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Cross-border value chains for non-timber forest products in four different Asian countries

Edited by
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The International Network for Bamboo and Rattan (INBAR) is an independent, non-profit intergovernmental organization established in 1997. INBAR is dedicated to improving the social, economic, and environmental benefits of bamboo and rattan. INBAR plays a unique role in finding and demonstrating innovative ways of using bamboo and rattan to protect environments and biodiversity, alleviate poverty, and facilitate fairer pro-poor trade. INBAR connects a global network of partners from the government, private, and not-for-profit sectors in over 50 countries to define and implement a global agenda for sustainable development through bamboo and rattan.

The Global Forum on Agricultural Research (GFAR) provides a catalyst for change, the mechanism enabling all those concerned with the future of agriculture and its role in development around the world to come together and address key global needs. GFAR's actions are focused around four key areas: global advocacy; inter-regional partnership; knowledge sharing; and shaping institutions for the future.

GFAR seeks to integrate research with the societies it aims to serve and puts farmers and the explicit needs of the poor at the very core of agricultural research and innovation systems. The Global Forum does not directly implement research programs: agreed actions are delivered through the organizations, networks and agencies involved in, and accountable for, the generation and use of agricultural knowledge for development around the world.

The Global Non-Timber Forest Products (NTFP) Partnership aims to link global, regional, and national organizations currently engaged in research and development activities concerning the systematic conservation and management of NTFPs in four regions: Africa, East and Southeast Asia, Latin America, and South Asia. Leveraging a regionally focused global network, the NTFP Partnership aims to raise the profile of NTFPs and enhance capacities, relevance and effectiveness of partners, producers, and all other stakeholders. With currently 25 members from different stakeholder constituencies (private sector, non-governmental organizations, National Agricultural Research System, International Agricultural Research Centers, intergovernmental organizations, commodity bodies) and in all regions of the developing world as well as in Europe, the Partnership is in a position to mobilize formidable knowledge and technical resources.

Foreword

Non-timber forest products (NTFPs) are important in many ways for food security, livelihoods, and health of small farmers and forest dwellers in the developing world. Often they are traded internationally and in some cases the majority of a given product crosses international borders. In those cases, external markets on the other side of the border determine the vibrancy of the sector. And often little is known about participants and their roles in international supply chains.

Given the importance of NTFPs for these vulnerable groups (small farmers and forest dwellers), and the knowledge gap especially regarding the international NTFP trade, the Global NTFP Partnership decided to do an analysis of available information to identify issues and options for interventions. Knowledge generation and sharing is at the core of the Partnership's activities.

The Partnership, one of the global partnership programs (GPPs) of the Global Forum on Agricultural Research (GFAR), was launched in December 2005 in Marrakech. It has currently 25 members from different constituencies (International Agricultural Research Centers, National Agricultural Research Systems, non-governmental organization, private sector) with a shared vision, mission, and goals. It aims to link global, regional, and national organizations currently engaged in research and development activities concerning the systematic conservation and management of NTFPs, to raise the profile of NTFPs and enhance capacities, relevance and effectiveness of partners, producers and all other stakeholders. The lead agency of the Partnership is the International Network for Bamboo and Rattan (INBAR).

The members contributing to this publication are the Asia Network for Sustainable Agriculture and Bioresources (ANSAB) in Nepal, the National Agriculture and Forestry Research Institute of Laos (NAFRI), the World Agroforestry Centre (ICRAF-China), and the Centre for Mountain Ecosystem Studies (CMES, non-member) in China.

The NTFP Partnership and INBAR hope that this publication, though focusing on a limited number of NTFPs in four countries, will be useful for a wider audience interested in understanding the issues and designing interventions around NTFPs and the communities depending on them. We are grateful to GFAR for making available the funds that enabled us to carry out these studies.

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Lessons from NTFP cross-border value-chain studies

Supply chain analyses help understand processes and players involved, and also identify problems and opportunities for interventions. Quite often, supply chains cross borders into neighboring countries and even those that are far away. Many non-timber forest products (NTFPs) are traded internationally and in most cases not much is known, on both sides of the borders, about their origins, collectors/producers, resources and surrounding ecosystems, quality, markets and prices, and consumers. In the case of Nepal and India, this aspect assumes significance as 95% of soap nut and spikenard, the two NTFPs examined in this study, is going from Nepal to India.

To shed more light on the international aspects of supply chains, the Global NTFP Partnership takes up two case studies in four different countries on selected NTFPs crossing borders between Laos and China and between Nepal and India. These two studies use a value-chain approach to address international issues around NTFPs, specifically, external drivers of NTFP-based livelihoods and associated forest management regimes and policies. The studies not only help identify common issues and opportunities in the countries studied, but also position the Partnership and other stakeholders for the development of collaborative project ideas, concepts, and proposals.

The studies differ in their emphasis. For instance, the Nepal–India study underlines livelihood and supply chain related issues whereas the Laos–China study focuses more on production systems. The two studies show that issues and opportunities are somewhat specific to NTFPs, communities, and regions. However, commonalities and cross-cutting issues exist, which can be addressed through collaboration in research and development (R&D), knowledge sharing, and cross-border trade cooperation.

The general issues (listed below), the needs, and the opportunities arising from the studies and from the wider perspective of the NTFP sector deserve closer attention.

General issues

1. Domestication and cultivation

Collection of NTFPs in the forest is generally the only or the most important source of income for marginalized and resource-poor communities. Domestication and cultivation are viable options to protect erosion of NTFP resources and the surrounding eco-systems from uncontrolled and unsustainable harvesting practices. Though this would improve the supply situation and strengthen producers' positions as against traders, it is also quite possible that this would strengthen landowners' position and weaken the landless.

2. Value-chains

Better understanding value chains and especially cross-border value chains is necessary; therefore, there is need for more in-depth studies as local conditions vary. Value-chain analyses will facilitate the design of locally appropriate interventions.

3. Cash income

Perhaps the most important aspect of NTFPs is the cash income that they generate for large sections of the populations, especially the poorer households. Lack of equitable distribution of profits along the value chain is often seen. Producer associations could make a difference here by empowering the communities with more bargaining power. This will have to be complemented by training of NTFP collectors in negotiating skills.

4. Processing and value-added

The incomes of primary producers/collectors get affected not only by their limitations in negotiating with buyers but also by the inherent low value of NTFPs collected. There is a striking lack of processing and value-addition happening at source. Imparting appropriate training in cleaning, sorting, and packaging can address this issue.

5. Lack of storage facilities and packaging

In addition to training needs, adequate investments in infrastructural facilities would reduce the dependence of communities on fluctuating markets and increase product quality.

6. NTFP collectors lack information and market access

Market intelligence systems, supported by widely available tools such as mobile phones, complement the above points. The involvement of the public and the private sectors would help address the issues raised in points 4 and 5.

7. Investment

Given the potential of the sector, NTFP enterprises would need to position themselves as ideal investment destinations for social entrepreneurs.

8. Sustainability and biodiversity

NTFP collection makes use of forest biodiversity. However, uncontrolled collection process may lead to adverse effects on ecosystems. Sustainable harvesting is therefore an important skill the forest-dependent communities must possess. Such harvesting practices will ensure that these communities have sustainable livelihoods in the long run.

9. Advocacy

Consumers should be educated about origins and implications of NTFP consumption for natural resources and for NTFP-dependent communities, as they can influence trade significantly by their purchasing behavior.

Cross-border issues

10. NTFP certification

Certification requires monitoring of sustainable use of harvested species, also of other species linked to those harvested, with costs borne by consumers. There is increasing certification in national and global markets; however, this is often too expensive for collectors.

10. Policies

While some countries have relevant policy frameworks in place, others do not. Furthermore, policies are not usually enforced. Regional policy harmonization is necessary to avoid situations where different frameworks neutralize efforts on the other side of the border.

