Forests, Trees and Livelihoods, 2008, Vol. 18, pp. 00–00
1472-8028 $10

TRADITIONAL KNOWLEDGE, FOREST MANAGEMENT, AND CERTIFICATION: A REALITY CHECK

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ABSTRACT

Evaluations of initial attempts at NTFP certification reveal substantial ecological, socioeconomic and administrative obstacles for forest product collectors. However, the problem of lack of sufficient scientific understanding of the ecology of NTFP species can sometimes be addressed by recognition and documentation of traditional ecological knowledge (TEK). Increasing local input regarding NTFP resource inventories, production/yield, development of criteria and indicators, and monitoring sustainable management can offer valuable contributions to the certification process. Besides benefiting efforts at certification, such attention can foster needed appreciation and local documentation of traditional ecological knowledge. Cases from Namibia, the Philippines and Brazil are used to demonstrate how local initiatives in sustainable resource management strengthened communities understanding of their resource base. The process of sharing ecological knowledge locally can catalyze broader objectives of community empowerment and sustainable management – with or without a seal.

Key words: Non-timber forest products, traditional ecological knowledge (TEK); sustainable management; participatory monitoring and evaluation; criteria and indicators, local knowledge

INTRODUCTION

Certification is a relatively new forest policy tool that attempts to foster responsible forest stewardship through the labeling of consumer products. After a decade of experience focusing on large-scale timber producers, certification is making significant steps to include both small producers and non-timber forest products (NTFPs).

Recent evaluation of community certification experiences have demonstrated mixed results (Molnar 2002). Projects have shown that communities feel that certification has resulted in greater recognition of their traditional management practices, improved articulation of community based management systems and a broader view of market opportunities. However, communities have also experienced substantial obstacles in attaining certification, including financial inaccessibility, lack of organizational and administrative infrastructure, poorly developed markets, variable product quantity and quality, lack of ecological knowledge regarding NTFPs, and difficulty tracking the various products from source to point of sale. In addition, the added value and increased profits

described by proponents of certification, have not yet been realized in the case of many NTFP products. Furthermore, once a project and/or donor support has ended, most communities simply cannot afford the costs of certification.

While the majority of community certification experiences have been with timber extraction, non-timber certification has begun to gain a foothold. Examples of NTFP certification include chiclé in Mexico, Brazil nut in Bolivia, venison in Scotland, and bark incense in Denmark (Brown *et al.* 2002, Shanley *et al.* 2006). Some initiatives that began with a timber focus are now including or have shifted to, a non-timber focus, sometimes at the request of the communities themselves. In other cases, the idea of NTFP certification began less out of interest by producers themselves, but out of a desire by certifiers, donors and the conservation community to expand the practice of certification to forest products other than timber. However, because it uses a formal framework of criteria and indicators that requires detailed ecological and socioeconomic information, certification has little chance of success with NTFP producers unless they understand the tool, the process, the costs and the potential benefits.

NTFP certification is in its initial phase and various organizations are still testing different criteria and indicators and methods of implementation. One fundamental obstacle is that basic ecological information about NTFP resource distribution, population dynamics, growth requirements, reproductive strategies and NTFP production/yield is lacking for many NTFP resource species (Cunningham 2001, Peters 1996). In this article, examples are given of some of the ways in which small NTFP producers can provide key ecological input to the certification process. Examples of communities involved in forest management from Africa, Asia and South America are included to show how traditional ecological knowledge can be used to surmount some of the barriers to NTFP certification. Because there are relatively few NTFPs certified, most of the examples are of communities working toward sustainable management and/or potential NTFP certification. Whether or not certification is the end result, the process of developing and implementing guidelines and standards for wise NTFP management can contribute to broader efforts at sustainable forest management and accountability.

