WWF Greater Mekong

Lao PDR Country Programme

Sustainable Rattan Harvest and Production

Technical Report

Non Timber Forest Product inventory and value in Bolikhamsai Province, Lao PDR

by
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for a living plane

Executive summary

Forest inventories and values of Non-Timber forest products (NTFPs) were estimated around two villages in Bolikhamsai Province, Khamkeut district. The main values were as follows:

Ban Souphouan:

Value of NTFP's collected	Kip	Dollars (USD$1 = 8500kip)
Per year	140,590,000	$16,540
Per year per hectare	402,837	$47.39
Present Value per hectare (15 years, 10%)	2,603,262	$397
Value per household	2,162,923	$254

Forest area	Area (ha)	Total forest inventory value (Kip)	$USD	Inventory value per hectare (Kip)	$USD
Nong Kan	45	206,000,000	$24,235	4,600,000	$541
Phu Sangnoy	304	2,829,453,712	$332,877	9,307,414	$1,095

Ban Phontong:

Value of NTFP's collected	Kip	Dollars (USD$1 = 8500kip)
Per year	62,670,000	$7,372
Per year per hectare	172,170	$20.26
Present Value per hectare (15 years, 10%)	1,440,495	$169
Value per household	673,871	$79

Forest area	Area (ha)	Total forest inventory value (Kip)	$USD	Inventory value per hectare (Kip)	$USD
Nonggeung	154	510,737,833	$60,087	3,316,479	$390
Nongmathag	211	1,827,518,946	$215,002	8,661,227	$1,019

Introduction

Non-timber forest products (NTFPs) are an important resource for rural people in Laos, and many areas in Southeast Asia. They are used as food and medicine, sold for cash and used as building materials. The role of NTFPs in rural livelihoods has been receiving increasing attention from governments and the development community in recent years (see for example Rosales et al. 2003 and Hansen & Top 2006). The *WWF Sustainable Rattan Harvesting and Production Project* is working towards sustainable management of NTFPs in Laos, focusing on rattan. Rattan is an important NTFP in Laos, being used in handicrafts and as a food source. Canes from mature plants are woven into many products and young shoots are a traditional part of the local diet. Rattan sales account for a significant portion of cash income in rural villages throughout the Mekong region.

While the *WWF Sustainable Rattan Harvesting and Production Project* is focused on rattan, the project is assisting participating villages to formulate broader NTFP management and harvesting plans. In December 2006, the project established Village NTFP Management groups and has conducted inventories of NTFPs in over 80 ha of forest around villages
This report presents the results of NTFP inventories and interviews with NTFP collectors carried out in Kamkeut District, Bolikhamsai Province. These surveys are being used to engage with the local communities and authorities to manage forest resources sustainably. This report features estimates of the economic value of the forest resources of the survey areas.

Four forest areas were surveyed: Nong Guemh forest and Nong Kan forest near Soupphouan Village and around Phonthong Village, Nongmathag forest and Nonggeung forest. Soupphouan and Phonthong villages are resettlement villages for population affected by the Theun Hinboun Extension Project (THEP). THEP is contributing financially to these forest inventories and other resettlement activities, while WWF is providing technical and financial support. Other project partners include Dutch development agency SNV, Swedish company IKEA and the European Commission.

Methodology

Interviews with villagers and trips to local markets were used to investigate prices and collection practices related to each NTFP. In group and individual interviews, villagers were asked to estimate the quantities of NTFPs they harvested each year and from this to estimate the quantity that the village would harvest as a whole. This data has enabled basic estimates of economic benefits NTFPs bring to each village. Village volunteers, WWF and FRC staff spent 53 days surveying 349ha of forest around Soupphouan and 364ha around Phonthong. Survey areas were established in participatory mapping exercises, where sketch maps were produced showing different forest types, NTFP and rattan concentrations. Forest areas were divided up into sampling blocks between convenient natural boundaries such as roads and rivers.

In each sampling block, transects were taken with three to five people walking 2 meters apart, counting NTFP and timber species as they went. In this manner 5% of each block was surveyed, using GPS points to ensure the adequate samples had been taken. This rate was recommended in project guidelines developed by Mr Souksomphong Prixar, forestry expert from the Faculty of Forestry, National University of Laos.

Rattan plants were also noted by the length of canes or development of the plant. From these sample plot results, rough densities for each block were calculated, and an estimate of the forest inventory obtained. Price data was also used to put a financial value on the forest inventory, but, as discussed below, such figures should be treated with caution.