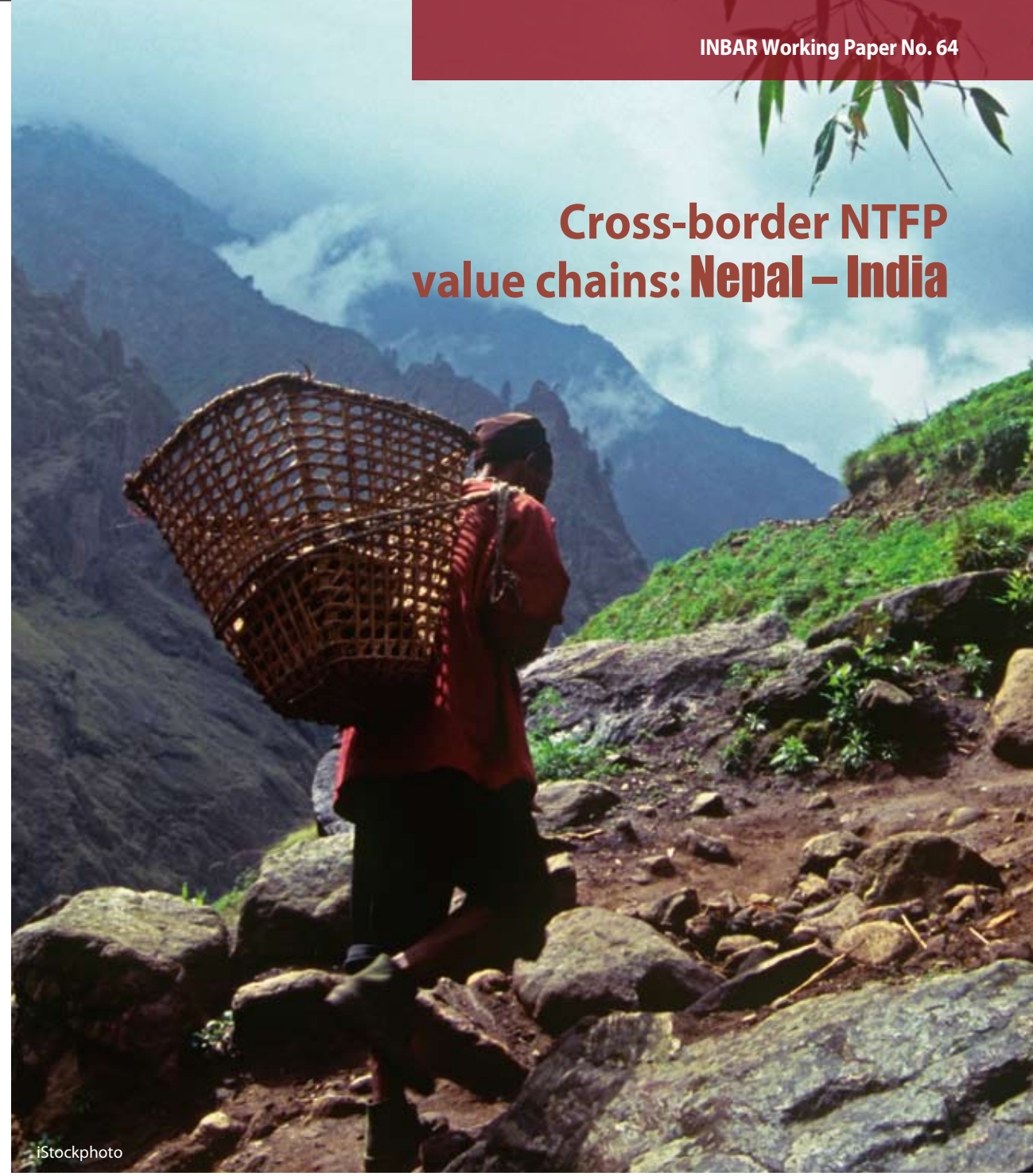
11. International collaboration

There are about 150 NTFPs of major significance in international trade. This involves millions of poor producers and workers, including many who live in the most remote areas of developing countries. With increased interest in natural health and beauty products fuelling a massive growth in demand for these products in North America, Europe, and Japan, there are huge opportunities for producers in the South to link with these markets. In many cases, there are also large and untapped domestic and regional markets for such products.

There is ample scope for collaborative R&D and cross-border trade involving partners from both sides of the border, as well as between and among supply chain participants and other NTFP stakeholders. Trade associations should be set up and regional multi-stakeholder 'roundtables' with the objective of removing trade barriers and setting transparent and concrete agreement terms should be held. Given the relevance of NTFPs for large numbers of small farmers and forest dwellers, it is recommended to develop regional projects focusing on value-chain development, capacity building, and organizational aspects of NTFP collectors. Members of the Global NTFP Partnership and other stakeholders should engage donors to generate more interest in this sector, which would motivate the rural poor. Also governments and their agencies concerned with rural poverty alleviation should consider investments in the sector, especially in access and trade policy development and collaborative R&D.

With regard to endangered species, the Convention on International Trade in Endangered Species (CITES), should collect and publish trade chain statistics. In a harmonized policy environment, this could contribute to sustainable and responsible resource management.

Cross-border NTFP value chains: Nepal – India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1. Overview

Non-timber forest products (NTFPs) are natural products that offer economic development opportunities to the rural people in Nepal. NTFPs sustain the livelihoods of a majority of the population of Himalayan, High Mountain, and Western regions of Nepal. However, there is no information on income and employment generated from the NTFPs at the macro level, except for some project-level information.

The NTFP sector in Nepal is strongly influenced by markets and value addition in India. Most of the NTFPs collected in Nepal pass through the market centers of the Nepal–India border through legal and illegal routes (Subedi 2006; Rawal 2004a; Edward 1996; Aryal 1993). Only a small portion of the export volume goes to a further 30 countries including Europe and America. Edward (1996) estimates that over 95% of the NTFPs harvested in Nepal is exported to India. Another study also presents a similar picture—about 90%. These NTFPs, mostly in a crude form, are then supplied throughout the subcontinent by the Indian wholesalers. Traditional cultural and commercial links and a common traditional Ayurveda system are the reasons for this trade relationship between Nepal and India (Rawal 2004a). The trade in medicinal and aromatic plants (MAPs) from Nepal to India is roughly estimated at 10,000–15,000 tons a year. The annual sales value of these NTFPs is pegged at 8.6 million dollars[1] (Subedi 2006).

About 800 NTFP species are in use locally for medicines, foods, oils, fibers, dyes, incense, etc., in Nepal (Edward 1996). For example, *Neopicrorhiza scrophulariflora* ('Kutki'), *Cordyceps sinensis* ('Yarsagumba'), *Swertia chirayita* ('Chiraito'), *Aconitum ferox* ('Bikh'), *Aconitum heterophyllum* ('Atis'), *Delphinium denudatum* ('Nirmasi'), *Bergenia ciliata* ('Pakhanved'), *Dactylorhiza hatagirea* ('Panchaunle'), *Paris polyphylla* ('Satuwa'), and *Rheum australe* ('Padamchal') have medicinal value; *Choerospondias axillaris* ('Lapsi'), *Berberis aristata* ('Chutro'), and *Morchella elata* ('Guchhi Chyau') are used as food. Most inhabitants of the rural areas use shoots, rhizomes, fruits, flowers, and roots of different NTFPs as food or as supplementary food in addition to agricultural crops.

NTFPs harvested from over 160 plant species are being traded, of which about 100 are high-value NTFPs, traded in national and international markets. NTFPs with comparatively high demand include *Neopicrorhiza scrophulariflora* ('Kutki'), *Cordyceps sinensis* ('Yarsagumba'), *Swertia chirayita* ('Chiraito'), *Sapindus mukorossi* ('Ritha') *Aconitum ferox* ('Bikh'), *Aconitum heterophyllum* ('Atis'), *Taxus wallichiana* ('Lothsalla'), *Delphinium denudatum* ('Nirmasi'), *Bergenia ciliata* ('Pakhanved'), *Dactylorhiza hatagirea* ('Panchaunle'), *Paris polyphylla* ('Satuwa'), *Rheum australe* ('Padamchal'), *Rhododendron anthopogon* ('Sunpati'), *Nardostachys grandiflora* ('Jatamansi'), *Allium wallichii* ('Ban lasun'), *Girardinea diversifolia* ('Allo'), *Daphne bholua* ('Lokta'), *Arundinaria falcata* ('Tusa', 'Malingo'), *Hippophae spp*. ('Dalechuk', 'Bhuichuk'),*Cinnamomum spp*. ('Sinkauli', 'Dalchini'), *Piper longum* ('Pipla'), *Persea spp*. ('Kaulo'), and *Zanthoxylum armatum* ('Timur').

[1] All references to dollars in this document relate to US currency.

2. Prioritization of NTFPs

The NTFP business sustains the livelihoods of rural communities in the mid- and far-west development regions of Nepal. People in the remote hills are the primary collectors of NTFPs. Although many of these products are traded, only a few species are commercially important and involve large populations. It was therefore important to conduct a detailed study on the trade patterns of these NTFPs to identify problems, constraints, and opportunities. Such a study would help design and implement interventions required for promoting conservation, sustainable harvesting, better access opportunities, sustainable enterprises, and equitable benefit-sharing mechanism among the market actors involved in the value chain. As it was not feasible to conduct a detailed study for all available species, prioritization of these NTFPs was done.

Fig. 1: Soapnut ('Ritha', *Sapindus mukorossi*)

Fig. 2: Spikenard ('Jatamansi', *Nardostachys grandiflora*)

From the prioritization exercise, 'Ritha' and 'Jatamansi' emerged as candidates for this study as they have several comparative advantages (Figs 1 and 2). 'Ritha' is also known as soapnut, which is used in shampoo and detergents. This herbal product helps maintain the laundry fresh and clean compared to other detergents. Its mildness keeps colors bright, and maintains the fabric structure for longer periods. 'Jatamansi' is harvested for local use as well as for trading of its valuable roots/rhizomes. The rhizome of 'Jatamansi' is used as an aromatic adjunct in the preparation of medicinal oil and imparts blackness to hair. There is demand in international markets. Some of the advantages and issues associated with these products are described below.

Market demand, competition, and market coverage. A significant number of collectors and buyers in local and regional marketplaces (e.g., Nepalgunj, Mahendranagar, Krisnanagar, and Kathmandu) are involved in the business of bringing these products to market. Markets for these products do not operate in a systematic way because of inconsistencies in supply and demand. External interventions could make the situation more favorable. Such interventions include (a) expansion of the market to provide alternative selling options to the producers and (b) development of better linkages between primary producers and outside traders. These interventions would promote a healthy competition among producers and traders, thus helping the market function in a sustainable manner.

Comparative advantage to the poor. The Nepal living standard survey report shows that the employment status and per capita income of the people living in the mid- and far-west development regions of Nepal are lower than those living in other regions (CBS 2004). NTFPs are major sources of income of the people in these regions. Out of various NTFPs available in the region, these two species are found in large quantities, which is an advantage. The products can be considered organic as they are usually cultivated and collected under natural conditions. The costs of cultivation of these products are lower than those of other products, but the cost for transportation and post-harvesting technologies is high. Especially, 'Ritha' is highly beneficial for poor people as they have indigenous knowledge of cultivation and harvesting (ANSAB 2008).