Challenges and locally crafted solutions for NTFP management and certification

Timber – a singular, well-defined product – has generated a large investment in time and energy to set standards and guidelines and to put into place a credible system of certification and monitoring. Ecological monitoring of timber harvest, however, is a far simpler task than assessing sustainable off-take of fungi, insects or resins, and therefore lessons cannot easily be transferred. Non-timber forest products represent a wide array of products with complex ecology and trade chains, and, as such, are very different than the industrial timber sector, which is focused solely on commercial production of wood. Furthermore, unlike timber,

the vast majority of NTFPs serve subsistence needs and are traded in local markets, and as such, are inappropriate for international certification schemes (Shanley *et al.* 2002). While certification may not be an applicable tool for the majority of NTFPs, the process of certification can catalyze reflection among communities, researchers and NGOs as to the value of forest goods and the management practices, often undocumented, which sustain them.

In spite of the various obstacles associated with NTFP certification, by late 2002, 36 forest products were certified by the Forest Stewardship Council (FSC) (Brown *et al.* 2002). By 2006, close to sixty NTFPs were certified by FSC (Shanley, Pierce and Laird 2006), the majority of these in Brazil. Besides formally certified products, many communities are working toward setting sustainable harvesting and management guidelines and creating monitoring systems. Communities working toward sustainable management of forests for multiple products can offer lessons for others.

Ecology – community expertise

Meaningful development and application of verifiers and indicators of sustainable use depends, in part, upon ecological understanding of a species. However, even for species that have a long history of international trade such as such as palm heart, rattan and chiclé, relatively little is known about the distribution, population dynamics, growth requirements, reproductive strategies and NTFP production/yield. Long term ecological studies could provide this data, however, the high cost and long time frame required for such studies signifies that it is likely that relatively few species worldwide will be candidates for lengthy, in-depth investigation.

Nevertheless, the process of collecting ecological information can be significantly abbreviated through the documentation of traditional ecological knowledge or TEK, defined as 'a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission' (Berkes 1999). Harvesters can be an excellent source of information on NTFP resource species' phenology, symbiotic relationships and local NTFP resource distribution and abundance, and can often give estimates of NTFP production. Some of the areas in which traditional ecological knowledge can be useful include the planning and implementation of: resource inventories; NTFP production/yield studies; management guidelines; monitoring systems; and the formulation of meaningful criteria and indicators for certification. Examples of each of these are described below using case studies from Brazil, Namibia and the Philippines.

Inventories of useful species: random plots or locally informed?

The first task that any community group interested in commercialization of

NTFPs must take is to identify the NTFP resource species within their forest area that have existing or potential markets. Communities generally generate such data in an informal manner, based on the in depth knowledge of hunters, forest product collectors and swidden farmers.

In the realm of forest management and certification, the next task is usually to conduct a NTFP resource inventory to estimate how much there is of each NTFP resource species for the purpose of developing a sustainable harvesting limit or Annual Allowable Cut (AAC). Forest inventories often take months, and can be quite technically complex, involving the mastery of the compass, clinometer, tape measure (both standard and diameter at breast height) and the careful recording of data. While standard forest inventory techniques have an important role to play in forest management, it is important to assess how they should be adapted for NTFP resource management. Since forest residents are most knowledgeable about NTFP resources, local involvement is also fundamental (Stockdale and Corbett, 1999; Stockdale *et al.* 2003).

Community participation is useful for identifying which species extracted for timber also possess important non-timber uses. Community driven inventories have the additional advantage of including not only commercially valuable species but those which are of subsistence use and/or culturally important to villagers. Stockdale *et al.* (2003) have found the benefits of involving local people in resource inventory to include their: knowledge of local NTFP resource distribution and the area in which the inventory is to be conducted; ability to identify different NTFP age classes, particularly the seedling/juvenile stages; and ability to accurately estimate NTFP production/yield.

In the state of Acre, Brazil, after numerous attempts using traditional inventory methods, various researchers, together with communities, developed alternative methods to cut time, diminish costs, and to generate results that could be directly useful for the communities. The NTFP working group in the Brazilian state of Acre used one inventory method called, "*Inventoria Florestal Sistematizado Pos-Exploratorio com Multiplos Inicios,*" (Systematic Post-Exploration Forest Inventory with Multiple Starts). However, scientists had little success in finding, much less mapping the target palm species of interest to the community. The random sample method also made little sense to the community, whose objective was to determine where the species of economic interest occurred and to calculate the potential harvest of fruit. After days of slashing undergrowth to cut transects for random plots in which there occurred very few of the target species, the researchers discovered that it made better sense to simply ask community members where the economic species occurred and to begin from there. Following the lead of the community members, the team quickly found and numbered numerous palms, initiated production studies, and determined sustainable off-take of fruit for jewelry making (Anute 2005).

