economic value of NTFPs, there is a gap between the production and the commercialization of new and alternative non-timber forest products. Until this link is ensured, and small producers have access to information, finances, and formal institutional support, inefficiencies for many non-timber forest products will remain.

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