Resource potential and possibility of cultivation. Both far-west and mid-west development regions are good habitats for 'Jatamansi' and 'Ritha'. Only sustainable harvesting mechanisms and practices need to be developed in the case of 'Jatamansi'. 'Ritha' can be cultivated both in the natural forest and agricultural land. 'Ritha' trees can be readily grown on the bund and marginal agricultural lands, without competing with agriculture crops. Therefore, there is a high potential to grow and commercialize both of these products.

Employment generation. The sector could provide better income opportunities for the local people. The Department of Forest record of 2007 shows that about 15,000 local people in Nepal are engaged in 'Jatamansi' harvesting; 'Ritha' collection also engages the same number of people (DoF 2007). In addition to collection, there is much scope for employment of rural people in value addition of these products. Only a few processing units for 'Jatamansi' have been established in rural areas and at regional level. These units have provided employment for a number of local people. Due to the inconsistency in the raw materials because of seasonal variation and lack of storage facilities, these units do not run regularly and at full capacity. Besides, marketing issues and unfair competition among the market actors also hinder fair trade. In the case of 'Ritha', a few local soap-making industries have been established at the local level using 'Ritha' powder. Observation shows that the industries making soap from 'Ritha' and carrying out oil distillation from 'Jatamansi' can bring more money to rural areas as the processing of these products is labor-intensive.

Benefits to marginalized groups (women, lower caste, and poor). These products provide employment and monetary benefits to the local people, especially to the disadvantaged groups such as women, the ultra-poor, and marginalized households. These people are involved in the collection of raw materials and simple processing of 'Ritha' as these activities require only a little capital investment, which even marginalized groups can afford.

Environmental benefits. The cultivation, harvesting, and processing practices of 'Ritha' and 'Jatamansi' are simple and have no negative impact on the environment.

Regulatory policy. There is a clear provision for the commercialization of 'Ritha' in the existing laws of Nepal. These laws permit for cultivation and collection in natural forest and trading in domestic and international markets. There is a slight restriction in the case of 'Jatamansi' trade. Export of 'Jatamansi' without processing has been banned and written permission from the Department of Forest is required for its trade (GoN 1993, 1995).

Economic significance. The economic significance of the two commodities is not fully assessed. However, observations indicate that they have significant potential to contribute to the local and the national economy compared to other NTFPs. According to the Department of Forest record (2005), a total of 204 tons of 'Jatamansi' was harvested in Nepal, with a monetary value of NPR 44,213,019 (DoF 2005). In the case of 'Ritha', the complete figure is not available but records show that the annual production in Darchula and Baitadi districts is approximately 722 tons with a monetary value of NPR 17,500,000 (DFO 2007).

3. Value chain(s)

The value chain of 'Ritha' has not been clearly established in Nepal but there is some information on 'Jatamansi' oil within the country. Annex 1 gives a generic overview of the value chain of 'Ritha' and 'Jatamansi' oil. Based on the existing literature, functions and roles of the actors involved are summarized below.

Resource ownership and management. All 'Jatamansi' comes from natural forests managed either by the government and/or communities whereas 'Ritha' is collected mostly from private land. Under the community forest management, community forest user groups (CFUGs) are authorized to harvest and trade the available resources based on the forest management plan prepared by the communities and approved by the District Forest Officer. Under the Forest Legislation 1995, CFUGs are authorized bodies to provide the letters of clearance for harvesting and export of Jatamansi' and 'Ritha' either in raw or processed form from the districts if they are collected from the community forest. If they are collected from government-managed forests, officers from District Forest Office or Range Forest Office provide such clearance letters.

In government-managed forests, the traditional management system does not exist; it is considered a free access common property resource (CPR). This perception has promoted unsustainable harvesting practices. An external evaluation carried out by ANSAB in 2002 noted that if a CFUG is given larger areas of forest land with assistance for the implementation of their operational plans and monitoring, resource management practices improve. In contrast, giving free access to government lands results in harvesting of immature 'Jatamansi' rhizomes, i.e., generally before the seeds ripen. This would lead to steady depletion of the resource base. In the case of 'Ritha', there is not much information on the resource status and ecology.

Harvesting and collecting. 'Jatamansi' is found in the upper mountains and harvesters often have to stay overnight during collection. The harvesters dig up the 'Jatamansi' rhizomes, clean them of dirt, dry them in the sun, and package them for sale. Mostly, they sell the dried 'Jatamansi' to district-/village-level traders. 'Ritha' trade also functions similarly. Farmers collect 'Ritha' fruits from the trees and sell them to local or district-level traders.

Some of the poor and marginalized families receive an advance payment from traders in the village or from outside to collect both 'Jatamansi' and 'Ritha' for the next season. This mechanism forces the harvesters to supply a given product to the same 'petty contractor' at a predetermined price. The practice promotes unhealthy competition as they have to pay back their advances. It also leads to the collection of immature products without considering sustainability and quality of products.

'Ritha' farming communities face problems in selling their product. The price of 'Ritha' has decreased drastically since 2006. For instance, the market price for 'Ritha' in 2009 was NPR 14 per kg whereas it was NPR 25 in 2006. The price of 'Jatamansi' is relatively stable. However, local people suffer from irregular market demand and high competition in collection as the majority of the population depends on this business for their livelihoods. The most pressing problem of local people in both cases is limited information and access to markets.

Local/district-level traders. Local or district-level traders buy the dried 'Jatamansi' from harvesters. They either sell to the local distillation plant or to the regional traders in a raw form. The local/district-level traders collect the materials, do packaging, and sell it. At this stage, the traders have to obtain a clearance letter from the District Forest Office to take materials outside the district. Most of these traders face problems in getting the clearance letter as the process is complex and bureaucratic.

Regional-level traders. Regional-level traders are based in regional market centers of Nepal, including Nepalgunj, Bhairahawam, Krishnanagar, and Kathmandu. Many regional traders collect 'Ritha', 'Jatamansi', and other NTFPs and sell them either to the processing plant or to exporters. These actors have insignificant roles in value addition as they normally only do the packaging of 'Ritha' and 'Jatamansi'. Some regional traders also directly export the commodities to the international markets. Most of these traders do not have sufficient and good storage facilities and cannot easily store the products when demand and prices fluctuate in the international markets.

Processing units. The Forest Act (1993) makes distillation of 'Jatamansi' mandatory. Processing generates local employment and reduces the cost of transportation. Maintaining product quality is a challenge as technology and skills are limited. Due to quality variation, processing units often face problems of competing with the regional-level processing unit in international markets. 'Ritha' is not well processed in Nepal except for grading, cleaning, and packaging.

Exporters. Very few companies or individuals export 'Ritha' and 'Jatamansi' oil to the international markets. There is a clear process and taxation provision to export NTFPs. Export of any product requires a clearance letter from the customs office.

Exporters need to arrange for various documents for customs clearance in Nepal and also in India. They face difficulties in obtaining such letters. The documents needed in Nepal include Customs Transit Declaration (CTD) by Nepalese Customs Office, commercial invoice, packaging list, Letter of Credit copy, and authorization letter in the name of the forwarding agent. The Indian customs procedures include CTD and other documents, inspection of the proper packaging with lock of cargo form for all NTFPs, and verifications of the quantities presented in the accompanying papers (Rawal 2004b). Many traders find these lengthy and complex procedures difficult to understand.

International markets (India). There is no clear understanding of the value chain for these products after crossing the border into India. According to the exporters, they sell products either to Indian traders close to the border or to traders in Delhi. The price and volume demand for 'Ritha' fluctuates. It is hard to understand the market dynamics in India. Due to this fluctuation, the 'Ritha' business is in critical condition. In the case of 'Jatamansi', illegal trade continues as the price for raw 'Jatamansi' in India is higher than in Nepal.

4. Problems and possible solutions

Local people and other traders involved in the 'Ritha' and 'Jatamansi' business face various problems to sustain their businesses. Some of them are listed below.

Lack of enterprise development and responsible business practices. The actors involved in the value chains are not well identified. Their activities range from consolidating products in the districts and region to exporting them to India or to other international markets. There are no long-term enterprise perspectives, which contribute to unsustainable practices in the trade. This has created market irregularities and irresponsible business practices. It is important to conduct value-chain studies of the products and identify the issues to design intervention strategies.

Lack of proper marketing and market information system at local level. Local people have limited access to the information such as price, quality, and market demand. Due to this, they are bound to sell the products at the price offered by the traders. A study done by ANSAB in 1997 shows that the price received by the collectors/producers is only one-fourth of the price fetched in the final destination. Communities lose their benefits from NTFPs due to (a) lack of value addition at source, (b) the inevitable role of middlemen, and (c) unorganized value chains (Larsen and Olsen 2007, Pandit and Thapa 2004). Therefore, it is important to develop a proper market information system and also to develop and inculcate responsible practices in middlemen and enable them to contribute in a positive way to sustainable business practices.

Lack of knowledge of value chain. There is limited knowledge of the value-chain governance. Identifying actors, their roles and various functions, and gaps is important to promote effective involvement of stakeholders in the NTFP business and to avoid unhealthy competition. Lack of awareness and recognition of Nepali NTFPs in international markets is also a reason for the lack of sustainable marketing mechanisms. There is still a challenge in maintaining product quality, organizing value-adding activities locally, and accessing markets in an organized way. The government has no clear national strategies on marketing of these products to international markets. Both India and Nepal need to work together to make international communities aware of NTFPs and their qualities including promotion of organic natural products.

