

Selected NTFPs for development in Phoukoun, Xieng Nguen, Ngoi and Pakxeng districts, Luang Prabang



A training report with recommendations for World Vision, Luang Prabang, implemented by Northern Agriculture and Forestry Research Centre (NAFREc) and Netherlands Development Organisation Laos (SNV)

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Report based on village discussions and reports written in Lao language for Phoukhoun, Xieng Nguen, Ngoi and Pakxeng districts supported by World Vision, Luang Prabang, January-March, 2007

Executive Summary

One of World Vision aims is to promote the sustainable development of non-timber forest products (NTFPs) for marketing and management and is seeking to improve the potential income from these products.

PRAs revealed that communities in Phoukhoun, Xieng Nguen, Ngoi and Pakxeng districts collect a variety of NTFPs for sale and own consumption. NTFPs account for 16–39% of the village cash income, covering over 50 products. Most people earn some part of their income from NTFPs, but for the poorest households (17% of the population) earnings are as high as 48%. This is without considering the many NTFPs consumed (81 plant and animal products) or used in and around the house (23 products). People who are better off collect fewer wild NTFPs and move into NTFP management on their own land, as is the case for paper mulberry, broom grass and *peuak meuak*. The natural resources of most village areas consists of “pa lao on” or “pa lao keh” (regenerating forest in various stages) in which most NTFPs are collected.

Villagers selected a range of products to develop topped by broom grass and paper mulberry followed by *peuak meuak*, sugar palm fruits, sticklac, bamboo grubs, bamboo shoots and wild banana flower. For these products a range of constraints exist which villagers discussed and analysed resulting in by their recommendations. These recommendations fall into the areas of marketing/processing and management.

The following recommendations are proposed to World Vision:

1. Organise villagers in management and marketing groups to improve their production and negotiation position. A series of meetings facilitated by the project and district offices should be held in which in-depth discussion take place examining constraints and look for long term solutions. Leadership and higher level of responsibility is a skill lacking in many villages. It is crucial to gradually build up a group of people, develop their trust in themselves and each other and provide members with extensive support before they are able to work own their own.
2. Establishment of agro forestry/homegardens. Such gardens could contain selected NTFPs, fruit trees, medicinal plants, etc. The project should take advantage of high amount of villagers interested in managing NTFPs in a more intensive way, while maintaining and protecting the forest cover. Site and plant selection should be done by the villagers, in close co-operation with the project and DAFO. Agro forest gardens could be established in individual household plots or in village community forests. This requires further the establishment of (NTFP) nurseries managed by producer groups. Broom grass and paper mulberry are already managed in gardens by many families and this should be taken advantage of as to develop this system on a larger scale, especially in Xieng Nguen district.
3. Develop NTFP management plans including harvest regulations for selected products. First the DAFO extension services are advised to raise awareness for sustainable management at village level while benefiting from their local knowledge. Experts are also available at NAFReC to support this process. Final responsibility needs to be part of building within village groups.
4. Regular meetings with traders and village forums to discuss and improve prices and product quality. A kick off workshop is proposed to start this process to build understanding and eventually overcome differences. This can be done at village level, but should be scaled up to “*kum ban*” level as a forum of discussion. SADU is experienced in using “*kum ban*” meetings as a market information system (MIS) forum in which price transparency is promoted across

- the value chain for the most important NTFPs and agricultural products. This activity is considered crucial for overall success!
5. Discuss the quota system and other policy issues with district officials. To date these systems have proved to be ineffective having negative effects on village (and district) economy, natural resources and traders. Instead a system needs to be developed that is based on the actual abundance and status of NTFPs. Resource assessments and harvest guidelines of the most important NTFPs need to be developed in collaboration of village resource management groups. NAFReC could be involved in formulating criteria for the assessment. An assessment of domesticated NTFPs planted nearby villages should be a relatively simple exercise to start with and for which tax exemption should be sought for.
 6. Collaborate with other stakeholders in the province and neighbouring provinces which are also intervening in management and marketing developments. Stakeholders are: Petrama (agribusiness), SADU, NAFREC, PAFO Luang Prabang, Forcom, Department of Industry and Commerce, Asia Urbs II and SNV. In Sayaboury province this is GTZ and in Oudomxay province OCISP.
 7. Expand previous NTFP assessment towards other districts and other stakeholders in the NTFP trade. It is crucial for a more integrated approach to develop management and marketing of NTFPs to understand the point of view of traders, market people, factories and policy makers also active in the NTFP value chain. A value chain study seeks to understand their choices made with regard to their activities, strategies and constraints for a particular NTFP from the production side to processing and marketing. Through such a study the potential interventions can be identified benefiting all stakeholders active in the chain. The aim is to transfer some of the processing steps and therefore value adding to the poor and to establish more direct links between the producers and the consumers. Implementation of a value chain analysis should be for the main products first: paper mulberry and broom grass.

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1. Introduction

World Vision has a development programme in Phoukhoun, Xieng Nguen, Ngoi, Phonxay and Pakxeng districts in Luang Prabang province providing development support to 157 villages. Besides the sectors health and education the programme also covers livelihood improvement support to rural communities which rely on upland agriculture, livestock and NTFPs. As Non Timber Forest Products (NTFPs) are an important part of the livelihood system of the rural households, World Vision is seeking to improve the potential income from these products.

Due to increasing market demand for certain NTFPs like paper mulberry, broom grass, *peuak meuak* and sugar palm fruits resources have been increasingly exploited. Harvesting of these products is not always done so in a sustainable manner and people risk that in the future continuous benefits can be gained. Besides, local people often sell their products to traders without further adding value to them, thereby limiting their changes of receiving good prices.

An important element of improved income generation from NTFPs is first a clear understanding of the most lucrative NTFPs in the target villages and districts. To acquire this knowledge participatory assessments need to take place for product identification. World Vision, Luang Prabang requested the Northern Agriculture and Forestry Research Centre (NAFReC) and SNV (Netherlands Development Organisation) to assist in identifying important NTFPs for improved marketing and resource management, as well as providing training to district staff on the following issues:

- 1) Participatory assessments for identifying most lucrative NTFPs (1 or 2)
- 2) NTFP management when necessary
- 3) Solving possible other problems that communities face in developing their NTFP income, such as marketing or product development.

The product assessment training took place in 4 districts and 8 villages over a period of 28 days between January-March 2007, see table 1.

Table 1: Training schedule in 4 districts, 8 villages

Activity	District - Village							
	Phoukoun		Xieng Nguen		Ngoi		Pakxeng	
Training (theory)	11/01		22/01		13/02		13-03/07	
Village training (practice)	Lak Ha	12-14/01	Naming	23-25/01	Houay Lek	14-16/02	Pak Kang	14-16/03
	Phoukoun Noi	15-18/01	Kiew Taloun II	26-28/01	Houay Houa Noi	17-19/02	Houay Keng	17-19/03

In each district the programme staff and government staff were monitored while implementing the activities involved. These assessments did not only look at NTFPs for marketing but also for own consumption at village level. Assessments covered identification and prioritisation of important NTFPs, interviews, group discussions, resource assessment, problem analysis, summarising/returning results.

This paper discusses the results from the participatory assessments aiming to inform World Vision and the 4 districts on suitable NTFPs for development. Following the assessments the training team and the villagers together developed recommendations to help solve challenges villages face. Recommendations deal with improvement of the NTFPs in the areas of management and marketing at village level as to help assure the sustainable use of the resources and improve benefits from NTFPs.

Detailed accounts of the survey are available in 4 district reports in Lao language.

2. Methodology

To collect information about the local challenges, local people's knowledge and perception are crucial inputs to identify relevant interventions. PRA (Participatory Rural Appraisal) is aimed at data collection and to understand local concepts and issues. It covers an important phase where a project builds upon local people's abilities to empower them.

The most important characteristic for getting good information through PRA tools is attitude. In order to build a positive relationship with local women and men, outsiders must have an attitude of respect, humility and patience, and a willingness to learn from villagers. They must be supportive of using methods and tools that empower villagers to express and analyse their knowledge and to design their own development action plans. Participatory approaches are based on active partnership between farmers and development workers who should act as facilitators aiming to help overcome farmer's limitations. By learning together a start can be made to understand rural perceptions and requirements. "let them talk, let's listen and not judge?"

The intense involvement of local people in the PRA process tends to generate much enthusiasm and expectations about the development actions that they have identified. This means they are getting ready for change, which is a positive aspect, but can cause problems if supports for implementation are not forthcoming. It is essential that the PRA team be honest and clear, from the beginning and throughout the process, about whether or not resources from outside development institutions will be made available. If outside resources will not be or limited available, the focus must be on development activities that can be implemented with local resources only. Table 2 explains the purpose of each PRA tool.

Table 2: PRA tools and their purpose to collect specific data

Method	Data collected	Motivation
Building rapport	Focus revealed in initial discussions	Trust building, get to know each other, ensure collaboration
Participatory group sketch mapping	Natural resources used, importance areas	What do villagers consider important areas for their livelihood
Listing and ranking of NTFP's	Important NTFPs for own use and sale	What do villagers consider important NTFPs for their livelihood
Seasonal calendars	Important activities carried out when	When NTFPs become important
Group discussions	Local NTFP context: market, resources, skills, regulations	Select NTFPs based on enterprise development criteria
Problem analysis	Constraints and potential to overcome these	Identify and understand potential and needs for support for specific NTFPs
Forest walks	Observations of NTFP/forest status, harvesting, ecology	Putting a picture with the talk, know what we talk about, cross checking, relaxed discussions
Simple family interviews	Livelihood strategies for wealth classes	Cross checking, understand context of the poor and self sufficient households

3. Results

In order to identify the most suitable NTFPs for development (in the marketing and management context) the various socio-economic and environmental data collected in interviews and group discussions as well as observations are reviewed to better understand the role of NTFPs.

3.1 Village income and the role of NTFPs

From specified income generating activities the total village income and the proportional share NTFPs take up in these is presented in table 3.

Table 3: Income sources and contributions to total village income, with special reference to important NTFPs

District	Village	Sources of Income (%)				Top NTFPs providing income
		Livestock	Agriculture	NTFP	Other	
Phoukoun	Lak Ha	37	32	22	9	<ul style="list-style-type: none"> ▪ <i>Noh lan</i> bamboo shoots ▪ Broom grass
	Phoukoun Noi	45	28	20	7	<ul style="list-style-type: none"> ▪ Paper mulberry ▪ Sugar palm fruits
Xieng Ngun	Naming	10	32	16	42	<ul style="list-style-type: none"> ▪ Broom grass ▪ Paper mulberry
	Kiew Taloun II	17	53	20	10	
Ngoi*	Houay Lek	35	17	29	20	<ul style="list-style-type: none"> ▪ Bamboo grubs ▪ Broom grass ▪ Paper mulberry ▪ Sticklac
	Houay Houa Noi	19	36	39	6	
Pakxang	Pak Kang	41	19	17	23	<ul style="list-style-type: none"> ▪ Fish ▪ Bamboo shoots
	Houay Keng	49	3	23	25	<ul style="list-style-type: none"> ▪ Fuelwood ▪ Broom grass ▪ Fish
	Average	32%	28%	23%	18%	

**Ngoi district is increasingly raising sticklac which is by some seen as an agricultural product, by others as an NTFP. In the latter context the NTFP proportion to the village income would then rise to 55% and 42% for Ban Houay Lek and Ban Houay Houa Noi, and agriculture subsequently lower to respectively 8% and 33%.*

A relationship between village income and the relative importance NTFPs have in it is not clear and varies between villages. However, the role of NTFPs is always significant and often more than 20% of the total income a village receives.