A similar finding was made by a separate group of researchers studying the medicinal oil tree, copaiba (*Copaifera* spp.). In lieu of lengthy transects which are labor and time intensive to cut, they discovered that the already established

rubber tappers trails made effective starting points for locating copaiba trees. Researchers also learned that rubber tappers possess excellent mental maps, not only of Brazil nut and rubber trees from which they regularly collect, but of other useful species. As one of the scientists related, "If you want to find a copaíba tree, place a rubber tapper in front of you and you will never go wrong". Since making this discovery, NTFP researchers in the region are commonly using rubber tappers trails as their "transect" to locate a variety of economically useful species (Leite *et al.* 2001).

Community-based production studies

One piece of critical information lacking for planning the management of NTFP resources is the NTFP production/yield, or the average amount of NTFP produced per individual resource, often broken down into different resource age/size classes or environmental conditions. The variable and inconsistent production of many tropical NTFP species renders them difficult candidates to study, often necessitating many years to gain an approximate idea of their productivity. Yet, this is a critical piece of information needed to compare the financial benefits of NTFPs, as opposed to those of other land uses. It is also a key piece of information needed for NTFP resource management involving the estimation of an annual allowable cut and therefore for NTFP certification. Although local knowledge can be limited in accurately estimating production, it can provide a basis on which to begin analysis. To fill this significant gap in knowledge in the state of Pará, Brazil, one governmental program and one community initiative sought to generate this as well as other ecological information on two types of medicinal oil trees.

The oil extracted from the seed of andiroba (*Carapa guianensis)* is one of the most widely sold medicinals in Belém, Brazil. It is used to combat rheumatism, aches, sprains and bruises as well as acting as an insect repellent. Even though the oil is widely traded and used by all classes of Brazilian society, the average production per tree is poorly documented, as well as the average amount of oil produced from the seeds.

Considering the potential commercialization of NTFPs, the community of Pedreira, in the state of Pará, jointly with researcher Andre Dias, developed an experiment to estimate the production of fruit per tree. Community members were aware that the seeds are produced annually for a period of approximately 3-4 months, generally with a year of high production followed by a year of lower production. The community chose an area of forest and mapped and numbered each of the *Carapa guianensis* trees within it.

Throughout the fruiting season, as soon as the fruit matured and began falling from the trees, the community employed a rapid system to estimate production. Through visual assessment of the number of fruit on the ground, they estimated fruit fall using four categories of weight (0, 1–15 kg, 16–50 kg, and > 50).

Based on the average production per tree they calculated the fruit production of the entire area, the volume of oil that could result from this fruit and the labor necessary to harvest the fruit and extract the oil. Having such information allowed the community to weigh the potential costs and benefits of the extraction and sale of *andiroba* oil; as well, it enhanced the scientific world's scant knowledge of the species (Dias 2001).

Farmer developed management guidelines

The role of farmers in developing management guidelines is beneficial not only in creating more ecologically appropriate guidelines but also in the eventual application of guidelines. This is the case of the medicinal tuber, devil's claw (*Harpagophytum procumbens*), which attained organic certification through the Namibian NGO, SANProta/CRIAA. Some harvesters of devil's claw in the region collaborate with an association (Phytotrade) that negotiates with European buyers for the sale of the medicinal tuber. Well-substantiated clinical evidence of efficacy, an increase in people suffering from arthritis and increased marketing initiatives by product manufacturers has triggered a dramatic increase in sales of devil's claw in recent years. In 1998/9, export sales from Namibia reached over 600 tons, involving between 5,000 and 10,000 Namibian harvesters in tuber extraction. To combat the problem of unsustainable harvest, donors funded a service NGO to organize groups of registered harvesters. Harvesters exchanged knowledge about sustainable resource use and voluntarily adopted sustainable NTFP resource management practices that they helped to formulate. This includes extracting only part of the tuber and leaving other parts intact, to continue growing. An exporter signed a contract to purchase all of the devil's claw produced by this project, paid the harvesters upon delivery, thus gaining access to a reliable, premium product (Lombard *et al,* 2006).