Over-harvesting. Most NTFP collection areas are natural forests, i.e., unregulated and open-access properties. Increased demand from traders results in increased extraction from natural resources. The demand has resulted in over-harvesting and harvesting of immature plants in order to supply the markets of India and the developed world (Subedi 2006). Unregulated harvesting creates pressure on natural resources and a drive toward depletion. It is crucial to help local communities to develop sustainable harvesting practices of the products.

Inconsistent demand in India. Local poor communities and producers/primary collectors of many NTFPs, including 'Ritha' and 'Jatamansi', do not get fair prices for their products due to inconsistent demand in India and international markets. According to local people, the current price of 'Ritha' is lower compared to previous years (*Source*: ANSAB field staff). It is important that local people know the reasons for decreasing demand and prices.

As collectors have no access to alternative markets, they follow traditional channels to sell their products at whatever price offered. As 'Jatamansi' oil of Nepal is in the introduction stage in the international markets, this weak position has directly affected the price of the product. This could be addressed by identifying better marketing channels for the products and developing a mechanism for two-way information flow in the value chain.

Lack of clear policy on NTFP. Though there exists an NTFP development policy in Nepal, the guidelines and regulations need to be revised and further developed. The provision in the existing regulations and directives are not consistent with the policy. The irrational fixation of royalties, different informal taxes (of political parties, groups, and governmental bodies), unnecessary and complex systems for collection and trading the NTFPs domestically and internationally, etc. are all problems faced by the traders. Proper policy guidelines and enforcement mechanisms need to be developed. A policy provision on special subsidies and compensation to the NTFP cultivators should be developed to encourage farmers to domesticate/cultivate NTFPs.

Lack of trans-border cooperation between Nepal and India. Trade of NTFPs between the two countries is basically on an individual basis, the government is not involved. Hence,various hurdles exist such as a complex export/import process. Government authorities always ask for various documents and it is required to follow a lengthy process to get permission. No document is available outlining processes and requirements for trading. Proper cooperation between the countries and transparent guidelines for NTFP trade need to be developed.

Lack of coordination among service providers. There is no strategic relationship among organizations in the field of NTFPs. A good relationship and cooperation among them would be a key success factor for the NTFP sector in its commercialization drive, particularly from the point of view of leveraging existing relationships, knowledge, and expertise already available in the field and to avoid repeating the learning curve (Karki and Nagpal 2004).

5. Interface with national policy

Although the Nepal NTFP policy (2005) gives relatively clear provisions, there is a need for guidelines and review of existing laws (act and regulations). The Forest Act (1993) and the Forest Regulation (1995) are the major national regulatory frameworks for NTFP trade. The Forest Act (1993) restricts use of NTFPs/MAPs by imposing (a) a licensing system for removal of NTFPs, sale, transportation, and export; (b) a royalty system; (c) a controlling authority at the local district forest office; and (d) severe punishment for illegal NTFP collection. It further states that the government may impose a ban on the collection, use, sale, distribution, and export of any products without any justification. Under this provision, the Government of Nepal has banned the export of raw 'Jatamansi'. There is, however, significant illegal export to India. Many provisions stated in the act and the regulations are contradictory to the policy. It is urgently required to develop guidelines to implement the policy and to revise the act and regulations.

6. Interface with international conventions

Nepal is a signatory to the major international regimes such as the Convention on Biological Diversity (CBD) and the World Trade Organization (WTO). The CBD is a major one for sustainable trade and conservation of NTFPs/MAPs. Article 8(j) of the CBD (1992) clearly mentions the provision for the contracting parties to respect, preserve, and maintain the knowledge and practices of such communities embodying traditional lifestyles, which conserve and use biodiversity in a sustainable manner. However, traders in the NTFP business come mostly from outside and they encourage local people to collect large quantities of NTFPs when there is high demand in international markets. Traditional mechanisms for using NTFPs in rural areas are no more in existence as they are diluted with external influences and cannot withstand the pressure of those that are only motivated to obtain economic benefits.

Similarly, the CBD promotes the sharing of benefits deriving from traditional knowledge and practices with these communities. But bringing more benefits for the local communities, who are engaged in cultivation, conservation, and sustainable harvesting of NTFPs, is not being considered. Most of the traders come from outside and ask the local people for collection as per required volume. This has promoted unsustainable harvesting and trade.

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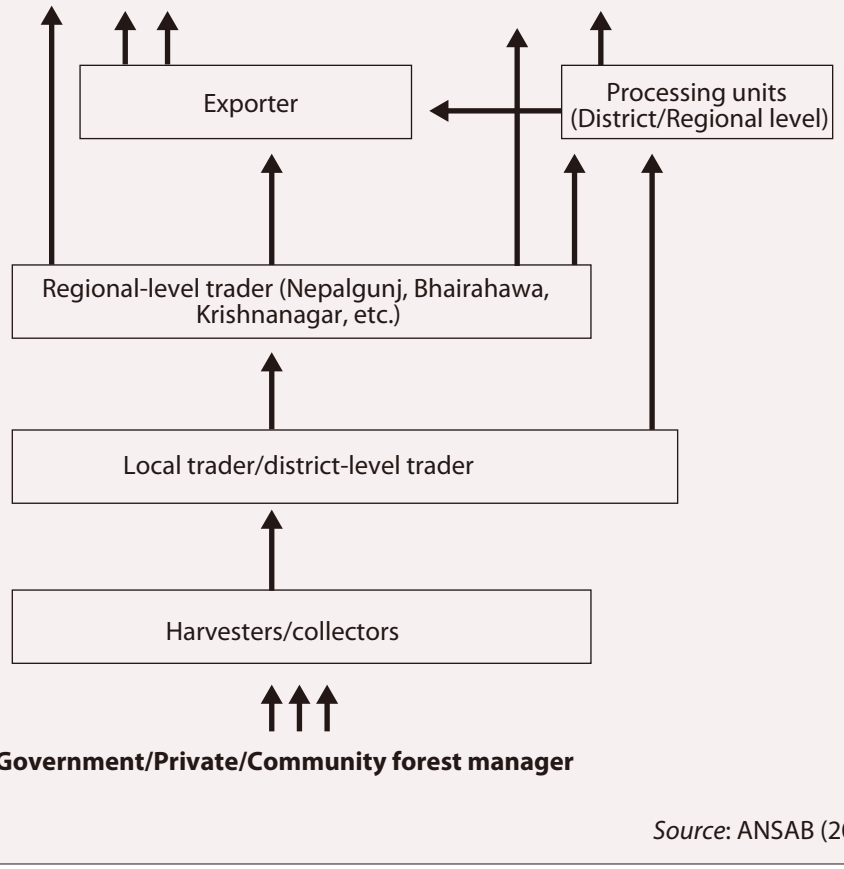
ANNEX I

Generic value chain of NTFPs (including 'Ritha' and 'Jatamansi')



Source: ANSAB (2008)

Cross-border NTFP value chains: Laos – China

Laos: Horst Weyerhaeuser and Manuel Bertomeu, NAFRI, Vientiane, Lao PDR
China: Andreas Wilkes and Yan Mei; ICRAF-China/KIB, Kunming, China PR

1. Overview

Historically in Southeast Asia NTFPs have been essential for subsistence and economic activities of rural people living in or adjacent to forest areas. Spices, gums, resins, and medicines and many other plant commodities found in the forests and uplands of Southeast Asia were key to the development of international trade and economic development of the early kingdoms in the region (Callis 2005).

Today in Laos, over 700 forest products are used by rural people for their subsistence or for trading. NTFPs can represent up to 45% of the cash income and up to 50% of the non-cash income of upland families. Thus NTFPs are key to food security and are a coping mechanism for the poorest families in times of need or during periods of scarcity (Foppes and Ketphanh 2004). NTFPs are not only important for household consumption but also for the country's economy. In 2004, the share of NTFPs was 19% of the total value of agricultural exports (11,756 million dollars) (Wieman *et al*. 2009). The contribution of NTFPs to the national economies would be even higher if the environmental values of the systems of NTFP production were accounted for. It is because many of these NTFPs are grown, managed, and harvested from permanent forest plots and/or patches of cultivated forests with important (but yet unaccounted for) biodiversity, climate change mitigation, watershed, and landscape values.

Of the vast variety of NTFPs produced in Laos, the extracts, which include exudates, essential oils, gums, latexes, resins, and oleoresins, are in high demand in foreign niche markets because of their intrinsic high value (NAFRI *et.al*. 2007).[2] The collection of natural chemicals for the pharmaceutical or insecticide industry is emerging as a promising industry though there are artificial substitutes for these products. The main export destinations of the NTFPs of Laos, in general, and of extracts in particular, are China, Thailand, and Viet Nam. Demand from China is particularly high (NAFRI *et.al*. 2007). Together with India, China is the world's largest producer and consumer of NTFPs, producing and processing wild products with a value estimated at 11 billion dollars in 1994.