Figure 1 indicates that a village with lower overall income engages more in NTFP income generating activities. In addition figure 2 reveals that a higher NTFP income is correlated strongly with a higher overall income per person, this is also true at household level. Additional information will be given in the following paragraphs.

Looking more closely to the results of the analysis some important NTFPs providing this higher income are bamboo grubs (10-13% in 2 villages, 1 month per year), broom grass (2-13% in 8 villages, 3 months per year) and paper mulberry (1-10% in 7 villages, 4-5 months per year).

3.2 Involvement of the poor in NTFP activities

In the previous paragraph there were indications that poorer people depend more on NTFPs than better off groups. Figure 3 shows this as well; the poorest members of the communities assessed receive about half of their total yearly income from NTFPs (48%, varying from 27-93%).

Figure 1: Relative contribution of NTFPs to total village income

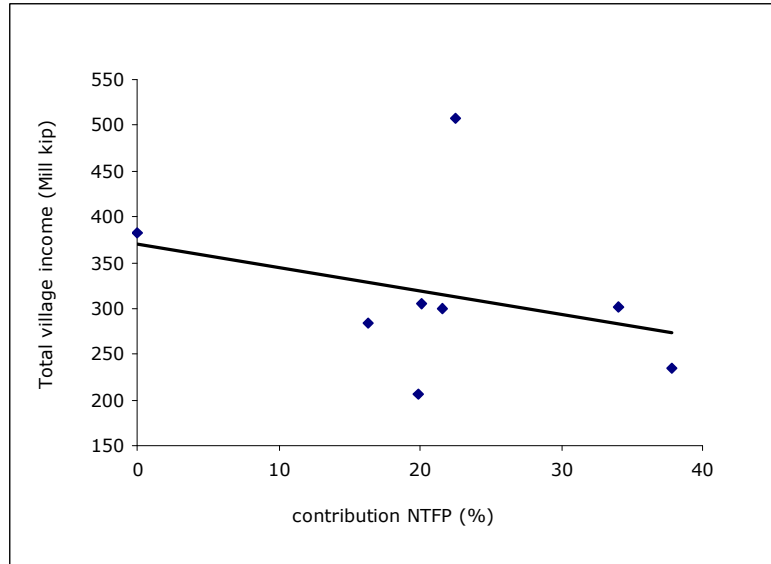


Figure 2: Relative contribution of NTFPs to total individual income

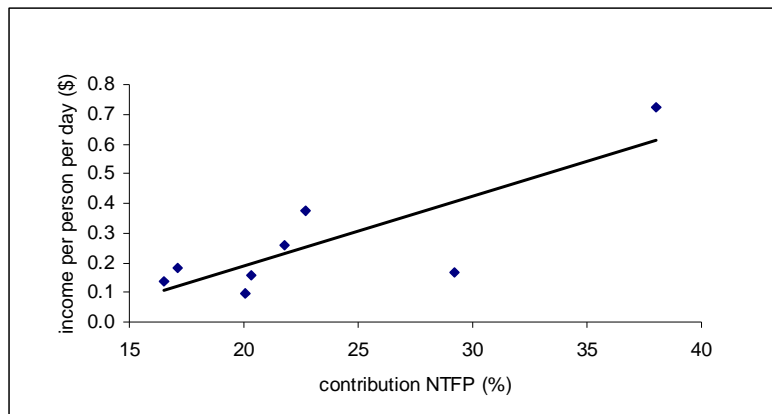
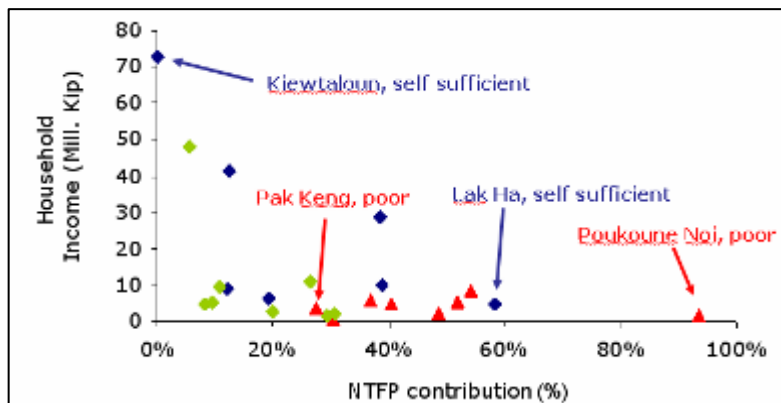


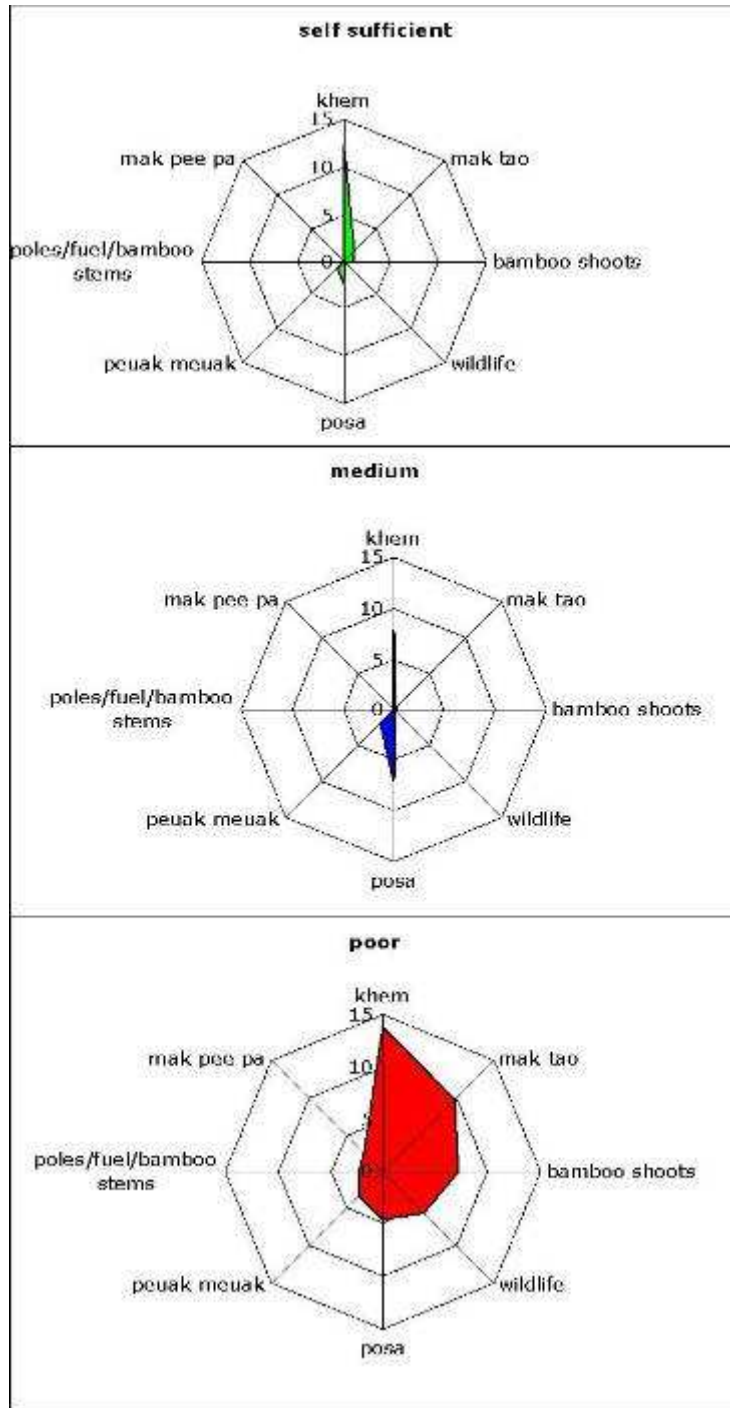
Figure 3: Contribution of NTFPs to different wealth groups.



However other wealth classes also receive some portion of their income from NTFPs. The poorest village members divide their time and resources over the largest variety of products such as broom grass, sugar palm fruits, bamboo shoots (*noh lan*) and wildlife

(Figure 4). For example a poor family interviewed in Ban Houa Keng (Pakxeng district) depends for 54% of its income on 10 NTFPs which are collected year round. The self sufficient wealth groups earn 18%, and medium wealth groups 26% from NTFPs. Both the wealthier groups are involved in NTFP harvesting, but more from actively managed resources like paper mulberry gardens, or managed broom grass areas. In one village a well of family is specialised in medicinal plants.

Figure 4: Livelihood strategies for wealth groups.



Between the wealth groups in a village there can be considerable variation, in some villages the difference between a poor and a self sufficient household can be as high as 22 fold (Ban Naming, Phoukoun), but usually self sufficient wealth groups earn 6 times as much as the poorest groups, for the medium vs. poor wealth groups this is 3 times as much. What is further noteworthy is that between villages there are big differences (see Figure 3). For instance a self sufficient villager in Lak Ha (Phoukoun district) has a similar income as compared to that of a poor villager in Pak Keng (Pakxeng district). However, the Lak Ha villager is considered better off due to a higher NTFP contribution in his/her livelihood strategy.

3.3 Women involvement in NTFP activities

Many NTFPs which are collected men and women assist each other in the harvesting, transport, processing and marketing of products. Some jobs are carried out only by men, especially when this requires heavy work (slashing bamboo for the stems or for finding bamboo grubs), long travel times (sugar palm fruits) or involves catching wildlife and fish.

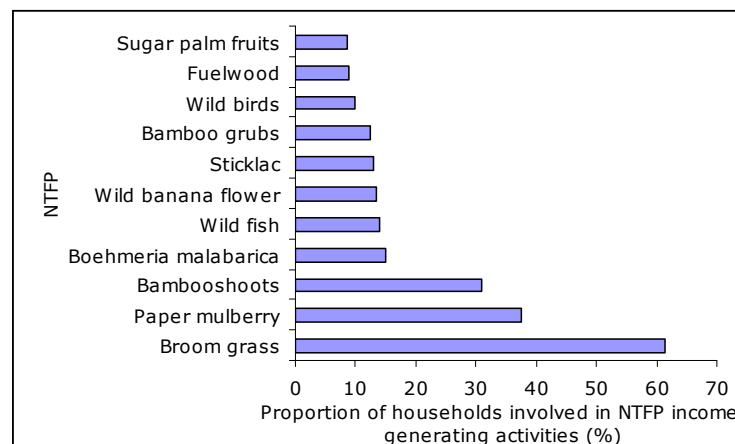
Typical women tasks are processing jobs such the cleaning of paper mulberry bark or broom grass, collecting vegetables and bamboo shoots as well as preparing these. Little information is available with regard to income held in reserve by women.

3.4 Amount of people involved in NTFP activities

Some NTFPs in Luang Prabang have a large demand and resources are sufficiently available to provide supplies. For the 4 districts 61% of all households, including all family members, are involved in broom grass harvesting and processing. In the case of paper mulberry 38% of the population strip bark from trees, transport these in bundles to the village where they remove the outer bark and dry the inner bark for collection by traders (Figure 5).

Most NTFPs are collected in the dry season, when people have time after rice and other cash crops are harvested. A wide range of other NTFPs sold involve less amount of employment due to limited supplies like *peuak meuak* and fish. About a third of the population, mainly women depend on the sale of bamboo shoots (*noh lan, noh sang, noh hok*) which are only available 3 months of the year. Sugar palm fruits which are also available for 3 months of the year take up almost all of male labour.