Conducting the inventory cost around 1,110,000 kip per day ($131). This consisted of 530,000 ($63) kip in wages and 640,000 kip ($76) in expenses including accommodation, meals and vehicle hire. For 53 days this comes to 58,830,000 kip ($6,922). At the sample rate of 5%, this results in a cost of around $10 per hectare.

	kip	US Dollars
Wages	530,000	$62
Expenses		
Vehicle hire	340,000	$40
Accomodation	80,000	$9
Meals	200,000	$24
Daily total	**1,150,000**	**$135**
Days	53	
Total expenditure	**60,950,000**	**$7,171**
Area (ha)	713	
Cost per ha (at 5% sampling rate)	**85,484**	**$10**

Limitations

Considerable differences between the contents and concentrations of adjacent blocks suggest that much variation occurs within blocks. This data represents an estimate to be used for NTFP management along with local knowledge rather than a statistically robust, scientific analysis.

Different units were sometimes used between the initial survey and that necessary for economic analysis. For example surveyors often counted number of trees, while it is the fruit or the bark of the tree that is used. For example, the bark of the tree Nyang Bong (*Persea kuzii*) is used to make incense. While forest surveyors counted the number of trees, the bark is sold by the kilo. Estimates as to how much bark an average tree would produce were obtained from villagers' estimates rather than any physical analysis. Price estimates also varied considerably. The season and the location can make a difference to prices, even between the villages and the larger market in nearby Laksao. Many NTFPs are not marketed and are difficult to price. While a price can be sometimes be inferred by asking participants how many of a marketed good they would trade for an amount of the unmarketed good, the nature of these NTFPs often don't lend themselves to barter – they may be very abundant for

a short time, making them untradeable. Some NTFPs have no demand for them in the larger towns due to lack of knowledge as to how they are used in villages, or alternative food and medicine being available. For NTFPs that were unmarketable, but considered important for quantification, a base estimate of 100-500kip (USD$0.01 - 0.06) has been used.

While the economic values discussed in this paper show that NTFPs are valuable and provide an important resource to rural people, caution should be used in discussing what NTFPs are "worth". The values presented of NTFPs in the forest do not take into account costs involved in collecting them – labour, transport, time, capital – or in preparing them for use or marketing. Estimating the value of the NTFP inventory also fails to consider what impact using/harvesting all those NTFPs might have on market prices. To get a better understanding of how much benefit NTFPs bring to local people in terms of income streams, more research on collection rates and quantities are needed. For examples and discussion of this topic, see Hansen & Top (2006), Bann (1997a) and Bann (1997b).

Despite these limitations, we hope that this information will be of use to other researchers, managers and planners. We are happy to make all our data available, much of it is in the appendices of this report. We hope that future data collection and studies will build on this information.

Results

Ban Souphouan

Ban Souphouan has 65 households and a total population of 319 people. In group and individual interviews villagers were asked how much of the main NTFP species they collected either as a household or an estimate for the village. Based on these answers, the village collects over $16,000 USD worth of NTFP products each year. While this is a broad estimate, we can safely conclude that NTFPs are an economically important part of the village's income, both through cash and village-use values. It is difficult to calculate NTFP collection values on a per hectare basis as collection costs, practices and practicalities are not considered. However, for the sake of comparison with other studies, the values here when considered over Ban Souphouan's 349ha of forest area (Nong Kan and Phu Sangnoy) arrive at $47.39 per hectare per year. Over 15 years at a 10% discount rate, this gives a net present value of $397 per hectare. This value seems broadly in line with Hansen & Top (2006), who reported around $22 per hectare and NPVs of $100 - $459 depending on forest type in four provinces in Cambodia. On a per household basis NTFP benefits are important, contributing $254 per year, or approximately $52 per person. This figure is also within the range of values found by (Hansen & Top 2006). Note that Hansen and Top's figures include fuelwood and wild meat, values not captured here.