Conservation impacts of the devil's claw project include recognition of traditional ecological knowledge about sustainable harvesting practices and the extension of these "best practices" to harvesters who were too young or who did not come from a traditional background. Scientists involved in the project maintain that such guidelines, when they include the practice of enhancing the survival and regeneration of superior resource individuals, could help to slow genetic erosion, thus allowing for increased diversity that can later be taken advantage of in screening programs for desirable traits. However, financial success is uncertain. Namibia captured at most 1% of the N$10 million trade in devil's claw extracts and the market sector where devil's claw is sold currently does not place a high premium on organic standards. NGOs supporting the harvesters have concluded that unless consumers demonstrate a firm commitment to certification, manufacturers can afford to ignore certified producers (Lombard *et al.* 2006).

Community monitoring of NTFPs

In the Philippines, such farmer-generated management guidelines were developed in a recent project spearheaded by a regional network called the NTFP-Exchange Programme for South and Southeast Asia (NTFP-EP), a national NGO called the NTFP Task Force (NTFP-TF), a number of smaller local NGOs, and a forestry consultant/researcher, Dr. Mary Stockdale. In May, 2006, this group attended a workshop in Daan village on Palawan island, where teams of experienced NTFP producers from across the country developed an agreement on 'best practices' for sustainable management of the Philippines' top three NTFPs: almaciga resin (from *Agathis philippinensis*), rattan stems (mainly from *Calamus* and *Daemonorops* spp.), and honey from the wild honey bee *Apis dorsata*.

In the same workshop, participants also explored the possibility of replacing the government's requirement that communities conduct NTFP resource inventories in order to obtain a permit to harvest these NTFPs with a different requirement - that of Participatory Monitoring and Evaluation (PAME) of NTFP sustainability. In other words, the communities and their supporting NGOs would instead develop a plan for monitoring and evaluating whether the NTFP resource was being managed sustainably, using a variety of indicators of NTFP resource vigor, regeneration and NTFP productivity. A variety of methods would be developed to measure these indicators that would emphasize simplicity, low cost, and the ability to fit in with the regular routines of community members. These methods included making records at the time of harvest; transect walks; or focus group discussion. Participatory monitoring and evaluation of NTFP sustainability was proposed because communities would be more likely to better understand this methodology as well as afford to use it, leading to greater success in sustainable management.

There is a precedent for this proposal: PAME of Biodiversity (PAMEB) has been used to manage various Protected Areas around the world (Lawrence and Ambrose-Oji 2001; Lawrence 2003), including in the Philippines (Danielsen *et al*. 2000). There, this form of monitoring now replaces the use of scientific monitoring of biodiversity under Philippine national law. NTFP-TF proposed to do the same for NTFPs (instead of for Biodiversity), for use in community-managed forest areas (instead of in Protected Areas), whereby PAME of NTFP sustainability would replace NTFP resource inventory as a tool of management.

NTFP-TF and partners therefore conducted an exercise that assessed the potential of PAME of NTFP sustainability for the top three NTFPs in the Philippines. Participants were asked to develop PAME criteria and indicators, as well as propose methods of measuring them. The result was three sets of criteria, indicators and methods for the three NTFPs. One interesting result was the holistic approach taken by the participants; for example, their indicators of NTFP sustainability for wild honey included the monitoring of water sources, of trees that are known to be important flower sources, and of trees that supply

the right environmental conditions for placement of hives (NTFP-EP/NTFP-TF 2006).

NTFP-TF and partners are now proposing a larger project to develop, test and assess a PAME for a larger group of NTFP resources. If successful they hope to have this tool made an alternative requirement (in place of the more onerous resource inventory requirement) for communities under national law.