Figure 5: NTFPs most commonly collected by 8 villages.



3.5 Available NTFP Resources

Availability regards to actual presence of a product, but not all harvestable products are always collected, as these are for most households subordinate to other livelihood strategies, such as livestock raising and/or agriculture.

The exact NTFP resource availability per village is difficult to estimate without a thorough resource assessment. However the amount of products harvested was obtained from villagers in interviews and group discussions and is used to reflect the availability of the resource.

Large volumes of bamboo shoots (*noh lan, hok, sang, khom*), broom grass and paper mulberry are collected in the 8 villages (63, 61 and 37 tonnes annually). These sun-abiding NTFPs are available in sufficient quantities in regenerating areas surrounding villages. In contrast, only 1 ton of bamboo grubs is collected from bamboos stems. This limited availability can be explained by the challenging task to recognise bamboo stems in which the grubs are nesting. Collectors often have to cut down a range of stems before a nest of grubs is found. Besides this bamboo grubs are generally sought much further away (5-6 hours) from the villages as compared to other NTFPs such as sticklac and fish (less than 1 hour). Besides the bamboo grubs other limited resources include fish, sugar palm fruits and *peuak meuak*. Each having their specific constraints: *peuak meuak* is over harvested, sugar palm trees are not well managed and fish is naturally limited. Some of the resources which are managed are paper mulberry, broom grass and sticklac.

3.6 The value of NTFPs

For raw products which are in high (seasonal) supply the market often offers lower prices, like for uncooked bamboo shoots (500-1,000 kip/kg). Paper mulberry and broom grass which require some cleaning before they can be sold receive a somewhat better price, 2,500-3,000 kip/kg. Still, villagers have problems meeting the often not transparent quality criteria set by traders, so that prices paid may vary significantly. Sugar palm fruits which require some distant travelling, and processing through boiling in the forest receive only 2,000-3,000 kip/kg, but often so because the quality of the product offered is low. The opposite is also true. Bamboo grubs which are only available for 1 month of the year fetch a price of 30,000 kip/kg. Their specialised harvesting practice and highly dispersed occurrence contributes to a higher price. This seasonally attracts about 10% of all households, each collecting as much as 10-11 kg/year. Prices between villages for NTFPs sold do not vary considerably, except for bamboo grubs (see Table 4), and seem not to depend much on volumes of the products supplied.

Table 4: Prices and price variation of some NTFPs between villages

NTFP	Average price (kip/kg)	Variation in price (kip/kg)
Broom grass	2,825	301
Paper mulberry	2,900	370
<i>Peuak meuak</i>	4,333	606
Sugar Palm fruits	2,625	479
Bamboo grubs	40,000	10,000
Sticklac	14,000	1,414
Bamboo shoots	900	535

3.7 The most important NTFPs

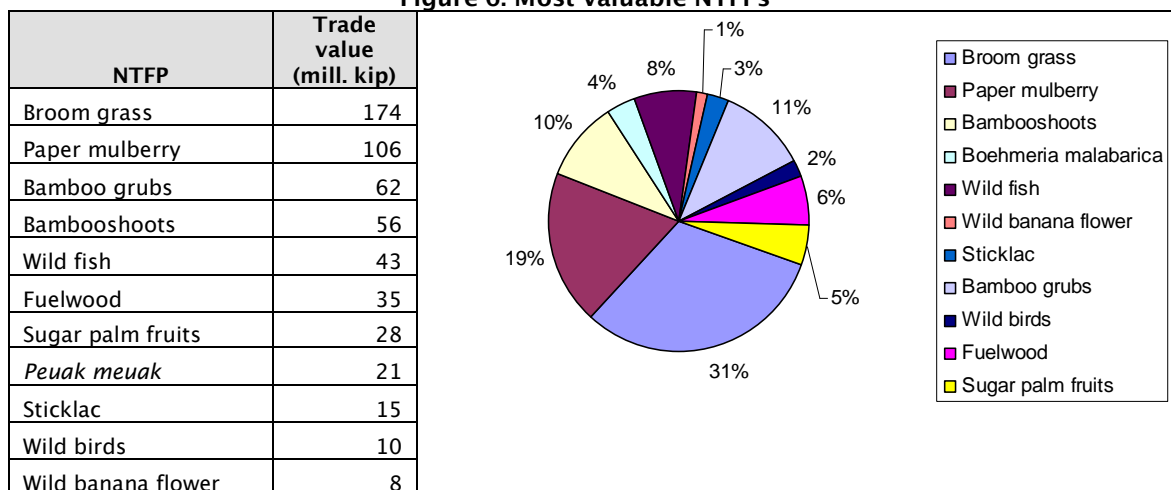
Importance of NTFPs often depends on what price people can sell it for, however if there is no market NTFPs are still important for people's own consumption. Table 5 shows that villagers of the 4 districts enumerated many NTFP foods, which are sometimes also sold for income. For a complete list see annex 1.

Table 5: NTFPs used for sale and own use

NTFP use	Amount of species	Types
Food	81	vegetables (30), mushrooms (16), animals (23), shoots (bamboo, rattan, palm) (10), fruits (16), flowers (4), spice, bulbs, river weed
Sale	51	vegetables (5), mushrooms (9), animals (11), shoots (bamboo, rattan, palm) (7), fruits (10), fibre (7), bulbs, poles, fuelwood, bamboo
Other use (tools, construction)	23	Bamboo (8), fuel, fibres (4), resin (2), wood (7), rattan stems, medicines,

The overall value of sold NTFPs comes from a combination of volume traded and price. The top most important example is broom grass which has a value of 174 million kip for the 8 villages combined (Figure 6).

Figure 6: Most valuable NTFPs



3.8 Useful NTFPs to develop

How important a certain NTFP is depends on different factors. If there is no market, NTFPs are often used for own consumption with limited opportunities to develop it, unless an innovative activity, such as active marketing, makes it so. However when there is a demand and resources is not sufficiently available little benefit can be accrued, except sometimes through domestication. In the development context, projects are often interested to focus their efforts on the poorest people and women. These groups make different uses of NTFPs, or face different challenges as compared with the more self sufficient households. Therefore it is important to look at the overall picture of a range of NTFPs before a decision should be made to further develop a certain product. Based on the results presented in the previous paragraphs, table 6 summarises the different socio-economic and environmental factors. Under each of these factors the a series of categories are given each followed by a score (1-4). These scores, written in

brackets, indicate the relative positive impact a category has. For example, in the case of sticklac the price of 1 kg is ca. 14,000 kip, which is larger than 10,000 kip so receives a score of 4. Sugar palm fruits are mainly a product handled by men and the role women play only a small role in the harvest and processing, so less than 50% indicating a score of 1.

Table 6: Summary of the importance of socio-economic and environmental factors for important NTFPs in 8 villages

NTFP	Price (kip/kg)	Proportion households	Proportion poor households	Proportion women	Resources availability	Labour spent (months)	Total score
	<2,000 (1) 2,000-5,000 (2) 5,000-10,000 (3) 10,000> (4)	<20 (1) 20-40 (2) 40-60 (3) 60> (4)	Mainly (3) Medium (2) Limited (1)	<50 (1) 50-70 (2) 70> (3)	Limited (1) Medium (2) Sufficient (3) Abundant (4)	<3 (1) 3-6 (2) 6-9 (3) 9-12 (4)	
Broom grass (<i>khem</i>)	2	4	2	2	4	2	16
Paper mulberry (<i>posa</i>)	2	2	1	2	2	3	12
Bamboo grubs (<i>toh meh</i>)	4	1	2	1	1	1	10
Wild fish	4	1	3	1	2	4	15
Fuelwood	1	1	3	2	2	4	13
Bambooshoots (<i>noh hok, sang, lan</i>)	1	2	3	3	3	2	14
Sugar palm fruits (<i>mak tao</i>)	2	1	3	1	2	2	11
Boehmeria malabarica (<i>peuak meuak</i>)	2	1	2	2	1	4	12
Sticklac (raised)	4	1	1	2	1	4	13
Wild birds	4	1	3	1	2	4	15
Wild banana flower (<i>mak pee pa</i>)	1	1	3	2	3	4	14

The scores allocated in the table can be adapted to the requirement of the project's objectives. This can be done by applying a higher priority, simply by using a multiplying factor. In case women and the poorest households are target groups, scores can be increased in order to put priority on them. When the aim is to improve natural resources management its priority needs to be increased in a similar way.

For a more detailed account of the original information please see annex 2.

3.9 Selection of NTFPs

The above is based on the data collected in 8 villages and an interpretation of the NAFREC/SNV NTFP team.

In participatory group discussions villagers listed and prioritised both commercial NTFPs and NTFPs for own consumption in order to select a short list of products which villagers would like to develop further. Borrowed from the MA&D approach (FAO, NAFRI, SNV 2006. Lao Field Guide Manual on Market Analysis and Development for Non-Wood

Three steps to select NTFPs for development:

1. Listing of NTFPs used for food, sale and household use and prioritising through scoring
2. Discussion of priority NTFPs from the 3 categories based on market, environmental, social and technical criteria
3. Selection of NTFPs based on criteria

Step	1	2	3
Village			
Lak Ha	47	8	4
Phoukoun Noi	52	11	4
Naming	54	11	3
Kiew Taloun II	104	13	2
Houay Lek	82	9	5
Houay Houa Noi	59	11	4
Pak Kang	134	10	2
Houay Keng	80	8	2

Forest Products, Vientiane) criteria to select NTFPs for development were used to assist villagers to discuss the NTFP shortlist. The method also helps to understand the social, environmental and technical constraints of a range of products. The four areas of criteria used consider:

1. market demand/economy
2. natural resource base/environment, distance from the village, etc
3. social/institutional: concerned village traditions, laws and regulations set by the government
4. science/technology: required skills in collecting and processing NTFPs.

3.10 Problem analysis and potential solutions for selected NTFPs

Based on criteria discussed and applied to prioritised NTFPs villagers of the 8 villages selected the most viable NTFPs of the assessment. These were further analysed in detail with village groups using their own perception with regard to problems they face. The group discussions were also used to extract potential solutions and recommended proposals to present to the project. In summary the table 7 shows these.