2. Prioritization of NTFPs

Stick lac exudate and benzoin resin are two NTFP extracts that are important because of their high value and quality and high demand from international markets (Figs 1 and 2). These two extracts were selected for this study on the following basis:

Production offers significant economic opportunities to smallholders. Both products offer significant opportunities to smallholders. The income from the most important NTFPs, including stick lac and benzoin, occurs at a time when there are, apart from some vegetables, hardly any other sources of income. This is also the time when the supply of rice is declining and often people have to borrow money or sell livestock to fill the gap in the rice supply. Thus income from NTFPs functions as a buffer during periods of scarcity.The advantages of stick lac are many: (a) it provides quick and regular returns, (b) it has low labor and capital requirements, (c) it does not compete much for labor with food crop production activities as labor for inoculation and harvesting can be provided during slack periods, (d) it is easy to transport, (e) it can be produced on trees planted on farm niches that do not compete for land with food crops, (f) it can be continuously produced as host trees allow permanent production, and (g) it provides direct cash income that can be used for food security or in times of emergency. Although benzoin has a relatively small monetary value compared to some other Lao exports, it does offer a source of income to one of the poorest and most disadvantaged groups in the country.

Competitive advantages of Laos in international markets. Both extracts are products in which Laos is competitive in international markets. Lao benzoin products have a high reputation for quality in international markets and command a high price. There is some benzoin production in Viet Nam, but Laos dominates the international market for Siam benzoin. Compared to Sumatran benzoin, Siam benzoin has a unique aroma and is of higher quality and therefore gets a higher price compared to cheaper Sumatran benzoin. Re-exports from Viet Nam and Thailand appear to be of Lao origin, therefore Laos is not competing with other countries for a greater share of the international Siam benzoin market. Lac is produced in a number of countries, and total exports from Laos are a small share of international markets. Due to the growing demand in China and the proximity of Laos to China, there is potential for increased exports and incomes from lac production and trade.

Possibility of cultivation and environmental benefits. Both products can be cultivated in natural forests as well as in the agroforestry systems where they do not compete with agricultural crops. Therefore, there is a high potential to grow and commercialize both of these products. If properly conducted, the cultivation, harvesting, and processing practices of lac and benzoin resin have potential to be beneficial for wider environmental management goals. Based on current available data on yields and incomes, FORCOM (2006) reports that stick lac incomes can substitute for shifting cultivation of upland rice and therefore could contribute to the government's goal of stabilizing shifting cultivation in the uplands. Benzoin production in styrax forests offers an excellent rehabilitation method for degraded forests damaged by shifting cultivation.

Fig. 1: Stick lac harvest

Fig. 2: Benzoin resin

The study of these two extracts was made on the basis of available published material in English, Lao, and Chinese.

[2] The high intrinsic value of most NTFPs is due to their scarcity, quality, and for being organically produced.

3. Production, processing, and supply chain description

3.1 Lac exudate

3.1.1 Product

Lac is the resinous protective exudation of an insect, *Laccifer lacca* (Lac insect) that is parasitic on certain trees. There are many host tree species, but only a few are being utilized for lac production. Where forests are abundant, production of stick lac takes place in the forests. In the natural forest, the insects are introduced twice a year onto new trees and branches of 'Mai Faen' (*Protium serratum*) trees. The tree belongs to the person who infests it, and can be re-infested every third year. More recently, on-farm production of stick lac has also started. Farmers introduce stick lac insects onto the branches of trees such as pigeon pea (*Cajanus cajan*) planted in open fields or fallow land. On-farm lac production with pigeon pea has only recently emerged but is spreading in the northern part of Luang Prabang Province as a result of increasing demand of lac from China.

Stick lac ('Khang' in Lao) production begins with the procurement of twigs of 10–15 cm in size with sticked female lac insect (brood lac). The twigs are fixed into the host trees where the farmer wants to produce stick lac (inoculation). Approximately 15 days after inoculation, the brood lac is taken away from the host tree as the larva of the lac insect has already infested the host tree. After hatching, the larva starts to move, eventually settling at the top of the twigs. Once the host trees have been infected with brood lac, the lac insect requires little or no attention. Stick lac is normally harvested five to six months after inoculation. Harvesting also involves the cutting of twigs with potential brood lac, and then grading and selecting good quality stick lac for use as brood lac for the next crop.

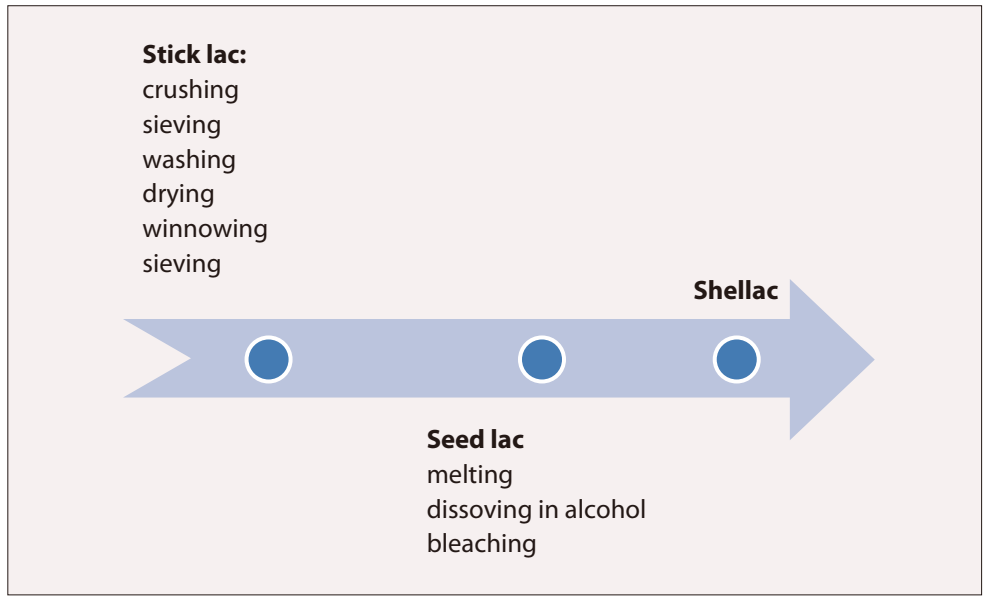
After harvest and transportation to the village, the lac is scraped off the twigs (this is known as crude or "wet stick lac"). Stick lac consists of the resin, the encrusted insects, lac dye, and twig residues. Then, the stick lac is crushed and sieved to remove sand and dust and finally washed in hot water/sodium carbonate to break open the encrusted insect bodies and to wash out the lac dye and twigs. Decaying bug bodies turn the water a deep red, which is used as a natural dye. The remaining resin is dried, winnowed (fanned and separated), and sieved to get the commercial variety of dried stick lac or "seed lac". Dried stick lac is usually stored in bags or in bamboo baskets for sale. Seed lac can be further refined into bleached shellac (flakes or powder) by melting and mixing with alcohol, acids, and other ingredients (FORCOM 2006).

In Laos, usually there are two crops of stick lac per year, one in March–May and the other in September–November. Due to the cold weather in winter, the May crop generally has a low yield and is used mainly for brood lac. Commercial stick lac is usually obtained from the October crop.

3.1.2 Applications

Lac is a natural polymer that has been traditionally used as glue to make or repair farm equipment, and for dyeing silk and cotton. In commercial applications, lac has several properties (listed below) that create demand for new applications:

- Because of its adhesiveness, gloss, and moisture resistance, shellac is prized as a polish for high-class furniture;
- Because of its high plasticity, adhesive strength, and resistance to moisture and corrosion, lac is being used as an electrical insulator, in gummed tape and scotch tape, and also as a coating for urea to make it a slow release fertilizer;
- Because it is not poisonous, has no smell, and is water resistant, lac is used in food and pharmaceutical products, notably as a preservative coating for fruit (e.g., oranges, melons, and vegetables) where its use reduces moisture loss through evaporation and thus prevents rotting and maintains external appearance of fruits; as a coating for confectionary and as a coloring in food; and as a coating for medicinal pills and capsules so that the medicine releases gradually and thus increasing absorption of active ingredients.
- A by-product of processing is a red dye, which is often used in fabric dyes.



3.1.3 Economics, trade, and market demand

Information on yield and prices of stick lac in Laos is scant. FORCOM (2006) reports that in 2006, dried stick lac was sold in villages at an average of 15,000 kip/kg (10,000–18,000 kip/kg). Assuming that 1 ha of host trees inoculated with brood lac produced on average 800 kg of dried stick lac, farmers would cash in from the sale of stick lac 12 million kip, which is enough to purchase 6 tons of rice (sale price for rice is 2,000 kip/kg) equivalent to 4 ha of upland rice (at 1.5 tons per ha). Other sources provide alternative data on the relative economic benefits of rice and lac production, but in any case point to the fact that improvements in the value chain and integration of small holders into the value chain should increase benefits from lac production for Lao farmers.

Reports from Yunnan – the main stick lac producing area of China – state that total yields of stick lac in Yunnan have been decreasing over the past 10 years. Apart from the impact of management practices, it seems that prices are also a factor that deters farmers from taking interest in stick lac production. The reports argue that, on the one hand, it takes 3–5 years to gain economic returns from tree plot establishment and inoculation; while on the other hand, the price for lac in Yunnan has not been stable, ranging between 18,000-19,000 RMB/ton to 2,000–3,000 RMB/ton. Sometimes farmers cannot even sell their lac. Therefore, in China at least it appears that price variations are a major constraint on farmers' involvement.

Lac is produced in a number of countries – including China, India, Indonesia, Laos, Myanmar, Thailand, and Viet Nam – and exported to about 45 countries. Germany, Italy, Egypt, Indonesia and are the major markets. The total annual global production is estimated to be 20,000 tons. India and Thailand are the major producers, producing on average 17,000 tons of lac a year, of which about 70% is produced by India and 30% by Thailand. Laos produces about 100 tons a year, part of which is exported to China, Thailand, and Viet Nam (de Beer 1993; FAO info).