Table 1 – Collection of NTFPs and Economic values, Ban Souphouan (top ten)

NTFP species	Quantity collected in 1 year (Kg)	Price per kilo (kip)	Economic benefit per year (kip)	value USD (1 USD = 8500 kip)	Period of collection
Mak Naeng (cardamom)	800	40,000	32,000,000	$3,765	
Bamboo shoots (various species)	5,000	5,000	25,000,000	$2,941	All year
San (Lao lady palm)	5,000	5,000	25,000,000	$2,941	All year
Mushrooms	1,000	20,000	20,000,000	$2,353	Aug-Sep
Phak van	300	25,000	7,500,000	$882	April-May
Kha (Galangal)	1,000	5,000	5,000,000	$588	All year
Wai boun (D.jenkinsiana rattan species)	4,000	1,000	4,000,000	$471	All year
Phak kout (Vegetable fern)	2,000	2,000	4,000,000	$471	All year
Wai khom (C.viminalis rattan species)	3,000	1,000	3,000,000	$353	All year
Ya houa	500	5,000	2,500,000	$294	All year
Ka don nam	500	5,000	2,500,000	$294	All year
Total displayed here			98,500,000	$15,353	
TOTAL			108,590,000	$16,540	

Forest area 1. Nong Kan

In each forest area surveyed villagers were asked which NTFP species were most important to be managed cooperatively, and what species were less in need of regulation. In relation to the forest area Nong Kan, villagers in Souphouan responded with the following species.

Table 2

Most important species for the sustainable harvesting plan	Other species that need to be managed sustainably	NTFP species that can be used without regulation	
1. C.solitarius 2. Mak Naeng (cardamom) 3. Wai boun (D.jenkinsiana rattan species) 4. Kheua haem (Berberine) 5. Nyang bong (Bong bark) also wood and timber species such as: Khedsana (agarwood), Kanyung (Dalbergia cochinchinensis), Mai du (pterocarpus macrolapus)	1. Phak van 2. San (Lao lady palm) 3. Phak samek 4. Bamboo shoots 5. Kha (Galangal) 6. Mushrooms	1. Lek sii 2. Mak houat 3. Khok ien don 4. Thond kiew 5. Khalangseum (Ziziphus attopoensis) 6. Khee men 7. Thond dok ngor 8. Khaeng kham hoy 9. Oil sam suan 10. bee daeng 11. khem daeng 12. kheua fai thong. 13. Samilax glabra.	14. Mornoy 15. Kum chaluck 16. Mai thong 17. Mai khampom 18. Mak ken 19. kheua san 20. kheua xieng plan 21. Yahoua kor 22. Kok Jio Khon 23. Thond phon men 24. Kheua mak ka don 25. Kheua khee doy.

It is interesting to note that of the 5 species that villagers listed as most important for conservation through the management plan, only *D.jenkinsiana*, a rattan species, is also listed in the top ten species bringing economic benefit to the village in table 1. This suggests that these valuable species have been over-harvested in the past, and could bring substantial economic benefit if managed more sustainably. It is also interesting to note that the most important species in table two are not food species, while in table one, food species take up the top five positions.

Nong Kan forest inventory

Nong Kan was the first area surveyed, with an area of 45ha. Around 28 NTFP species were found, including four species of rattan, *Calamus solitarius, C. tetradactylus, C. viminalis and D. jenkinsiana.* The value of these NTFPs is estimated at 206,000,000 kip (USD$24,235), or around 4,600,000 kip (USD$541) per hectare. Rattan canes of less than five meters were counted but not valued, as only longer ones will be harvested. At the time of survey there were around 7,357 mature rattan canes in Nong Kan with a value of approximately 18,392,500 kip ($2,164).

Table 3 – Main species in Nong Kan forest inventory

NTFP Local name	Latin name	Use	Value in kip	Value in USD$ ($1 = 8,500 kip)
Mak naeng	*Amomum sp*	Food, medicine and cash	43,040,000	$5,045
Khe hom	*Cinnamomum cassia*	Food	42,000,000	$4,923
Kheua haem	*Coscinium fenestratum*	Medicine and cash	27,540,000	$3,228
Teuy	*Pandanus fibrosus*	Construction and handicrafts	18,000,000	$2,110
Piidin	N/A	food and medicine also sold for cash	8,910,000	$1,044

Note that few of these species identified as valuable within the forest inventory featured in the lists of species important for village income, or viewed as important for management by villagers. This highlights the difficulty valuing the forest inventory at market prices, as no consideration is made of demand for the products.