Table 7: Village problem analyses and potential solutions for selected NTFPs

NTFP	Problem	Reason	Potential solutions
Broom grass (8 villages)	<ul style="list-style-type: none"> ▪ Traders cut prices, no transparency in pricing ▪ Prices are low ▪ Low quality product ▪ Resources are dwindling ▪ Difficult to collect ▪ Not all areas are suitable for quality broom grass ▪ Cattle compete with broom supply, eat the grass 	<ul style="list-style-type: none"> ▪ Market: traders do not guarantee prices and collect produce before they pay villagers. Traders and villagers cheat each other using false weighing scales and added stones in products. ▪ Processing: stems are cut back too short, lack of processing skills, covered in dirt or not well dried. ▪ Management: <ol style="list-style-type: none"> 1. Often grows in steep areas, far away and difficult to enter through thick grass vegetation 2. Not planted or wrong choice of planting site; 3. No fire control to stimulate growth, resulting in small flowers with short stems. 4. Plants of poor quality when growing in shade (prefers sun light) 5. Cattle areas are established in broom grass areas 6. Overharvesting in some cases 	<ul style="list-style-type: none"> ▪ Market: <ol style="list-style-type: none"> 1. Traders should make deposits first before they collect produce. 2. Traders and villagers should not cheat ▪ Processing: <ol style="list-style-type: none"> 1. Develop quality standards according to the market demand to be explained to villagers and carried out. Threshing and cleaning according to agreements. 2. Once quality standards are met and pre-season negotiations made agreed prices should be guaranteed by traders. 3. Quality control by permanent village unit to check trade and quality standards ▪ Management: <ol style="list-style-type: none"> 1. Harvest the grass clump by clump; 2. Fire management is required after clumps are 2 years old, after that they die or stems are too short and of low quality. 3. Choose suitable planting areas or manage current stock with fire; 4. Planting on private land (home gardens) and receiving expert advise; 5. Develop management systems in separated areas for broom grass and cattle

Paper mulberry (8 villages)	<ul style="list-style-type: none"> ▪ Prices are low and uncertain ▪ Low quality ▪ Difficult to strip the bark ▪ Not sufficient resources, dwindling ▪ Cattle damage trees ▪ People steal paper mulberry 	<ul style="list-style-type: none"> ▪ Market: no price guarantee by traders, or monopoly depresses prices ▪ Processing: <ol style="list-style-type: none"> 1. Not well dried, turning red 2. Outer bark not completely removed 3. Harvesting in rainy season makes bark turn black due fungus 4. There is no grading ▪ Management: <ol style="list-style-type: none"> 1. Wrong choice of planting site 2. No additional planting carried out 3. Not planted in the right season 4. Overharvesting 5. Too small an area for cattle raising, villagers do not invest in fences around paper mulberry gardens and cattle owners do not take responsibility for damage ▪ People are not committed 	<ul style="list-style-type: none"> ▪ Market: trader need to set quality criteria before the buying season starts and guarantee prices. Households want to sell individually because they do not trust quality of bulked products from all villages. ▪ Processing: <ol style="list-style-type: none"> 1. Dry bark well and remove all outer bark; 2. Don't let trees get too old, choose bark from trees younger than 2-3 years of age, and harvest bark in long strips 3. Recommendation from trader to improve quality need to be followed up ▪ Management: <ol style="list-style-type: none"> 1. Improve site selection for planting 2. Plant in the right season: June and July; 3. Enrichment planting in private areas, with expert advice 4. Harvest when new shoots have developed, and flowers and fruits appear (March-April) 5. Increase cattle area 6. Improve management system for cattle and paper mulberry in which cattle owners are responsible for damage and gardens need to be fenced – people ask for barbed wire form the project ▪ Develop village regulations and carry these out, encourage people to grow paper mulberry
Bamboo grubs (1 village)	<ul style="list-style-type: none"> ▪ Unsustainable harvesting of the bamboo host for the grubs 	<ul style="list-style-type: none"> ▪ Bamboo shoots and stems are destroyed in harvesting/search for grubs (mai sang, mai hok) 	<ul style="list-style-type: none"> ▪ Management <ol style="list-style-type: none"> 1. Village needs to develop harvest regulations 2. When stems need to be cut housing the grubs, stems can be recognised by small holes in the stem, and/or stems which are not well developed. 3. In village meetings, knowledgeable collectors need to explain techniques to other people.
Bamboo shoots (<i>Noh lan</i>) (1 village)	<ul style="list-style-type: none"> ▪ Resources are dwindling 	<ul style="list-style-type: none"> ▪ Management: <ol style="list-style-type: none"> 1. Outside people start fires to prepare upland rice fields in communal areas 2. No clear production zones are established 	<ul style="list-style-type: none"> ▪ Management: <ol style="list-style-type: none"> 1. Planting of bamboo 2. Managing bamboo in household plots for harvesting purposes

Sugar palm fruits (2 villages)	<ul style="list-style-type: none"> ▪ Limited resources ▪ Difficult to harvest ▪ Low prices 	<ul style="list-style-type: none"> ▪ Processing: <ol style="list-style-type: none"> 1. Quality is low, not sufficiently boiled (unripe); 2. Too young and too old fruits are collected. ▪ Management: <ol style="list-style-type: none"> 1. Resources too far from the village, grows near streams and cliffs difficult to access; 2. It takes one palm tree 18-20 years to produce fruits; 3. Use of destructive harvesting methods not according to regulations, top shoots are often harvested by cutting down the whole palm; 4. Palm trees are tall with no branches and fruits difficult to collect 	<ul style="list-style-type: none"> ▪ Processing: <ol style="list-style-type: none"> 1. Select ripe fruits, as required by the market; 2. Boil fruits sufficiently long. ▪ Management: <ol style="list-style-type: none"> 1. Shoot cutting should be forbidden; 2. Develop a ladder system to climb the trees
<i>Peuak meuak</i> (3 villages)	<ul style="list-style-type: none"> ▪ Limited resources 	<ul style="list-style-type: none"> ▪ Management: <ol style="list-style-type: none"> 1. Over harvesting due to lack of harvesting rules, roots are also harvested; 2. No plantings are established or planting sites not well chosen 	<ul style="list-style-type: none"> ▪ Management: <ol style="list-style-type: none"> 1. Plantings owned by households (homegarden) 2. villages needs to develop harvest regulations
Sticklac (2 villages)	<ul style="list-style-type: none"> ▪ Low quality ▪ Price is unsure ▪ Pigeon pea trees die 	<ul style="list-style-type: none"> ▪ Market: Too many traders who want to buy, when there is little produce price is high and when much produce price is low. Lao traders complained that they find it difficult to compete with the Chinese traders who do not have licenses and pay no taxes. ▪ Quality: Not well dried; ▪ Management: <ol style="list-style-type: none"> 1. Planting pigeon pea not on suitable soil 2. Shoot and stem borers destroy the pigeon pea tree; 3. Moles destroy roots; 4. Black ants eat the mother lac insect; 5. Older lac insects are eaten by rats 	<ul style="list-style-type: none"> ▪ Market: Villagers desire to build good relationships with regular traders only and negotiate and set prices with ▪ Quality: Dry well according to traders requirements ▪ Management: <ol style="list-style-type: none"> 1. Need to check damage continuously 2. Need to weed the pigeon pea area
Wild Banana flower (1 village)	<ul style="list-style-type: none"> ▪ Thick and difficult to enter vegetation 	<ul style="list-style-type: none"> ▪ Grows in regenerating forest (pa lao) 	<ul style="list-style-type: none"> ▪ Clearing paths in the vegetation

4. Discussion

Taking in consideration all the data collected on the value of NTFPs, available resources, amount of households involved in the NTFPs, labour inputs, as well as the proportion of poor people and women involved a range of products were found suitable to develop

further. In extensive village discussions on NTFP selection a similar range of products were chosen by villagers, however prioritised differently (Table 8). All in all, broom grass and paper mulberry are for all villages priority products to develop further. *Peuak meuak*, Sugar palm fruits and Sticklac are secondary products which should also be taken into consideration. Earlier selected products by the FAO MA&D project in Xieng Ngeun province (Ban Long Leuad and Ban Houay Hia) were similar.

Table 8: Selected NTFPs based on data vs. village discussions

Selected NTFPs	Based on data	Based on village discussions
Broom grass	1	1
Paper mulberry	9	2
<i>Peuak meuak</i>	8	3
Sugar palm fruits	10	4
Sticklac	7	5
Bamboo grubs	11	6
Bamboo shoots	5	7
Banana flower	4	8
Wild birds	2	
Wild fish	3	
Fuel wood	6	

The challenges people face to improve the benefits from these products boil down to marketing/processing and management and are summarised in table 9.

Table 9: Challenges to improve marketing and management of selected NTFPs

Marketing/Processing	Management
low prices	limited management of natural resources
lack of quality of the products	lack of technical skills to harvest NTFPs
lack of transparency in quality criteria and prices by traders	lack of skills to successfully plant NTFPs
lack of technical skills to process NTFPs	conflict over land use
lack of negotiation skills of villagers	lack of regulations and enforcement
artificial monopolies created through the quota and bidding system	

The quota system for NTFPs in some Luang Prabang districts is implemented as a bidding exercise in which traders provide figures for which they can buy all paper mulberry or broom grass in the villages of the district. This system of allocating quotas enables only one trader to buy all produce against a set price. This district created monopoly gives no options for villagers to choose a better price or service from competing traders.

As the concerned policy is actively explained by district staff it has created an uneasy relationship with villagers. This has been also hindering this exercise which attempted to identify appropriate interventions to help villagers overcome their concerns. District staff also explained that the only way for villagers to get more benefit is by improving their efforts to produce quality product (clean product, grading, and boiling), but so far there has been no clear support. Contracts with traders do not exist, nor are grades defined or explained to villagers, often resulting in lowered prices for villagers. Villages mentioned several times that prices never seem to have improved and quality demands are only harder to meet or becoming less transparent.

Quota system in practice

Once a company wins the quota, it needs to be aware that at various levels, different taxes and fees have to be paid, all involving additional papers to be filled in and submitted to different offices. Additional official fees also play an important role in driving the profit margins down. Eventually the price of 1 kg of paper mulberry or broom grass has to go down in order for the company to make a profit, with the villagers ending up in receiving a low price.

Quota systems should theoretically be based on wild NTFP resource estimates, but these are often not available, because no resource assessments are carried out. Taxes such as the Natural Resource tax, District Management and Export tax are supposedly to be only charged for forest products that are collected in the wild, and not for agricultural products, including NTFPs that are cultivated. According to the Forestry Law, local communities should benefit from tax exemptions when they promote NTFP plantations.

However, this is not the case in Luang Prabang where there seems to be no differentiation made between wild or domesticated products. A simple solution would be a rapid assessment in villages who claim they plant and manage paper mulberry or broom grass. District officials could quickly estimate the area and potential production of domesticated NTFPs as these are often planted nearby the villages.

The export of unprocessed NTFPs is banned in Lao PDR but since the implementation of such a ban is seen as a transformation process, the government still allows exports of raw materials through the allocation of quota. There are also certain import restrictions in place in neighbouring countries to prevent competition from Laos. However, with the establishment of the ASEAN free trade area (AFTA) in 2015, these restrictions will disappear for Laos.

5. Recommendations

In the problem analysis carried out in each village villagers mentioned a range of interventions with regard to management and marketing challenges, these are summarised in Table 10.

Table 10: Interventions proposed by villages

Main intervention	Activity	Village	NTFPs
Management	Management and development of plans/regulations of NTFP areas	All villages	Broom grass, paper mulberry, <i>peuak meuak</i> , bamboo shoots
	Training in harvest techniques, recognising desired ripeness and desired boiling time and temperature.	Houay Lek	Sugar palm fruits
	Training in planting techniques and assistance in decision making for planting in suitable areas and season.	Naming, Houay Lek, Houay Houn Noi, Pak Keng, Houa Keng	Paper mulberry, broom grass, <i>peuak meuak</i>
	Establishment plantings/gardens for individual households	Lak Ha, Phoukoun Noi, Naming, Kiew Taloum II, Houa Keng	Paper mulberry, broom grass, <i>peuak meuak</i>
	Training to combat pests (black ants)	Houay Houn Noi	Sticklac
	Barbed wire for fencing to separate cattle and NTFP crops.	Houa Keng, Pak Keng	Paper mulberry

Marketing	Discussions with traders to negotiate, guarantee prices and quality standards before planting season.	Houay Lek, Houay Houn Noi, Houa Keng, Pak Keng	Broom grass, Paper mulberry, Sticklac
	Unit establishment at village level to oversee sales between villagers and traders.	Houay Lek, Houay Houn Noi	Broom grass, Paper mulberry
	Improve NTFP production and quality to ensure good prices.	Phoukoun Noi, Houay Lek, Naming, Kiew Taloum II, Houay Houn Noi	Broom grass, Paper mulberry

In the table 11 the NAFReC/SNV team makes further recommendations per district with regard to selected products.