Local use: modifying criteria and indicators

One of the major barriers for communities regarding both national forestry regulations and international certification systems is their formal language and complex bureaucratic processes. While criteria and indicators should allow communities to recognize good management practices – which in some cases they know better than anyone else – the rigid style and cumbersome structure of C & I often make them less a tool, than a barrier to achieving outsider's recognition of sustainabile NTFP resource management.

In the heavily altered landscape of Zona Brangantina in the Brazilian Amazon, remaining forest is scant, consisting of various aged secondary forest. One long-term project in the region has concentrated on helping small producers value and use secondary forest (Ferreira *et al.* 2007). By law, communities need a management plan detailing sustainable procedures for harvest to legally commercialize the NTFP resource species in their forests. In preparation, the project called together a group of specialists, including agronomists, ecologists and foresters, to create a set of ecological indicators for secondary forest management. These indicators would serve to complement already developed social indicators. The group of biophysical scientists created a list of 158 indicators, including evapo-transpiration and various delineations of soil structure, of which numerous concepts were unfamiliar to the community. The language was modified by the project team, which realized that additional modifications would also need to be made directly by the community. Next, partners from the community, consisting of a small group of villagers, worked on revising the indicators.

Local technicians and villagers significantly reduced the redundancy and complexity of the draft criteria and indicators. Identifying broad criteria as "*pai*" (father) and more detailed indicators as "*filho*" (children), the community produced a highly modified second draft. The process of working on and clarifying the criteria and indicators for local use empowered villagers to speak with municipal authorities regarding broader issues such as water quality and roads. One consultant on the project concluded that it would be illustrative for the community members themselves – the local experts – to draft the initial set of criteria and indicators, thereby reflecting what they consider to be ecological, social and economic criteria for sustainability and quality of life (Pokorny *et al.* 2002., Nunes, in progress).

Key concepts to consider for indicators of sustainability and potential certification

Because so little ecological knowledge has been generated by the scientific community regarding the basic ecology of even widely used NTFP species, local knowledge regarding management and harvesting is often at the core of creating reliable indicators of sustainability.

In the Philippines example, above, NTFP producers involved in developing a system for community monitoring (PAME of NTFP sustainability) had previously developed guidelines for 'best practices' in harvesting and management for the same set of NTFPs. The participants claimed that earlier discussions documenting best practices facilitated the development of PAME criteria and indicators (NTFP-EP/NTFP-TF, 2006). In Namibia, widely recognized guidelines for the sustainable harvest of devil's claw have also been generated with the substantial input of local collectors.

Examples of how local ecological knowledge can inform the certification process are various. In Mexico, national legislation regarding chiclé harvest is based on the knowledge of generations of chiclé tappers regarding the minimum diameter of tree before tapping can be done. Old-time maple syrup tappers in Vermont understand that closure of tap hole is a key indicator of sustainability – tap hole closure is now included within sugar maple guidelines for certification and can be a more reliable indicator than diameter as to whether a tree is ready to be tapped (Pierce, 2002).

Depending on many factors, including life form, abundance, rates of growth and regeneration and reproductive strategy, a NTFP species may be more or less susceptible to exploitation than others (Cunningham 2001). One method to help communities consider the ecological implications of harvest is to group the NTFP by plant part harvested: the whole plant; exudates; vegetative structures (apical bud, bark, root, leaves); and reproductive propagules (fruit and seed). For each category, community members can gauge a number of key variables that are necessary to determine sustainability (Shanley *et al.,* 2002):

- **Knowledge base** – does there exist sufficient local experience or knowledge or scientific findings to determine sustainable management practices?
- **Quantity** – does the quantity removed per individual resource minimize negative impact on long-term vigor, reproduction and NTFP production?
- **Frequency** – has a frequency of harvest been set in order to reduce negative impact upon vigor, reproduction and NTFP production?
- **Age/diameter** – does harvest include only individuals above a minimum age/height/diameter?
- **Timing/seasonality** – is harvesting timed to reduce stress during reproductive periods and to minimize impact on reproductive capacity?
- **Density/abundance** – are sufficient individuals left post-harvest, to ensure the retention of mature, reproducing individuals?