Forest area 2 - Phu Sangnoy forest inventory

The Phu Sangnoy forest area surveyed was 304 ha. Around 80 NTFP species were identified, including rattan species wai khom (*C. viminalis), C. rhabadocladus,* wai nam hang *(C. palustris),*wai boun *(D. jenkinsiana),* wai hangnou *(C. tetradactylus), wai thok (C. solitarius).* The most important species for management identified by the villagers were largely the same as in the Nong Kan forest area, displayed in table 2.

Table 4

Most important species for the sustainable harvesting plan	Other species that need to be managed sustainably	NTFP species that can be used without regulation
wai thok *(C. solitarius).* Mak Naeng (cardamom) wai boun *(D. jenkinsiana)* Kheua haem (Berberine) Nyang bong (Bong bark) also wood and timber species such as: Khedsana (agarwood), Kanyung (Dalbergia cochinchinensis), Mai du (pterocarpus macrolapus)	Phak van San (Lao lady palm) Phak samek (Syzyium gratum) Bamboo Kha (Galangal) Mushrooms	Lek sii Mak houat Khok ien don Thond kiew Khalangseum Khee men Thond dok ngor Khaeng kham hoy Oil sam suan bee daeng khem daeng kheua fai thong Ya houa

The total market value of NTFP species found in Phu Sangnoy was 2,829,453,712kip ($332,877), around 9,307,414 kip per hectare ($1,095). These values may be overstated due

to difficulties estimating the yields of some of the major species. **The rattan species found had a market value of 7,312,500 ($860)**

Table 5 - main species in Phu Sangnoy forest inventory

NTFP Local name	Latin name	Value in kip	Value in USD ($1 = 8,500 kip)
Sha oide /manonling		947,400,000	$ 111,459
Mak fai	*Baccaurea ramiflora*	624,000,000	$ 73,412
Mak kho	*Livistona saribus*	241,600,000	$ 28,424
Kok khi mou	*Ormosia cambodiana*	222,800,000	$ 26,212
Mak naeng	*Amomum spp*	164,114,400	$ 19,308
Teuy	*Pandanus fibrosus*	130,200,000	$ 15,318
Nyang bong	*Persea kuzii*	95,038,099	$ 11,181
Khe hom	*Sesbania grandiflora*	47,880,000	$ 5,633
Ya houa	*Samilax glabra*	46,500,000	$ 5,471
Kok kao san		45,300,000	$ 5,329

As with Nong Kan forest area, few of these NTFPs were considered the most important for management by villagers, and only Yahoua was one of the most valuable among those collected.

Ban Phontong

Ban Phontong has 93 households and a total population of 460 people. As in Ban Souphouan, group and individual interviews were held to ask villagers how much of the main NTFP species they collected either as a household or an estimate for the village. Based on these answers, the village collects over $7,000 USD worth of NTFP products each year. Over the 364 ha area of forest surveyed, this amounts to $26.60 per hectare and NPV per hectare of $169. Not all species have been valued and some of the main species– particularly Lao Lady Palm (san) and Alpinia sp (Kha) – have not been included. While reporting lower overall values than Ban Souphouan, NTFPs are still economically important for the village's income, both through cash and village-use values. On a per household basis NTFP benefits seem less important than in Souphouan, contributing only $79 per year, or approximately $16 per person. While other factors may be important, this suggests that the missing NTFPs mentioned above play an important part and these figures are probably an underestimate.

Table 6 – Collection of NTFPs and Economic values, Ban Phontong (top ten)

Names	Quantity collected in 1 year (Kg)	Period of collection	Price	Economic benefit per year	value USD (1 USD = 8500 kip)
Mak Naeng	500	8	40,000	20,000,000	$ 2,352.94
Bamboo (shoot)	2,000	All year	5,000	10,000,000	$ 1,176.47
Mushrooms	300	38,175	20,000	6,000,000	$ 705.88
Kheua wan xieng	100	All year	50,000	5,000,000	$ 588.24
Wai thok *C.solitarius*	1,500	Nov-Jan	2,500	3,750,000	$ 441.18
Phak van	150	38,112	25,000	3,750,000	$ 441.18
Wai Boun *D.jenkinsiana*	3,000	All year	1,000	3,000,000	$ 352.94
Lek sii	300	All year	10,000	3,000,000	$ 352.94
Wai Khom *C.viminalis*	2,000	All year	1,000	2,000,000	$ 235.29
Dok euang (orchids)	100	38,112	15,000	1,500,000	$ 176.47
Total displayed				58,000,000	$6,823
TOTAL				62,670,000	$ 7,372

Species identified as being important for conservation seem largely the same as in Souphouan, and are the same over both forest areas surveyed in Ban Phontong, Nongmathag and Nonggeung.