Table 11: Summary of recommendations of the NAFReC/SNV team

District and selected NTFPs	Recommended support				
	Establishment of village groups	Development of agro forestry a/o household gardens	Development of management/harvest regulations	Discussions between traders and villages	Implement market survey
Phoukoun (broom grass, <i>peuak meuak</i>)	√	√	√		
Xieng Ngeun (broom grass, paper mulberry)		√	√		
Ngoi (broom grass, paper mulberry, sugar palm fruits, <i>peuak meuak</i> , sticklac, bamboo grubs)		√		√	√
Pakxeng (broom grass, paper mulberry, <i>peuak meuak</i> , sugar palm fruits)	√			√	

* *Paper mulberry planting in Phoukoun district is not recommended due to slow development on dry soils, broom grass is very suitable here.*

** *Management improvement for Banana flower in Xieng Nguen district may not be worthwhile as of its low price.*

5.1 Establishment of management/production/processing/marketing groups

From the perspective of NAFReC/SNV some of the wishes of villagers may have to come through capacity building of village leadership rather than through physical support. This is the case for land use conflicts and the demand for barbed wire. Internal village conflicts could be settled through a series of meetings facilitated by the project and district offices in which in-depth discussion take place discussing further the constraints and looking for long term solutions. Higher level of responsibility is crucial to overcome these and other challenges villagers face. This is in line with a conclusion drawn in a previous SNV training held in early 2006. Then it was proposed to organise and build village groups as well as action plan development with villages. Both management/producer and processing/marketing groups need to be set up and developed. Typical roles of such groups should be to zone natural areas and develop village regulations. Examples are the allocation of cattle zones and paper mulberry and broom grass gardens within village boundaries. This is a good starting point for village

institution building as positive effects (no damage to crops, higher incomes, building of trust). The same concept could be extended to forest resources and other NTFPs. Building village groups is a challenging target. In Ngoi district for instance village groups have been abandoned due to low levels of trust between villagers. The same has been noticed elsewhere with credit groups, which after a while are dissolved when one of their members mismanaged funds. This shows that it is crucial to gradually build up a group of people, build their trust in each other and provide members with extensive support before they are able to work on their own. For the paragraphs 5.2-5.4 (domestication, management, processing) recommendations given should be consulted together with annex 3, which covers reviewed literature and experiences on the current state of knowledge.

5.2 Establishment of Agroforestry/Homegardens

What is very positive from the assessments in all villages is that local people are highly interested in improving the management of their resources and to start/improve household gardens including a range of NTFPs. Such gardens or agro forestry plots could also take advantage of additional crops, such as fruit trees, medicinal plants, etc. The project should take advantage of this interest to manage paper mulberry, broom grass, sugar palm fruits and bamboo in a more intensive way, while maintaining and protecting the forest cover. This could include enrichment plantings in natural areas managed by the community. Site and plant selection should be done by the villagers, in close co-operation with the project and DAFO. Agro forest gardens could be established in individual household plots or in village community forests. This requires the establishment of NTFP nurseries, which should be developed and managed by interested people/producer village groups. Broom grass and paper mulberry are well managed in gardens by many families and this should be taken advantage of as to develop this system on a larger scale. Especially Xieng Nguen district is suitable for paper mulberry up scaling with regard to site/soil, close by markets and relative ease of transport.

5.3 Development of sustainable management and harvesting techniques

The DAFO extension services are advised to raise awareness for sustainable management at village level. Support is requested in the development and improvement of harvest techniques of paper mulberry, broom grass, *peuak meuak*, sugar palm fruits and bamboo (shoots). Some expertise on sustainable management techniques is present with knowledgeable villagers, experts at NAFReC as well as other stakeholders (see paragraph 5.7). However, responsibility for the development of harvest regulations need to be part of building within village groups.

5.4 Processing development

Marketing groups as developed and described in paragraph 5.1 would be able to negotiate better prices, supervise quality, undertake processing such as better drying, sorting and grading, bulk products and transport these. Examples are: boiling of sugar palm fruits, cleaning of broom grass, boiling of paper mulberry bark. This should have a high priority as this is often stressed by traders, who could be involved in such activities. Some groups could even focus on processing raw materials into final products, such as making brooms.

5.5 Marketing development

A kick off workshop is proposed to have discussions between traders and villagers (stakeholder meetings) in order to build understanding and eventually overcome differences mentioned in this report, mainly with regard to price and quality of produce.

Important for facilitators is to remain impartial and aim to a mutual understanding in a series of meetings, not just a one of event. The creating of better relationships, open discussions from all parties involved will ease agreements and save district staff much time and effort later. Important to realise is that parties involved may initially not be ready to engage in a two way negotiation, as this is a rare skill. Best is to create a positive atmosphere in which results can be booked. At first this can be done at village level, but should be scaled up to “*kum ban*” level as a forum of discussion as well as an opportunity for villagers and traders to discuss prices, quality and a stepping stone to bulk products. SADU has shown that such “*kum ban*” meetings can eventually work as a market information system (MIS) forum in which price transparency is promoted across the value chain for the most important NTFPs and agricultural products.

This activity is considered as crucial for overall success!

5.6 Discussing the quota system and other policy issues

It is essential to engage in discussions with district leaders on the ineffectiveness of the quota and bidding system and the negative effects these have on village (and district) economy, natural resources and traders. Support is thereby required to districts to develop a quota system for NTFPs that is based on the actual abundance and status of NTFPs rather than on the traders planning only. Resource assessments and harvest guidelines of the most important NTFPs need to be developed in collaboration of village resource management groups. NAFReC should be involved in formulating criteria for the assessment. An assessment of domesticated NTFPs planted nearby villages should be a relatively simple exercise for which tax exemption should be sought for.

5.7 Collaboration

To save resources in intervening in management and marketing developments it would be wise to make use of traders, existing companies and projects that are also involved in this. Besides NAFReC and SNV other institutions are of interest in Luang Prabang:

- Petrama a agribusiness buying and processing agricultural corps and NTFPs,
- SADU, CIAT project already working with NAFREC, DAFO Xieng Nguen, DAFO Pakxeng, PAFO Luang Prabang, Forcom and SNV. Currently activities are:
 - boiling of paper mulberry bark at village level as to increase the price to 4,000 kip/kg
 - oven drying as part of post harvesting added value
 - assessing opportunities for export and domestic market for processing
 - researching secondary benefits (i.e. leaf fodder)
 - developing new integrated production models.

In 2005 Helberg mentioned that for Sayaboury province processing technologies which could scale up the income generation from NTFP are:

- effective drying ovens for products
- threshing machines for products such as broom grass
- milling machines for *peuak meuak* bark (some experience in Oudomxay, by OCISP)
- pulping machines for paper mulberry bark
- portable presses to press sugar palm endosperms out of the fruits
- cool and clean storage sheds in all zones for products like sugar palm fruits

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5.8 Value Chain Analysis

For World Vision to have more impact and to tackle poverty better SNV/NAFReC would further like to recommend expanding the previous assessment conducted in the 4 districts towards other districts and other stakeholders in the NTFP trade.

This means that now the views of villagers have been collected it is important to talk also to the other stakeholders in the NTFP value chain, such as the traders, market people, factories and policy makers.

A value chain study and subsequently development looks at a particular commodity starting from the production side to processing and marketing. Such a study covers the roles, organisation, coordination, power, inefficiencies (potential cost reductions), ineffectiveness (potential increase customer's satisfaction) and strategies of the various stakeholders while bringing a raw product to the retail of the final product. Outputs of such a value chain analysis would be the identification of potential intervention activities and approaches benefiting all stakeholders active in the chain.

Eventually the aim is to transfer at least some of the processing steps and hence value adding to the poor (and other chain stakeholders) and to establish more direct links between the producers and the consumers at the end of the value chain.

In the assessment carried out in the 8 villages it became clear that besides the uncertainty of price and quality standards, villagers and district staff was unsure what the products were used for. Sticklac and *peuak meuak* were the NTFPs which held the darkest secrets with regards to use. Improved knowledge of NTFP use, market demand and quality standards could benefit villagers by adding value themselves, rather than further in the chain.

A market survey, including identifying other selling points, would benefit sticklac cultivators, which area is now expanding now over 200 ha. Currently the buying behaviour of many (Chinese) traders is unpredictable and the market now well understood.

5.9 Final comments

1. For a final choice of NTFP development it is important for the project to remember its priority target groups, i.e. the poor or women.
2. Phoukoun district is strategic for trade in northern Laos. It is situated between Luang Prabang province with access to Thai and Chinese markets, Xieng Khouang province with access to Vietnam and Vientiane province with access to Thailand. This puts a burden on the natural resources and the NTFP team urges to ensure a balance between trade and environment by conserving quality natural resources still available or by incorporating management interventions in a variety of economic developments, such as livestock raising.
3. Repeating the NTFP assessment for all villages supported by World Vision while considering a range of NTFPs is recommended. So far only villages were visited which had reasonable good access to roads and markets. In more remote villagers the socio-economic and environmental situation could vary as will the marketability of products.

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Annex 1: List of NTFPs discussed in 8 villages

No	Local Name (Lao)	Local Name (phonetic)	Scientific Name	Family	Type	Use
1.	ຢານາງ	Nha nang	Tiliacora triandra	Menispermaceae	Vegetable/spice	Food
2.	ກົກຈູງ	Khok jiang			?	Food
3.	ຄັນຄາກ	Khan khaak			?	Food
4.	ຄວກ	Khouak			?	Food
5.	ບອນໝາມ	Bon man	Aglaonema modestum?	Araceae	Tuber?	Food
6.	ເຈຍ	Yeejah	Bat		Animal	Food
7.	ກຸງ	Kung	Shrimp		Animal	Food
8.	ກົບ	Kob	Frog		Animal	Food, sale
9.	ຂຽດ	Kiat	Frog?		Animal	Food, sale
10.	ຕຸ້ນ	Tun	Mole		Animal	Food, sale
11.	ນົກ	Nok	Bird		Animal	Food, sale
12.	ປູ ແປງ	Puu peng	Crab		Animal	Food, sale
13.	ປາ	Paa	fish		Animal	Food, sale
14.	ຫອຍຜາ	Hoi	Shell fish		Animal	Food, sale
15.	ອິງ	Eung			Animal	Food
16.	ອັນ	Ohn			Animal	Food, sale
17.	ຮອກ	Hok	Squirrel		Animal	Food
18.	ໄກ່ປ່າ	Khai pa	Wild chicken		Animal	Food
19.	ໝູ	Nuu	Rat		Animal	Food, sale
20.	ນ້ອງໄກ່	Nong kgai			Animal	Food
21.	ເທົາ	Tao	Turtle		Animal	Food
22.	ໂຕເຜິ້ງ	Toh pheung	Honey bee		Animal	Food
23.	ຕໍ່	Toh	Wasp		Animal	Food
24.	ແລນ	Len			Animal	Food
25.	ຈັກຈັນ	Chakchan			Animal	Food
26.	ເຄື່ອງສອ້ນ	Kheuang lon			?	Food