According to Chinese research, the main importers of lac are the US, Germany, Japan, Korea, and Russia, mostly importing raw stick lac, seed lac, and shellac, and then processing bleached lac and dye lac, which is then re-exported to other countries. In 2008, analysis of the Chinese lac market price found that raw stick lac is 15 RMB/kg, seed lac is 22 RMB/kg, vegetable and fruit preservative is 25 RMB/kg, shellac is 30 RMB/kg, and food quality bleached lac is 50 RMB/kg. This shows that in the lac business, competitiveness depends on processing technologies to create value added.

Exports from Laos are in the form of stick lac (not processed to "seed lac" or "shellac"). Since 2003, the production of stick lac in northern Laos (particularly in Houay Lek village, Ngoi district, and Louang Prabang province) has been growing as a result of increasing demand from China and Viet Nam.

Yunnan, which borders Laos, is one of China's main processing centers. There are 12 processing enterprises in Yunnan with annual production of 3,000 tons, mainly raw stick lac, shellac, bleached lac, and food quality refined bleached lac, as well as the side product of processing which is red lac dye. Apart from ordinary bleached lac, the others are all exported. All of the food quality bleached lac and red dye produced is exported. The red lac dye is a natural edible dye, and sells for over 500,000 RMB/ton.

Chinese research suggests that global production is normally stable at about 50,000 tons. According to a 2008 market survey, the demand from the traditional international sectors is about 40,000 tons, and with new technological applications in recent years demand has been about 100,000 tons. International trade accounts for about 20,000–30,000 tons a year. A survey of Chinese domestic demand found that the domestic market volume is about 6,000 tons, but with high-tech applications it totals about 10,000 tons. Traded volume is about 2,000–3,000 tons, and in recent years Chinese stick lac production has been only about 1,000–1,500 tons.

In order to meet demand, some of Yunnan's enterprises have started to cooperate with Laos and other Southeast Asian countries to set up stick lac production bases to ensure supply. Kunming Suhua Biotech Co. is one of them. It is one of Kunming's biggest stick lac processing enterprises and produces about 300 tons of refined bleached lac and 500 tons of fruit and vegetable preservative each year. Reportedly, in 2008 it took the lead in the "China–Laos Stick lac Sector Cooperation project", and in Laos it set up the Laos–China Stick lac Sector Co. Ltd, and in 2009 established a production base of 2,500 ha, which can produce up to 2,500 tons a year. However, in the course of this desk study, these events could not be verified.

In recent years, supply of raw stick lac from China's lac producing areas can only meet 25%–30% of Chinese demand. The lack of raw material means that export-oriented processing enterprises in China are losing export contracts, and this has constrained the development of stick lac processing enterprises in China. Because of the lack of raw stick lac, and small domestic supply, processing enterprises find it hard to purchase up to 100 tons in one go. For the large domestic processors, because their demand is large and stable, as soon as they purchase domestically the price goes up, and stays high for 1–2 years. So they are willing to pay more to buy stick lac from countries that can supply lower quality stick lac in larger amounts, rather than upset the domestic Chinese market. This is the reason why the market price in China is lower than that in India and Thailand. Chinese research suggests that the further development of demand for raw lac from Chinese processing enterprises is constrained by the lack of R&D in products that would enable them to meet demand from new technological applications. Fake shellac from Guangdong but branded with Yunnan brand names also constrains development of processing enterprises in Yunnan.

Therefore, with growing demand internationally, but especially from China, combined with decreasing supply of raw lac from the main production areas in Yunnan, there is a large potential market opportunity for Laos.

3.2 Benzoin resin

3.2.1 Product

Laos is a major producer of Siam or Lao benzoin, a balsamic resin obtained from the nyan tree [*Styrax tonkinensis* (Pierre) Craib ex Hartwiss]. *Styrax tonkinensis* is a deciduous tree up to 25 m tall and 30 m wide and native to Southeast Asia. Trees reach sexual maturity at 4–5 years of age. The natural distribution of *S. tonkinensis* in Laos encompasses the northern provinces of Phongsaly, Luang Namtha, Oudomxay, Luang Prabang, and Houaphan. The distribution also extends into the northern provinces of Viet Nam. In Laos, it occurs predominantly at 800–1,600 m elevation with mean annual rainfall over most of its distribution ranging from 1,500 to 2,200 mm, with only a few dry months and a mean annual temperature ranging from 15°C to 26°C. *S. tonkinensis* is light demanding; in open, burned-over areas it often occurs in the upper story.

In natural forests, *S. tonkinensis* regenerates well in forest gaps, provided the undergrowth is not too heavy, as saplings are sensitive to competition. The current extension of the natural range of the species owes a great deal to human activities and its demand for light and its regular production of large quantities of viable seeds. Fire promotes and accelerates seed germination. As a result, *S. tonkinensis* may occur in almost pure stands over many hectares, occupying sites previously cleared for shifting cultivation. In Laos, production of benzoin is centered in its natural range, the mountainous, northern provinces of Luang Prabang, Phong Saly, Houaphan, and Oudomxay. Luang Prabang is the main province for benzoin production with some 3,000 ha of styrax forests above 700 m elevation in two districts of the province.

Given the above characteristics and site requirements of styrax trees, benzoin production is integrated into the shifting cultivation cycle, forming an agroforestry system combined with upland rice cultivation. Traditionally, in land where *S. tonkinensis* occurs naturally, after slash and burn farmers plant upland rice at the beginning of the rainy season (normally in April or May). The styrax fruits, which fall during the clear felling, germinate in the rainy season and the dense seedling growth is thinned to about 500–600 stems per ha during weeding. Four to six months later, the rice crop is harvested, and the styrax seedlings produced as a result of natural regeneration are allowed to grow during the 10–12 year fallow period[3]. Tapping begins at about the 7th or 8th year (or earlier), allowing up to four years or more of production before the cycle starts again and the land is cleared. In recent years, however, pressure on land caused by population increase, coupled with government restrictions on forest clearing, has resulted in a shorter cycle of 7–8 years, and tapping may only take place during the final 1–2 years. In some areas, the fallow period is reduced to only 4–5 years when the styrax trees are too young and small

[3] Rice is grown for only a single season because the yield declines significantly thereafter.

to tap. This reduction in cycle length means that not only are fewer trees likely to be tapped, but yields of benzoin from those trees are getting less.

A variation of this system, observed in Luang Prabang province, consists of a form of enrichment planting of styrax. Under this system, during the first year of shifting cultivation styrax seeds are sown directly with three or four seeds per hole. Seeds are collected from 7–8-year-old trees, which are reserved as seed sources and not tapped. After the styrax seeds are sown, the field is then burned. The heat produced by burning promotes seed germination. After the burning, farmers plant upland rice. Upland rice is planted in the first year only; from the second year onwards styrax trees only are grown. Weeding and cutting of climbers is done periodically to promote styrax tree growth. Benzoin tapping begins when the trees reach 7 years of age, and a DBH (diameter at breast height) of 12–14 cm. All large trees are tapped. It is said that trees having a larger crown can produce more benzoin. A further variation of the system described above consists of broadcasting large quantities of styrax seed (5 kg/ha) in the cleared field by hand. A month later the field is burned and upland rice planted. The styrax and rice seeds germinate at almost the same time, i.e. within 7–10 days. The density of styrax trees is 500–600 per ha and usually no thinning operations are carried out. When the trees are 7 years old, the farmers decide which trees should be tapped, depending upon their size. An estimated 50 styrax trees per hectare per year are tapped.

In Laos, styrax trees are commonly tapped for the first time at 6–7 years of age. The trees are tapped during September and November (around the end of the rainy season), when they are bearing fruit and the leaves are dying (the trees are deciduous). At that time, the bark is easy to cut. About 1–3 weeks after tapping, the styrax tree will close the tapping cuts with benzoin, but sap and resin will continue to be secreted. During the cooler, dryer winter season, the resin will dry and become hard and fragile. It is at this stage that the benzoin can be collected, usually during March–April (sometimes up to May). After harvest, the benzoin resin should be cleaned and graded according to size. In Laos, the grades are given a simple letter or number designation, e.g., A–D or 1–4.

Styrax trees also provide valuable wood, locally used for house construction (because of its resistance to insects) and fuelwood. Styrax is not a long-term tree crop. The older the forests get, the less competitive *S. tonkinensis* is. In forests approaching 15 years of age, styrax trees will barely produce benzoin and will begin to disappear.

Local people use the name *nyan* to refer to *Styrax* spp. and recognize two types: *black nyan* and *white nyan*. Commercial benzoin is produced only from *black nyan*. Unlike other non-wood forest products, the benzoin-producing styrax trees are traditionally individually owned. The size of the area where each family cultivates styrax trees usually ranges from 1 to 3 ha. All the other forest products in these areas can be gathered by the one who finds them first or who indicates by placing a sign that a claim is being laid on them.

3.2.2 Applications

There are two types of commercial benzoin. One is from mainland Southeast Asia, from *S. tonkinensis* Pierre Craid ex Hartwiss, known as Siam benzoin. The other is Sumatra Benzoin, which is from *S. parallelonеurum* Perkins. Laos is the main producing country of Siam benzoin. Indonesia, especially north Sumatra, is the only producing area for the Sumatran type. Siam benzoin has an annual production of about 50 tons, while around 1,000 tons of Sumatran benzoin is produced each year. While *S. tonkinensis* trees are present in Yunnan and some other southern Chinese provinces, production of benzoin is extremely limited. Basically all Chinese benzoin is imported.