- **Techniques** – is the plant part harvested using techniques that reduce negative impact upon vigor, reproduction and NTFP production?

Monitoring

- **Visual appraisals** of the behavior and condition of harvested plants are conducted pre and post harvest.
- **Periodic assessments of wildlife populations** are conducted to evaluate the status of fruit and seed dispersers.
- **Growth rates and regeneration** are monitored by a suitable inventory or other assessment system.

The steps described above can be accomplished in innumerable ways. The most common are informal assessments by harvesters themselves. Spontaneous evaluations are a part of every small producer's life. In the language of certification, "reducing negative impact and maintaining the long-term vigor" of the plant – is directly related to accomplishing "long-term vigor" for the small producer. While informal assessments of plant health conducted by farmers are common, these are often undetected and undocumented by outsiders. Further work is needed to identify and document these systems, particularly those in which forest species are managed, and to catalyze the transmission of information about effective management 'best practices' to other small NTFP producers.

CONCLUSION

When considering applying the tool of certification to a specific product, it is first important to recognize whether the product and the producers "fit" into the concept and practice of certification. For the majority of locally and regionally traded NTFPs, international certification schemes will not be suitable. However, for a small suite of select products with large markets such as rattan, bamboo, Brazil nut, and palm heart international certification schemes can be an appropriate tool.

Significant socio-economic obstacles exist as well. Most NTFP collectors are unlikely to have the financial or administrative resources necessary to consider international certification schemes. For small NTFP producers who cannot meet the costs or requirements of internationally developed certification schemes and for NTFPs that are not marketed on a large scale, local initiatives that create criteria and indicators for sustainable management are a possible alternative. Communities throughout the world are developing innovative local and regional labeling initiatives to distinguish their phytomedicines, craft and food products as sustainably sourced.

Whether producers use locally or internationally developed criteria, some of the key steps to attain credibility in marketing a sustainable product, are those needed

to ensure sustainable sourcing. Harvesters need to assess if there is a demand for their product and whether the resource base can meet this demand. Because relatively little information has been generated by the scientific community regarding sustainable management of NTFPs, local knowledge can play a critical role. *Andiroba* seed collectors in Amazonia, almaciga resin, rattan and wild honey harvesters in the Philippines, and devil's claw harvesters in Namibia, offer examples of how traditional ecological knowledge can supply critical information on NTFP resource species ecology and how local management systems can help to create guidelines for the sustainable management of NTFPs.

The process of defining criteria and indicators for NTFP management can serve as a catalyst to generate basic information regarding widely used forest resources. To generate this information in an effective way, select communities and forest residents need not only participate, but also to be acknowledged as local authorities. Increasing the importance of local input to the process of conducting NTFP resource inventories, NTFP production/yield studies, and developing, implementing and monitoring sustainable management practices will require greater respect and inclusion of local people in decision-making by scientists, students and the certification community. If certification can help to catalyze increased documentation and appreciation of local forest management practices, it will serve an important function, with or without a label.

ACKNOWLEDGEMENTS

The authors are grateful for generous support from the Tinker and Overbrook Foundations and the International Development Research Center (IDRC) to conduct ecological research focused on sustainable management and traditional knowledge. The research on which this article was based was supported in part, by a USAID grant to the Rainforest Alliance and conducted in collaboration with Alan Pierce, Sarah Laird and Abraham Guillen. A follow-up review of NTFP certification was conducted in collaboration with Forest Trends. The NTFP-EP/NTFP-TF workshop which supported the work on community monitoring described in the Philippines, was sponsored by MISEREOR of Germany. The authors would like to thank Jenne de Beer, Maria Cristina Guererro, Cyril Lombard, Marli Mattos, Westphalen Nunes, Andre Dias and Jarbas Anute for providing the case studies cited in this article, and Dr. Carmen Fernandez Garcia for useful review and comments.

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