27.	ຕົກແຕນ	Tak ten	Grasshopper		Animal (insect)	Food
28.	ແມງກອກ	Maeng khok			Animal (insect)	Food
29.	ໝູ່ປ່າ	Muu pa	Wild pig		Animal	Food, sale
30.	ໜໍ່ຊາງ / ໄມ້ຊາງ	Noh sang / mai sang	Dendrocalamus brandisii	Graminae, Bambusoideae	Bamboo shoots, stem	Food, sale, own use
31.	ໜໍ່ບົງ / ໄມ້ບົງ	Noh bong / mai bong	Bambusa tulda	Graminae, Bambusoideae	Bamboo shoots, stem	Food, sale, own use
32.	ໜໍ່ຫົກ / ໄມ້ຫົກ	Noh hok / mai hok	Dendrocalamus hamiltonii	Graminae, Bambusoideae	Bamboo shoots, stem	Food, sale, own use
33.	ໜໍ່ໄລ່	Noh lai		Graminae, Bambusoideae	Bamboo shoots	Food, own use
34.	ໜໍ່ບຸ່ນ	Noh bun / mai bun		Arecaceae, Palmae	Rattan shoots	Food
35.	ໜໍ່ລັນ / ໄມ້ລັນ	Noh lan / mai lan		Graminae, Bambusoideae	Bamboo shoots, stem	Food, sale, own use
36.	ໜໍ່ຂົມ / ໄມ້ຂົມ	Noh khom / mai khom	Indosasa sinica	Graminae, Bambusoideae	Bamboo shoots, stem	Food, sale, own use
37.	ດອກຂ່າປ່າ	Dok kha pa			Flower	Food
38.	ດອກບານ	Dok ban			Flower	Food
39.	ດອກແຄ້ປ່າ	Dok khe pa	Markhamia stipulata	Bignoniaceae	Flower	Food
40.	ໝາກຕາວ / ໜໍ່ຕາວ	Mak tao / noh tao	Arenga westerhoutii	Arecaceae, Palmae	Fruit, shoot	Food, sale
41.	ໝາກແຄ້ງພ້າ	Mak kheng fa			Fruit	Food, sale
42.	ໝາກແຄ້ນ	Mak khen	Flacourtia indica?	Flacourtiaceae	Fruit	Food
43.	ໝາກກໍ່	Mak ko	Castanopsis spp.		Fruit	Food, sale
44.	ໝາກກອກ	Mak khok	Spondias pinnata	Anacardiaceae	Fruit	Food, sale
45.	ໝາກລິນໄມ້	Mak linmai	Oroxylum indicum	Bignoniaceae	Fruit	Food, sale
46.	ໝາກວ່າ	Mak wa	Eugenia sp		Fruit	Food
47.	ໝາກສ້ານ	Mak saam			Fruit	Food
48.	ໝາກແຂ່ນ	Mak khen	Zanthoxylum rhetsa		Fruit	Food, sale
49.	ໝາກແຄງຂົມ	Mak kheng khom	Dialium ?	Leguminosae, Caesalpinioideae	Fruit	Food
50.	ໝາກແຟນ	Mak fen	Protium serratum		Fruit	Food, sale
51.	ໝາກໄຟ	Mak fai	Baccaurea ramiflora	Euphorbiaceae	Fruit	Food, sale
52.	ໝາກມ່ວງປ່າ	Mak mouang pa	Wild mango	Mangifera	Fruit	Food
53.	ເັດຂາວ	Het khao	Lentinus spp	Polyporaceae	Mushroom	Food
54.	ເັດຄົນ	Het khon	Lentinus spp	Polyporaceae	Mushroom	Food, sale
55.	ເັດຕາບ	Het tab	Termitocytes spp.	Amanitaceae	Mushroom	Food, sale

56.	ເັດບີ້	Het bee	Schizophyllum commune	Schizophyllaceae	Mushroom	Food, sale
57.	ເັດບົດ	Het bot	Lentinus polychrous	Polyporaceae	Mushroom	Food
58.	ເັດປວກ	Het pouak	Termitocytes robustus	Amanitaceae	Mushroom	Food, sale
59.	ເັດສະນຸ່ນ	Het sanun	Auricularia spp	Auriculariaceae	Mushroom	Food, sale
60.	ເັດຊາງ	Het sang			Mushroom	Food, sale
61.	ເັດເພາະ	Het poh	Astraeus	Sclerodermataceae	Mushroom	Food, sale
62.	ເັດໂຄກ	Het khoke			Mushroom	Food, sale
63.	ເັດໜວດ	Het nuad			Mushroom	Food, sale
64.	ເັດໂຄງ	Het khong			Mushroom	Food
65.	ໜໍ່ຫວາຍ / ເຄືອຫວາຍ	Noh wai / kheua wai	Calamus sp.	Arecaceae, Palmae	Rattan shoot, stem	Food, own use
66.	ໜໍ່ຫວາຍຂົມ	Noh wai khom	Calamus viminalis	Arecaceae, Palmae	Rattan shoots	Food
67.	ໄຄ	Kgai	Chlorophyta spirogyra (Riverweed)		River weed	Food
68.	ສະຄ່ານ	Sakhan	Piper ribesioides	Piperaceae	Spice	Food
69.	ບອນ	Bon	Aglaonema modestum?		Stem bulb	Food
70.	ຜັກກາດຮອງ	Phak kaat hong	Nasturtium indicum	Cruciferae	Vegetable	Food
71.	ຜັກກູດງ້ອງ	Phak kut gnong	Diplazium sp	Athyriaceae (Pteridophytes)	Vegetable	Food
72.	ຜັກນາງເລີດ	Phak nagleuk			Vegetable	Food
73.	ຜັກກູດນາມ	Phak kut nam	Diplazium sp	Athyriaceae (Pteridophytes)	Vegetable	Food
74.	ຜັກກູດໄຮ່	Phak kut hai	Diplazium sp	Athyriaceae (Pteridophytes)	Vegetable	Food, sale
75.	ຜັກຮາດ	Phak haat			Vegetable	Food
76.	ຜັກຫວານ	Phak van	Melientha suavis	Opiliaceae	Vegetable	Food, sale
77.	ຜັກຫໍ່ຍາເຮືອບິນ	Phak nha heua bin			Vegetable	Food
78.	ຜັກເຂົາ	Phak khao			Vegetable	Food
79.	ຜັກແຕກ	Phak tek			Vegetable	Food
80.	ຜັກນອດ	Phak nod	Passiflora foetita	Passifloraceae	Vegetable	Food, sale
81.	ຜັກຮິນ	Phak heun			Vegetable	Food
82.	ຜັກກາດນາ	Phak kaat na	Acmella oleracea/ Brassica sp.	Compositae / Cruciteerae	Vegetable	Food
83.	ຜັກກ້ານຖິນ	Phak kaan tin			Vegetable	Food
84.	ຜັກຕົບ	Phak tob			Vegetable	Food

85.	ຜັກຫົມໜາມ	Phak manam			Vegetable	Food
86.	ຜັກອີເລັດ	Phak ileut	Piper lolot	Piperaceae	Vegetable	Food
87.	ຜັກຮາກ	Phak haak			Vegetable	Food
88.	ຜັກຮາດຮິນ	Phak haat heun			Vegetable	Food
89.	ຜັກຕຳລິງ	Phak tam ling			Vegetable	Food
90.	ຜັກກັນຖິນ	Phak kan theun			Vegetable	Food
91.	ຜັກເນົາ	Phak nao	Acacia pennata	Leguminosae, Mimosoideae	Vegetable	Food, sale
92.	ຜັກໄຮ່	Phak hai			Vegetable	Food
93.	ຜັກໜອກ	Phak nok	Centella asiatica	Umbelliferae	Vegetable	Food
94.	ຜັກໝອກ	Phak mok			Vegetable	Food
95.	ຮາດຮິນ	Haat hin			?	Food
96.	ຜັກກູ່ມ	Phak kum			Vegetable	Food
97.	ຜັກຫົມ	Phak hom			Vegetable	Food
98.	ຜັກແວນ	Phak waen			Vegetable	Food
99.	ໃບບອນ	Bai bon	Aglaonema modestum?	Araceae	Vegetable	Food
100.	ໝາກປີ່ປ່າ	Mak pee pa	Musa spp	Graminae	Vegetable	Food, sale
101.	ຈີນາຍ	Jinai			?	Food, sale
102.	ໂຕແມ້	Toh meh	Omphisa fuscidentalis (Bamboo grub)		Animal	Food, sale
103.	ຫົວຂາ	Houa kha	Alpinia spp.	Zingiberaceae	Bulb	Food, sale
104.	ເປືອກເມືອກ	<i>Peuak meuak</i>	Boehmeria malabarica	Urticaceae	Fibre	Sale
105.	ແຂມ	<i>Khem</i>	Thysanolaena latifolia	Graminae	Fibre	Sale, own use
106.	ປໍສາ / ດອກປໍສາ	<i>Posa / dok posa</i>	Broussonetia papyrifera	Moraceae	Fibre, flower	Sale, food
107.	ຫຍ້າຄາ	Nha kha	Imperata cylindrica	Graminae	Fibre	Sale, own use
108.	ໃບຕອງປ່າ	Bai thong pa			Fibre	Sale, own use
109.	ໝາກຄໍ້	Mak kho	Schleichera oleosa	Sapindaceae	Fruit	Food, sale
110.	ໝາກຄົວະ	Mak kuah	Solanum sp.?	Solanaceae	Fruit	Food, sale
111.	ເຫັກເຫືອກ	Het leauk			Mushroom	Food, sale
112.	ເຫັດຫຼາດ	Het lad			Mushroom	Food, sale
113.	ເຫັດໂຄກ	Het khok			Mushroom	Food, sale

114.	ໄມ້ຈິງ	Mai jing			Wood	Sale, own use
115.	ໄມ້ເຮ້ຍ	Mai hia	Schizostachyum blumei	Graminae, Bambusoideae	Bamboo stem	Own use
116.	ໄມ້ແຮ້	Mai heh	Dinochloa scandense	Graminae, Bambusoideae	Bamboo stem	Own use
117.	ພືນ	Fuen	Fuelwood		Fuel	Own use
118.	ຫຍ້າ	Nha	Medicine		Medicine	Own use
119.	ຂີ້ຄັງ	Khi kang	Laccifer lacca (Sticklac)		Resin	Own use
120.	ຂີ້ຊີ	Kisi	Shorea spp.	Dipterocarpaceae	Resin	Own use
121.	ໄມ້ກໍ່ແດງ	Mai ko deng	Castanopsis hystrix	Fagaceae	Wood	Own use
122.	ໄມ້ປໍ	Mai po	Sterculia sp	Sterculiaceae	Fibre	Own use
123.	ໄມ້ໄດ	Mai dai			Wood	Own use
124.	ໄມ້ຫົວ	Mai houa			Wood	Own use
125.	ກົກຕຸງງ	Khok tiang			Wood	Own use
126.	ຫຍ້າອູບທອງ	Yha oubthong			?	Food/medicine

Annex 2: Analysed data used for selection of NTFPs.