Benzoin is mainly used for incense purposes and in the flavoring, fragrance, and pharmaceutical industries. The higher quality Siam benzoin is used mainly in the manufacture of fine fragrances.

Benzoin has been used for a long time in medical treatments in the pharmacopia of China, France, Italy, Japan, Sweden, Thailand, UK, and the US. It is mainly used as a fragrance and medicine. As a medicine, benzoin tincture is used as an absorbent, which can alleviate afflictions of the breathing system, such as mucositis, inflammation of the throat and bronchitis. Benzoin wash is used to prevent labial herpes, and as a mouthwash. External uses include treatment of skin rash, ulcers, and injuries. The better grades of benzoin are extracted and used in the manufacture of fragrances. These include personal health-care products such as toilet soap, shampoo, body lotion and cream, bath oil, aerosol and talcum powder, and household and other products such as liquid soap, air freshener, fabric softener, washing detergent, and other cleaning agents.

In Chinese medicine, benzoin is used to raise energy, invigorate blood and vital energy circulation, and as a pain reliever. It is used to treat abdominal pain, sudden dizziness, stroke and when children have had a big shock. External uses include treatment of injuries to prevent ulceration. *S. tonkinensis* timber is suitable for making wooden crates and other uses. The Chinese Pharmacopoeia (1992) states that benzoin preparations in the form of pills or powders are used to restore consciousness, and activate the flow of blood and relieve pain.

Benzoin's principal role in foods is as a flavoring agent. The Sumatra benzoin from Indonesia is used in the manufacture of chocolate flavors. For Siam benzoin, there is no specific data on how much is used in the food industry. Also, the absence of toxicological data means that it is not included in the permitted list of Codex Alimentarius. If favorable data were forthcoming, and benzoin was included in the Codex, this might open up new markets for benzoin.

Minor applications of benzoin include its use as a glazing agent in polishes and wood finishes. One company in the UK produces a formulation from an alcohol extract of black benzoin and seed lac. This is sold in 1-litre or 5-litre plastic bottles to the furniture trade. It is used particularly for traditional furniture. Sales of the product have increased in recent years, reflecting the fashion for this type of furniture, but purchases of benzoin are still very small, just a few tons per year by this company compared with consumption in the major end-use industries.

3.2.3 Economics and trade

Historically, Siam benzoin produced in Viet Nam was exported to Europe along with that from Laos at the beginning of the 20th century. Production was mainly in the northern provinces and continued into the 1950s; thereafter it declined, apparently because the price was not sufficiently attractive to induce the people to tap the trees. Recently, a ban on exploiting the protected forest areas where *S. tonkinensis* grows has contributed to the decrease in domestic production.

Annual production of Siam benzoin, one of the two types of commercially produced benzoin, is about 50 tons. For some years, Laos has been the sole producer of benzoin, although Viet Nam is believed to intermittently produce much smaller amounts, too.

Major markets of Siam benzoin are in the Middle East, India, and North Africa, where it is used for incense purposes. Saudi Arabia is the biggest single market, and may re-export to some smaller Gulf states, but the United Arab Emirates also takes significant quantities. In Africa, Djibouti serves as an entrepôt; Morocco, Tunisia, and Egypt are other prominent importers. In West Africa, Nigeria is an important importer. In Asia, Malaysia, China, India, and Sri Lanka import large amounts of benzoin, and in Asia, Malaysia is by far the biggest importer. France, Germany, and the UK are the biggest markets in Europe. Although Europe only accounts for about 5%–6% of benzoin's exports (from Singapore) in quantity, this share increases to about 14–16% in value terms. Conversely, in most years Africa has accounted for approximately 30% of exports but this drops to about 15%–20% when considered in value terms.

4. Issues and problems

4.1 Lac

4.1.1 Knowledge gaps

There still exist many knowledge gaps on certain aspects of stick lac production that can have an effect on productivity and profitability. Specifically there is a lack of knowledge on the aspects listed below.

- **Biophysical conditions suitable for the lac insect**. Extreme weather events such as too low or too high temperature, heavy rains and strong winds, hail storms and drought, can be destructive to lac insects and therefore lower stick lac yield. A lac insect has a fairly small range of environmental conditions for optimal growth. It produces best stick lac below 1,000 m asl, but also needs perfect conditions to mature and produce good quality stick lac. There is a need for more research on the optimal environmental conditions required for production of export quality lac.

- **Silvicultural techniques**. More systematic information is required on the properties of different host trees; it may be necessary to verify the recommended tree spacings for plantations currently made by extension agencies; the impacts of different agroforestry (intercropping associations) on the biology of the insect are not clear; and several aspects of management of the host trees are not systematically understood, e.g., pruning regimes and optimal inoculation methods.

- **Insect management techniques**. What roles do farmer-to-farmer exchanges have in brood quality management, and what criteria determine the quality of brood lac?

- **Farming economics and farm niche**. Pigeon pea had been promoted by research and extension agencies, and projects for improving fallows, in hedgerows intercropping, and rotational systems. Pigeon pea was proved to be effective for soil improvement, weed suppression, and reducing nematode in upland rice. Can lac production be integrated in this system? What would be the trade-offs? What is the optimal farm niche for stick lac production? Are there labor-saving interventions that can improve the economic benefits from lac production? Is the high price of brood lac inoculant a constraint to stick lac production?

- **Pest control**. Some information is known on pest impacts on stick lac production, but there is also a need to consider interactions of pest management methods with pesticides applied to crops.

Several surveys and participatory studies on stick lac production in Laos exist (FORCOM 2006; Keoboualapha et. al., undated) but there is need for a more in-depth assessment of farmer knowledge in producing areas to assess their knowledge on some important aspects of stick lac production for which very little is known about, and assess constraints to stick lac production. Farmer Participatory Research would be an ideal starting point for identifying further research questions for targeted scientific research on issues that can increase quality and yields of stick lac.

There are also some reports from Chinese research on stick lac silvicultural methods, climatic suitability, etc. (e.g., Chen and Wang 2007 and Shi 1993). This suggests potential for collaborative research between Lao and Chinese researchers to minimize repetition of existing research.

4.1.2 Value addition

Stick lac from Laos is exported to China, Viet Nam, and Thailand. But harvested lac is not processed to "seed lac" or "shellac" so far. After processing (crushing, 'boiling' in hot water/sodium carbonate, cleaning and filtering, evaporation), stick lac becomes seed lac. Seed lac can be further refined into bleached shellac (flakes, powder) with a mix of acids and other ingredients. The problem with shellac production is that the process can be environmentally hazardous as chlorine is used for bleaching.

Processing in Laos could focus on the second stage, where stick lac is transformed into seed lac. It is one step further up the value chain, it does not involve any high-tech processing, uses mainly water, sodium carbonate, manual labor, and an energy source to heat water (fuelwood, solar power, biofuel, biogas, small-scale hydropower) and the process does not harm the environment. It can therefore be suited to small holders living away from the main electricity grid.

Also, it should be considered that stick lac is a fickle product when it comes to storing and transport. As a raw product, stick lac loses its value quickly and cannot be stored for more than a few weeks under hot conditions as stick lac pieces tend to 'stick' when transported in warm or hot environments and a process of polymerization starts. Thus the soft resinous components become hard and difficult to process. A truck load of polymerized stick lac is hard to sell. Therefore, if there is sufficient and steady supply, production of stick lac in the field should be combined with simple processing and proper storage so that if price is low producers are able to store the product and sell it when prices are up again.

For value-chain participants in China, a lack of investment in R&D has constrained their ability to avoid competition from synthetic substitutes and to take advantage of new technological applications. In the late 1980s and early 1990s, one of the larger enterprises – Kunming Stick lac Factory – ran into decline because of the replacement of stick lac furniture varnish by artificial resin products. At the same time, in America stick lac began to be used in the fruit and vegetable coating business to replace chemical coatings but because of a lack of R&D on stick lac, Chinese enterprises have not been so well placed to take advantage of these trends and opportunities. Although Yunnan has research agencies working specially on host tree species, domestic breeding of the insect, and stocking, there has been no research on applications of stick lac.

4.2 Benzoin

During the past decade, the production of NTFPs has been promoted as a solution to the problem of shifting cultivation in Laos. The rationale is that NTFPs can reduce shifting cultivation and thus deforestation by providing effective alternative income sources to shifting cultivators. In the case of benzoin production systems, various studies have been conducted by FAO (2001) to achieve the following objectives:

- introduce better and innovative techniques of cultivation and harvesting (either through natural regeneration or plantation cultivation);
- improve extraction, processing, and purification of benzoin resin (technical aspects);
- develop the domestic trade of benzoin resin, and develop international marketing strategies and mechanisms (institutional aspects);
- promote agroforestry and rural development through a benzoin utilization program in the country (socio-economic and environmental aspects).

Project achievements and recommendations have been published in a monograph (FAO 2001) and are summarized below.

4.2.1 Supply

If benzoin production in Laos is to prosper, the supply of benzoin must be assured. The supply of benzoin is dependent on the availability of suitable trees to tap (and their productivity) and the willingness of people to tap them. The decreasing length of the shifting cultivation cycle means that there may be fewer trees being tapped now than in the past and that those which are being tapped are yielding less because shorter cultivation cycles means younger trees have not yet reached their optimal age. Therefore, the supply base for benzoin is becoming less secure. This results in the loss of an important source of household income from benzoin tapping. However, in more remote areas, this change is less predominant.