NTFP	Variation kip/kg	Total tones	Total income 8 villages (Mill. Kip)	Households involved (amount, %)	Villages (amount)	Women involvement (%)	Income/person year (kip)	Return to labour input per day (kip)	Labour months
Broom grass	2,500-3,300	60.5	174	435 (61)	8	70	63,492	705	3
Paper mulberry	2,500-3,500	36.7	105.5	295 (38)	8	50	56,739	315	6
Bamboo grubs	30,000	1.6	62	92 (13)	3	0	103,865	3,462	1
Wild fish		-	43	110	2	0	62,049	172	12
Fuelwood	1,750	20	35	25	2	50	222,222	617	12
Bambooshoots (Hok)	500-1,000	47.1	27.6	50 (6)	5	70	87,460	972	3
Sugar palm fruits	2,000-3,000	10	27.5	60 (9)	4	0	72,751	808	3
Boehmeria malabarica	3,500-5,000	4.7	21	107 (15)	5	50	31,375	87	12
Bamboo shoots (Lan)	1,000-2,000	11	20	83 (18)	2	70	38,248	425	3
Sticklac	13,000-15,000	1.6	22.8	156 (13)	2	50	23,199	64	12
Wild birds		-	10	35 (10)	1	0	45,351	126	12
Wild banana flower	500-1,000	5.4	8.2	107 (14)	3	50	12,164	34	12
Bamboo shoots (Sang)	1,000	5	8	90 (10)	3	70	14,109	157	3

An overview of the status of NTFPs in the 4 districts (8 villages). Broom grass and Paper mulberry are clear winners. Interesting NTFPs are bamboo grubs which fetch very good prices, give good return to labour in a short season, but are challenging to manage. More in-depth research (interviews, value chain analysis) are required to make certain that the right products are selected, especially if you want to focus on 1-2 only. In order to ensure that the poorest and women can benefit the most, many people are reached and products sustainable managed, relative easy ability to add value or provide for new skills.

Annex 3: State of knowledge of selected products

NTFP	Scientific name	Marketing	Management
Broom grass (khem)	<i>Thysanolaena maxima</i>	<p>Processing: Flowering stems are sun dried for 3-5 days. Flowers are removed by threshing and bundled for storage. Stems are bound together to make the broom handles, which may also sometimes be made from thin bamboo canes. 1 kg of flowering grass produces two brooms. One person can make 5-10 brooms in a day and these can be stored for many years.</p> <p>Quality criteria: Long, full flowers are preferred. They should be clean, unbroken and not damaged by insects.</p> <p>Marketing: Most brooms made in Laos are sold locally, with the price varying according to location and quality. Local producers sell the grass for \$0.06 per kg and brooms at \$0.25 each. The broom price rises to \$0.60 at provincial markets. Broom grass is the second largest NTFP export from Laos, at 200 tonnes per year in 2000. Broom making seems to be a sustainable business, with brooms a common household item even in Bangkok. Thai factories buy the grass to make brooms for export to Japan. Adding value for the Thai market failed with the Thai market not accepting the concept and putting import duties for processed products. The new variety of broom grass is selling for \$1 per kg. If a yield of just 2 tonnes per ha is assumed, this variety could generate \$1,700 per ha, more than rice.</p>	<p>Harvesting: The large inflorescences of plants over 2 years old are cut at their maximum length. Flowering stems should be harvested within a month, before they become too old.</p> <p>Yields, densities: 50 clumps per ha of naturally-occurring grass can be found in Oudomxay. A new variety of broom grass gives 30% male and 70% female stems on irrigated land, but a very low rate of female stems on rain-fed uplands.</p> <p>Sustainability: Harvesting is destructive to the plant, but large regeneration makes up for that. It takes one year to grow. Very commonly found.</p> <p>Propagation: by rooting stems, rootstocks and seeds. Plantings from root cuttings are spaced in holes 40 cm deep and 1 m-2 m. apart. It is easy to plant but is best if propagated naturally. Seed can be planted in February and stems cut in April, and again in June (every 45 days). A strong fence is needed to keep out cattle, which will eat the grass. It takes 3-4 years for the plants to establish, with annual weeding and cleaning required. Flowering starts after 3 years. Burning is required for next year's harvests.</p>
Paper mulberry (Posa)	<i>Broussonetia papyrifera</i>	<p>Processing: Women soak bark in water to ease cleaning and to remove the black outer bark with a bush knife. The remaining yellow-white bark is dried in the sun to reduce the chance of mould, and is later boiled in water. Boiled bark is pounded into pulp by hand and cleaned in water. It is then spread on mosquito wire or rough cotton mesh, framed in bamboo frames, and dried in the sun. Dry paper sheets are taken from the frames and polished with a stone. Removing and cleaning the bark is a very laborious process, but techniques such as boiling fresh stems before stripping the bark and machines for stripping and cleaning can enhance both productivity and the quality of the end product.</p> <p>Quality criteria: Thanks to a lack of lignines <i>po sa</i> paper has a long life. The best quality bark comes from young stems (one to three years) of DBH 2.5-4 cm, or from branches 6-12 months old. Grade A paper has no woody impurities. It is white in colour,</p>	<p>Harvesting: Stems 6-24 months old are cut at 10-40 cm above the ground to ensure resprouting of new stems. Bark is peeled from the cut stems to obtain a single long strip. Stems can also be stripped of bark before cutting, and also from branches at 1 year and after that every 6-9 months. <i>Posa</i> resprouts quickly and can be cut again the following year. Trees older than 3 years are not suitable to harvest bark from.</p> <p>Conservation status: Natural trees are becoming rare and give low quality bark. Conservation of wild trees needs to be promoted.</p> <p>Propagation: Mainly planted as a permanent crop in association with fruit, teak trees or coffee. <i>Po sa</i> is usually propagated by root-suckers and cuttings, but can also be planted by seed. Commonly cultivated in Sayaboury and Luang Phabang provinces, trees are very easy to establish, grow well almost anywhere, and can be harvested within 15 months of planting. They regenerate easily through coppicing and the production of root suckers. Scraping off</p>

		<p>fine-textured and clean. Proper drying of the bark is essential to achieve good quality and prices. Grade B is derived from thicker stems and is not so fine in texture, while grade C is of poorer quality, often mouldy and with traces of the outer bark. The first processing steps are time-consuming especially if grade A bark is produced.</p> <p>Villagers therefore mainly produce grade B from the thicker stems, because it is easier and faster to process. One person can produce a maximum of 5 kg of grade B mulberry bark per day.</p> <p>Marketing: raw bark 2,000–3,500 kip/kg at the farm gate and 3,500–4,700 kip/kg at the Thai border. If bark will be boiled benefit is 4,000–4,700 kip/kg. Production of paper earns \$0.93/man-day from 2 kg of bark, as opposed to \$0.46 for direct sale of the bark. Currently 10,000 ton of raw paper mulberry bark goes to Thailand.</p> <p>High Thai import taxes and a lack of value-adding processing are currently restricting further development. <i>Po sa</i> has a higher economic yield per ha than rice and maize (4 to 2 times).</p>	<p>soil from the roots to let in sunlight induces sucker growth. Trees are best planted between May and October on moist sandy soil at recommended distances of 1–2 m x 1–2 m (5,000–5,440 kg fry bark/ha). On fallow land this plant adds organic matter and improves the soil, and also controls weeds. Planting along roads makes transport of the fibre easier.</p> <p>Fences are needed to keep cattle out which eat and damage the trees.</p>
Peuak meuak	<i>Boehmeria malabarica</i>	<p>Processing: bark is stripped from the stem and dried in the sun for one week in small bundles, or is broken into small pieces to facilitate packing and transportation. The bark must be stored in dry, well-ventilated conditions to avoid fungus attack. No further processing takes place in Laos, but in China the bark is crushed or milled into a fine powder for sale to manufacturers of incense, who boil it to make a glue. To make incense sticks, fragrant substances are mixed with sawdust and applied to the sticks with glue made from <i>peuak meuak</i>. The equipment for milling <i>peuak meuak</i> costs around US\$1,250.</p> <p>Quality criteria: Sometimes <i>peuak meuak</i> supplies from farmers are not properly dried, resulting in lower prices. It is said that smaller stems do not provide the same adhesive qualities as bark stripped from older/thicker stems.</p> <p>Marketing: Exported to China and Thailand and a significant northern Laos's NTFP export product. Villagers can currently sell dried bark at US\$/kg 1.6–6.5. <i>Peuak meuak</i> is exported in the dry season, when many traders come to the Lao-Chinese border to buy it. Most is shipped to incense factories in Guangdong, Guanxi, Fujian and Hong Kong. It is also being shipped to Kunming, but it is not known if the buyers there manufacture incense or only mill the</p>	<p>Harvesting: The whole plant, including the roots, is harvested for its bark and is cut into sections of 0.5–1 m to facilitate transport.</p> <p>Sustainability: harvesting is destructive. Villagers cut stems or strip all bark from stems or roots. If some above-ground parts are left intact and plants are not uprooted, regeneration is possible from the roots of the parent clump. Planting will ensure regeneration and sustainability.</p> <p>Propagation: Attempts to propagate from seed have been unsuccessful, as seeds are very small and difficult to collect. However, it seems that under natural conditions it grows better from seed than regeneration from existing clumps. Nurseries are now mainly using planting material from separated rootstock and stem cuttings. Seedlings should be planted in gaps of 2 m x 3 m in open forest or rice or corn fields near streams. Dark and moist soil of fine to medium texture is required. In Viengkham district of Luang Phabang, people partly bury 50 cm-long branches in the soil, leaving two sides of the branch above ground. After six months about three shoots emerge on either side. Two other planting methods also seem to be working well:</p> <ol style="list-style-type: none"> 1. In open fallow vegetation it grows like a shrub with more but shorter stems or branches and smaller leaves. However leaf-eating caterpillar damage the leaves.

		<p>bark before shipping to incense factories in the east.</p> <p>Main profits are made in China. The absence of information on marketing, processing facilities and Chinese language skills prevent Lao people from receiving a better share.</p> <p>Chinese importers never receive sufficient supplies and would like production to increase. There is a need for better understanding of the demand for <i>peuak meuak</i> in China.</p>	<p>2. When grown under shade of 30-50% it climbs rapidly into trees (sometimes at 1.5 m per month for the first 4 months), and produces larger and darker leaves lower at the plant with smaller lighter leaves higher up. Climbing plants have thicker and longer branches, stems and roots. Good experiences exist in Phongsali with planting it under paper mulberry trees.</p> <p>Harvesting occurs after 3 years. Caterpillar damages the leaves and may slow down growth but does not seem to kill the plant. Caterpillars and leaves holding their eggs should be removed and destroyed by burning. Fencing is required to keep cattle out. Currently project plantations cover a little over 700 ha in Oudomxay and over 100 ha in Phongsali. Some are also reported in Luang Namtha.</p>
<p>Sugar palm fruit (Mak tao)</p>	<p><i>Arenga westerhoutii</i></p>	<p>Processing: Seed is extracted by splitting the fruit, which is done in the forest to ease transport. Also, extraction should be performed in the shade to preserve quality. The seeds are then cooked and can be kept in bags for 18-20 days, provided moisture and sunlight are avoided. A company in Vientiane is now canning the seeds.</p> <p>Quality criteria: Slightly immature fruits produce the best seeds. Grade A seed which is white is sold at 2,000 kip/kg. Sometimes the seeds turn reddish after boiling and it is not clear why this is so. It may be due to premature or late harvest, prolonged or insufficient boiling. These red seeds are sold at 1,000 kip/kg, and sometimes traders buy the black grade for 500 kip/kg as these can be bleached by the processor. The determination of the ideal ripeness stage and harvest period is still not well known. Traders also mention that the boiling procedure needs improvement.</p> <p>Marketing: Most boiled fruit is exported to Thailand to make sweets. It is assumed that 90% of the product consumed in Thailand is derived from Laos. Other Lao Provinces include: Xieng Khouang Sayabouri, Oudomxay, Bokeo and Khammouan. The total export from Laos to Thailand may be as high as 5,000 ton per year. The biggest buyer in Thailand is Lampang Foods which buys 5,000 tons/year from farmers at about US\$/kg 0.3. The price in Chiang Rai, is US\$/kg 0.4. After processing in Thailand the value jumps to US\$ 2 (possibly a retail price). Export of canned fruit to Thailand is limited by high import tax for processed products, not applied to raw fruit.</p>	<p>Harvesting: In Laos the seeds are harvested by climbing trees and cutting down fruit clusters. Ripe fruits have white seeds inside, if too much moist drips out of a cut fruit, it is not suitable for harvesting yet. The hair on these clusters should be avoided as it can cause itchiness. The top shoots are often harvested for food which kills the tree.</p> <p>Yields, densities: Within 50 m of streams, densities of 120 mature trees/ha are common. Trees produce seed after 13 years, after which they fruits again every two years. After 3-4 harvests a tree dies. One hectare could yield about 12,000-21,000 kg of seed, equivalent at current prices to US\$/ha 3,300-5,800.</p> <p>Sustainability: Harvesting techniques should avoid stem damage. Often, less is harvested than is possible. Shoot collection kills the plant, and as the regeneration rate is low, this should be regulated to ensure enough mature trees are left.</p> <p>Conservation status: Natural stands along streams are being threatened by agricultural clearance. Protected areas could be promoted around streams, while individual tree ownership rights might help to protect stands.</p> <p>Propagation: All fruit harvested in Laos comes from wild trees. For domestication, mature fruit is cleaned before planting and germination lasts three weeks, with a 75% survival rate. Spacing of 6 m x 9 m under the shade of other plants is recommended in order to maintain soil moisture. Although cultivation is possible, the time between planting and harvesting is often too long for most villagers.</p>

<p>Bamboo grubs (worms, caterpillars) (Toh meh, duang meh)</p>	<p><i>Omphisa fuscidentalis</i></p>	<p>The caterpillars die quickly once the internode is opened, so collectors harvest the entire internode. Caterpillars can be preserved by boiling them for a short time. It can be kept for 2-3 year by freezing. They are more often fried in oil and sold on markets for up to 15 US\$ per kilo, in Lao 4 US\$.</p> <p>Over the internet Thai Cooked Bamboo Worms in Cans (30 gram) are sold at 4 US\$; £3.49</p>	<p>Bamboo grubs inhabits the inside of bamboo stems. It is the larva of a moth with a long larval stage lasting for 10 months, whilst its adult life as a moth is only less than a week. Once becoming a moth (August) it will fly out and try to mate immediately. When this is fulfilled the female moth will lay its eggs on the skin of a bamboo shoot, and dies. Newly hatched larvae bore a hole in a bamboo shoot to enter and feed on the inner pulp without actually doing harm to their host. After maturation in September, the larvae enter diapause (best time to eat is between November to December the time for incubating) and remain inside the internode of bamboo culm until next June when they pupate in the same internode.</p> <p>Harvesting: According to some people bamboo stems with caterpillars will have yellow leaves; they also make a characteristic noise which helps collectors know where they are. An internode may contain a thousand caterpillars, about 700-800 grams. Collection is by cutting down the bamboo.</p> <p>Sustainability: In Xieng Ngun district, forestry authorities have banned the commercial harvesting of bamboo grubs, as too much bamboo has to be cut to find the grubs. It is therefore difficult for target groups to collect bamboo grubs.</p>
<p>Sticklac, Lac</p>	<p><i>Laccifer lacca</i></p>	<p>Processing: The sticklac is dried in the sun, crushed and sieved to remove sand and dust. It is then washed to break open the encrusted insect bodies, to wash out the lac dye and twigs. Decaying bug bodies turn the water a deep red. The remaining resin is dried, winnowed and sieved to get the commercial variety of seedlac. The products prepared from sticklac after washing and melting takes the form of yellow coloured flakes, called shellac.</p> <p>Quality and value of sticklac depends very much upon host tree, climate, whether the crop is harvested before or after the emergence of the larvae and methods of drying and storage. On an average 300,000 insects produce 1 kilogram of lac resin.</p> <p>Marketing: In many provinces like Sayaboury, Louang Phabang, Houaphanh, Savannakhet unknown quantities of sticklac is produced. In a good year total production may well exceed 100 tonnes. Part of it is exported to Thailand, China and Vietnam. Currently traders pay individual cultivators 17,000 kip per kg sticklac (Phongsali), which eventually finds its way to Japan for natural dyes. For Laos better market linkages need to be developed to be</p>	<p>Harvesting: The lac covers are separated by a knife or broken off by hand from the twigs of host plants.</p> <p>Propagation: Brood lac (or mother cell, 10-30 cm long) containing the female lac insect, is tied in bundles of 2 or 3 sticks and in turn tied up to the branches of the host trees in homegardens, such as <i>Tua heh</i> or Pigeon pea (<i>Cajanus cajan</i>), <i>Mak Faen</i> (<i>Protium serratum?</i>), <i>Samsa</i> or Rain tree (<i>Samanea saman</i>), <i>Zizyphus jujuba</i>, <i>Butea monosperma</i>, <i>Schleichera oleosa</i> (<i>kho som</i>, gives finest quality of shellac), <i>Acacia catechu</i>, <i>Albizzia odoratissima</i> or <i>Ficus religiosa</i>. Care should be taken while tying the bundles so that they have contacts with the branches. The brood lac bundles should be kept on the host tree for 2-3 weeks. Female insects lay up to 100 eggs, which hatch out into larvae. These small red larvae, about 0.5 mm long, crawl out of the brood lac and settle on the twigs where they suck the sap out of the trees. On average some 250 larvae can be present per 10 cm² of twig. A secretion exuded from the larvae bodies forms hard resinous layers, giving protection from attacks by predators. In time the bodies are completely covered leaving small anal and breathing openings, causing them to resemble reptilian scales. Insects mature under this</p>

		able to profit.	protective layer, become immobile and are permanently attached to the plant. As the lac insects remain close together, lac secretion from neighbouring cells unite and form a continuous cover on the tree branch. This accumulated resin also forms a cocoon serving to incubate eggs. The life cycle of a lac insect takes about 6 months and consists of 4 stages: egg, larva, pupa and adult. Fertilised females increase in size to have room for her growing number of eggs. Lac resin is secreted faster and a continuous layer grows into one body. After 3½ months the female shrinks allowing light into the cell and lays her eggs. Her ovaries contain a crimson fluid, resembling cochineal, the colouring derived from dried bodies. After the cycle has been completed and around the time when the next generation begins to emerge, the resin encrusted branches are harvested. A portion of broodlac is retained from the previous crop to produce the new crop. After the trees have been infected with broodlac, it requires little or no attention until harvest.
Banana flower (Mak pee pa)	<i>Musa acuminata</i>	Processing: sold raw.	Harvesting: Flowers are collected year round, by cutting the flower heads. Conservation status: Local people mentioned that harvest of the resources are stable.
Noh lan bamboo shoots	<i>Sirundinaria</i> sp.	(See below at bamboo)	
Noh khom bamboo s hoots	<i>Bambusa tulda</i>	Shoots are mainly used domestically, but some fresh shoots are sold.	In its original habitat – along streams in upland/sloping land it is suitable for erosion prevention.
Noh hok bamboo s hoots	<i>Dendrocalamus hamiltonii</i>	A shoot may weigh up to 5 kg, but the average is about 2 kg. Shoots are often dried in the sun after being boiled or grilled. In some northern areas they are dried in ovens. Shoots can be preserved by drying, salting, cooking or canning. Large shoots are for local consumption and available on local markets at US\$/kg 0.05-0.3 (fresh or cooked), or US\$/kg 1-1.3 (dried).	This bamboo is often well managed through village rules, and outsiders cannot harvest shoots or culms without permission. Canes and shoots are heavily harvested, and in some areas in the centre and north of the country and is becoming rare. It is easily propagated by culms and branch cuttings and seed, and villagers grow them in their gardens or in dry evergreen forest near the village. Natural regeneration of seedlings occurs abundantly. Bamboo seedlings can be planted under existing (opened up) forest cover, but undergrowth is best cleared to stimulate growth. Planting is 2 m x 2 m or 3 m x 3 m, but after a few years some seedlings die and the spacing is more likely to be 6 m x 6 m. <i>Douang meh</i> or <i>toh meh</i> , a moth larvae that feeds on the inner pulp of the shoots and in young culms is considered a tasty food source by villagers.
Noh sang bamboo shoots	<i>Dendrocalamus brandisii</i>		One of the strongest and largest bamboos in SE Asia. In January 2007 it started to flower in Luang Prabang provinces which indicates that the whole population will die off. Flowering occurs

			<p>one per ca. 30-50 years. Villagers explained that it is important to avoid forest fires during the seeding and regeneration period for two years and after five years bamboo poles can be harvested again. Sandy soil is most appropriate, and typically domesticated in Laos, grown in home gardens as a fence after being propagated by stumps or culm cuttings.</p>
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General guidelines bamboo shoots (*noh lan, noh hok, noh khom, noh sang*)

Harvesting: Culms can be harvested after one year. One person is able to cut up to 100 stems per day. Shoots are cut when they have grown about 5-20 cm above the ground, depending on the species and processing purpose (industry requires taller shoots). As different species appear at different times, bamboo shoots are available almost year-round but the rainy season is the main period. Collecting the shoots is usually the work of women and children. A bamboo stand's yield of shoots starts to decline after five years.

Sustainability: Improved management and harvesting methods are required for both natural forest and domestication as demand will remain high. Shoots are often collected too early or in too large a quantity, endangering the production of canes.

Conservation status: Overall bamboo has been decreasing due to over harvesting in periods of gregarious flowering. Villagers claim though that there is little danger bamboo resources will be depleted as market orders are still relatively low and regeneration, either by shoots or by seed, is sufficient.

Processing: Before being used for house construction, bamboo canes need to be kept in running water for one to two weeks. This ensures that sugars, fats and oils are washed out, thereby preventing later insect attacks. Another method used by companies is by smoking. Bamboo canes used for handicrafts and household items, such as mats and walls are split, dried and roughly woven together.

Edible bamboo shoots are first peeled, then further processed by the addition of salt (*noh som*), or by being steamed/boiled (*noh at*) and then sometimes sun or oven dried (*noh heng*). These processes allow shoots to be preserved for up to a year. Canned shoots are always pre-boiled. Unprocessed shoots require careful storage as tremendous heat is generated within a shoot's apex. Storage in cool places will prevent overheating and deterioration.

Quality criteria: Young canes of less than one year are preferred. Some bamboo shoots are more bitter and less popular. Generally, younger shoots taste better and these occur deeper in the soil. Older shoots have large fibres and are tougher to chew.

Marketing and prospects: Bamboo shoots represent an expanding export market, valued annually at over US\$ 20 million in Taiwan alone. Shoot production varies by species and locality. In China, *Phyllostachys pubescens* shoots comprise 18-30% of the total annual production of c. 1 million tonnes. In Thailand, 8-15% of total shoot production comes from plantations of *Dendrocalamus asper*, with about 20% consumed fresh and 80% processed for canning. Thailand exported 31,730 tonnes of canned bamboo shoots in 1989, at a value of \$18.4 million. The bulk of the exports went to the USA and Japan. In Laos shoots may sell locally for \$/kg 0.15-0.5, depending on the season, or about \$/kg 1 when dried. The value of 2 kg of bamboo shoots is roughly equal to 1 kg of rice.

Propagation: Vegetative reproduction by rhizomes and stumps is the common method used to obtain plants. Layering and propagation through cuttings and culm cutting are also practiced. Most bamboo plantations in Laos focus on about 50 species. Propagation is also possible by seed.