4.2.2 Value addition

Benzoin production in Laos can provide a good opportunity for off-farm employment and an income source for rural communities. However, most Siam benzoin exported from Laos is in the form in which it is collected from the tree, after it has been cleaned and graded and thus, producers get a low price for it. There should be efforts to develop benzoin resources and process benzoin resin for new and expanding markets.

4.2.3 Price fluctuations

With regard to the attitude of the people to tapping the trees, the task of tapping is arduous work and if there are more profitable or less demanding activities which give quicker returns than tapping styrax trees (keeping livestock or tending alternative crops), then those alternatives may be undertaken as the economic returns of benzoin are perceived to be marginal. Village surveys have documented the lack of interest in collecting benzoin in some villages (e.g., Soydara *et al*. 1997) and the Oudomxai area seems to have been particularly hard hit.

Although more than 60% of the households own some styrax forest, benzoin does not have the importance for the villagers that it formerly had. This trend is the same in the other benzoin-producing areas in Laos and is partly the result of low benzoin prices. Farmers would re-start tapping if the prices become more attractive. However, this downturn in benzoin tapping should not lead to the conclusion that it is not worthwhile to promote benzoin and its production. Many families, in particular the poorer ones, depend considerably on the cash income generated by the sale of benzoin. Furthermore, the recent movements on the benzoin market indicate a positive price development. An aspect which can seriously affect benzoin production in the future is the decreasing length of fallow periods on upland fields caused by increasing land pressure and the current way of land allocation to local people.

4.2.4 Competition with Viet Nam

Viet Nam is the only country known to be carrying out large-scale planting of *S. tonkinensis* (over 20,000 ha has been established). Silvicultural practices in Viet Nam have been documented by researchers. These researchers describe techniques ranging from seed collection and handling, nursery propagation to field establishment and management. In Viet Nam, *S. tonkinensis* is fast growing and under favorable conditions can attain annual height increments of 3 m during the first three years. It has also been documented that the mean heights of 18–25 m and DBH of 20–24 cm are obtainable at 10 years Such growth would give a wood yield of about 150m^3 per ha based on final stand densities of approximately 600–800 stems per ha.

5. Interface with national policies

It was noted above that both stick lac and benzoin productions have close synergies with national environmental management objectives in Laos. In particular, both products can potentially support the national policies in Laos to stabilize shifting cultivation, and effective integration into value chains could ensure that this occurs without reducing farmers' incomes. Both products can be produced in natural forests, but both products can also come from managed forests or trees as part of agroforestry systems. Government restrictions on forest clearance have reduced the length of the shifting cultivation cycle and this may be detrimental for benzoin extraction.

In Laos, the Ministry of Agriculture and Forestry controls all agricultural and forestry products, including non-wood forest products (NTFPs). Businessmen and private companies have to register their names and provide proof of funds in banks and evidence of storage facilities. Each June, the applicant must submit an annual buying plan for each commodity they deal with in that province. Based on this request, final approval and permission is issued by the Provincial Agriculture and Forestry Office (PAFO) as a quota for the year, because PAFO is responsible for the exploitation of forest products. At that time, the applicant must pay a 3% natural resource tax. Government guidelines only allow benzoin traders who have registered with PAFO to deal directly with villagers collecting benzoin. These traders cannot buy more than the quota being approved by PAFO. It is recommended that this issue be reviewed for any better alternatives. The current export tax system might function as a disincentive as there have been reports that there are many constraints in the government trade and export procedures, which cause considerable delays in the export of benzoin. Such constraints may have probably resulted in missing business opportunities.

China is one major destination for exports from Laos of both lac and benzoin. In recent years, there have been major, high-level initiatives between the two countries to support growing interdependence between the two economies. In particular, China has a set of policies to support Chinese companies to invest and establish business operations in Laos, and to support supply of exports from Laos to China. These policies provide opportunities to explore how trade in NTFPs between the two countries can be supportive of poverty alleviation and environmental conservation goals, while also providing attractive business opportunities to value-chain participants.

6. Interface with international conventions

Both Laos and China are signatories to the CBD, which has a major focus on sustainable development, trade and conservation of plants, including NTFPs/MAPs (medicinal and aromatic plants). The Convention encourages fair and equitable benefit-sharing, and supports the sustainable utilization of biological resources. The issues mentioned above concerning restrictions on shifting cultivation, sustainable agroforestry systems – including NTFP products – and international ABS aspects of the involvement of Chinese businesses in Laos in production of some of these NTFPs are all issues that are closely related to the concerns of the CBD.

7. Conclusions and recommendations

Both Laos and China are signatories to the CBD, which has a major focus on sustainable development, trade and conservation of plants, including NTFPs/MAPs (medicinal and aromatic plants). The Convention encourages fair and equitable benefit-sharing, and supports the sustainable utilization of biological resources. The issues mentioned above concerning restrictions on shifting cultivation, sustainable agroforestry systems – including NTFP products – and international ABS aspects of the involvement of Chinese businesses in Laos in production of some of these NTFPs are all issues that are closely related to the concerns of the CBD.

7.1 Lac

Lac product trade is growing internationally. Chinese demand is largely for imported lac because of declining domestic production. In recent years, growing demand has been driven by innovations in new technological applications. Significantly higher prices can be obtained for processed products compared to raw lac. At present, Laos exports only stick lac, with no processing of seed lac or shellac or other lac products. Therefore, we see that there are opportunities for improved contribution of lac to sustainable development in Laos if the volume of high-quality lac production can be increased and/or if Laos engages in processing of lac products (while avoiding the potential environmental pollution from processing bleached lac products). There are several areas where development research can contribute to achieving this.

Section 4.1.1 above listed a set of research questions devoted to increasing the quality and quantity of production in Laos, including research on:

- suitable biophysical conditions;
- silvicultural techniques;
- insect management techniques;
- pest control;
- farming systems and economics.

This research can be guided by a participatory farming systems approach, with on-farm trials to maximize knowledge that already exists among farmers and other actors in the value chain. There is also some existing knowledge among Chinese research and extension agencies, and drawing on this can reduce the effort expended in repeating research that has already been done.

Section 4.1.2 suggested that processing in Laos could be initiated focusing on the second stage of processing, where stick lac is transformed into seed lac. It is one step further up the value chain, it does not involve any high-tech processing, uses mainly water, sodium carbonate, manual labor, and an energy source to heat water (fuel-wood, solar power, biofuel, and biogas) and the process does not harm the environment.

Research should also be conducted on transport and storage, so that, if there is sufficient and steady supply of stick lac, it can be combined with simple processing and proper storage, so that if the price is low producers are able to store the product and sell it when prices are up again.

This study (Section 3.1.3) also identified some Chinese companies that are beginning production enterprises in Laos. These initiatives, and the wider policy environment that is supportive of increased investment and trade between Laos and China, provide potential opportunities to explore different ways of structuring the value chain so as to maximize benefit for small holders in Laos from involvement in lac production, processing, and trade.

7.2 Benzoin resin

By comparison, there is a better basis of knowledge about *S. tonkinensis* and benzoin production in Laos, mainly due to a previous FAO project. Siam benzoin is also a trade product in which Laos has a distinct comparative advantage. This study finds that there are potential development research contributions in the areas of supply and value addition.

- Increasing supply: The identification of superior seed sources and improved silvicultural management techniques will surely contribute to enhance benzoin production (although it should be noted that an improvement program for any tree species is costly to implement, takes a long time to obtain meaningful results, and requires a continuing commitment of skilled staff. Therefore, careful consideration must be exercised before embarking on a potentially costly tree improvement program.).

- Value addition: Most benzoin is exported from Laos in its raw form. Value addition could provide employment opportunities and increase incomes in Laos. Specific opportunities and options have not yet been identified.

Specific recommendations for research on benzoin include:

- Village surveys to be undertaken in the benzoin-producing provinces to assess the attitudes of shifting cultivators to benzoin production and identify opportunities and constraints to benzoin production
- On-farm trials, to demonstrate the value of good tapping practices and its relationship with market requirements (e.g., abundant of foreign matter)
- To determine market specifications for the raw material
- To study the trade-offs between color and aroma
- To introduce quality control or certification scheme
- To find means to minimize size degradation
- To develop effective methods of cleaning and storing and packaging (e.g., vacuum packaging) benzoin that minimize size degradation
- To find new end-use applications for benzoin as a food additive by the submission of toxicological data formally confirming its safety in foods.
- To develop the methods and capacity for collecting statistical information: procedures for collecting and collating production and domestic trade data annually. In collaboration with Lao customs, steps should also be taken to see that records are kept of benzoin exports by volume and value, with countries of destination, and that these records are made easily accessible
- To identify centers of production so that data exist on how much benzoin is produced and where
- To determine the trend in production year-by-year (historical trends)
- To determine the free-on-board (FOB) value of exports of benzoin from Laos and their destinations
- To carry out a market study (the end-uses of benzoin; the countries which have such end-use industries but which are not yet exporting targets; which other companies in those countries import benzoin, in addition to those already being traded with; and how those companies can be contacted)
- Feasibility study to explore the possibility of developing local industries for finished products using benzoin as well as the wood of *S. tonkinensis*
- To review government policies on the current quota system and regulations concerned (export taxes, etc.)

7.3 Limitations of the study

During the preparation of this report, the following limitations were encountered:

- There are few publications on the two NTFPs studied, and little reliable information on production and trade volumes
- Very limited information describing the actual value chains for the two products was found
- As this was a desk study, almost no interviews with value-chain actors were conducted

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