Table 7 – Species identified as important for conservation - Phontong

Most important species for the sustainable harvesting plan	Other species that need to be managed sustainably	NTFP species that can be used without regulation
wai thok *(C. solitarius).* Mak Naeng (cardamom) wai boun *(D. jenkinsiana)* Kheua haem (Berberine) Nyang bong (Bong bark) Also wood and timber species such as: Khedsana (agarwood), Kanyung (Dalbergia cochinchinensis), Mai du (plerocarpus macrolapus)	Phak van San (Lao lady palm) Phak samek (Syzyium gratum) Bamboo Kha (Galangal) Mushrooms	Lek sii Mak houat Khok ien don Thond kiew Khee men Thond dok ngor Khaeng kham hoy Oil sam suan bee daeng khem daeng kheua fai thong. Samilax glabra. Mornoy Kum chaluck Mai thong Mai khampom Mak ken kheua san kheua xieng plan Yahoua kor Kok Jio Khon Thond phon men Kheua mak ka don Kheua khee doy.

Forest area 1 - Nonggeung forest inventory

52 species of NTFP were identified in Nonggeung forest, including 8 species of rattan, wai thok *C. solitarius,* wai hangnou *C.tetradactylus,* wai khom *C. viminalis,* wai boun *D.jenkinsiana,* wai soum *C. gracilis, P.pierreana, C. rhabdocladus,*and wai nam hang *C. palustris.* The area seems to be particularly rich in rattan, with an estimated 87,000 mature rattan canes when surveyed, with a market value of around 218,660,000 kip ($25,725). If managed well, we estimate rattan cane harvesting from the area could earn Phonthong 43,732,000 kip annually ($5,145).

Other NTFP species had a market value of 292,077,833 kip ($34,362), over 154ha, coming out at 1,896,609kip per ha ($223). Total values of NTFPs, including rattan are therefore 510,737,833 kip ($60,087).

Table 8 – main species in Nonggeung forest inventory

NTFP Local name	Latin name	Value in kip	Value in USD ($1 = 8,500 kip)
Khedsana	*Aquila crassna*	148,000,000	$17,412
Kheua haem	*Coscimum fenestratum*	52,500,000	$6,176
Mak Naeng	*Amomum sp*	37,760,000	$4,442
Khamlang seumkoung	*Ziziphus attopoensis*	25,920,000	$3,049
Piidin		8,490,000	$999
Mak kho	*Livistona saribus*	6,400,000	$753
Lek sii		3,640,000	$428
Kha	*Alpinia sp*	3,509,167	$413
Nyang bong	*Persea kurzii*	2,400,000	$282
Phak van	*Melientha suavis*	1,500,000	$176
Total displayed		290,119,167	$34,132
TOTAL		292,077,833	$34,362

Forest area 2 - Nongmathag forest inventory

Nongmathag forest area covers 211ha. 41 species of NTFP were found in the area, including four species of rattan, *C. solitarius, D. jenkinsiana, C.tetradactylus* and *P.pierreana.* This area contained 104,649 mature rattan canes with a market value of 261,622,500 kip ($30,779). **We estimate that a sustainable yield for this areas rattan would be 20,789 canes per year, bringing income of 51,972,500 kip ($6,114).**

Other NTFP species are also abundant here, the inventory having a market value of 1,565,896,446 kip ($184,223). Per hectare the inventory is worth 7,421,310 kip ($873)

Table 9 – main species in Nongmathag forest inventory

NTFP Local name	Latin name	Value in kip	Value in USD ($1 = 8,500 kip)
Khe hom		521,101,875	$61,306
Mak naeng		252,638,167	$29,722
Kheua haem		192,561,750	$22,654
Manonling		156,512,000	$18,413
Mai sot		87,628,810	$10,309
Teuy		55,024,000	$6,473
Hangkang		45,207,875	$5,319
Khedsana		44,558,333	$5,242
kokkeiw		43,654,292	$5,136
Lek sii		22,674,722	$2,668
Total displayed		1,421,561,823	$167,243
TOTAL		1,565,896,446	$184,223

Conclusion and further research

NTFPs are clearly a valuable resource for villagers in both Ban Phontong and Ban Souphouan. The main values obtained in this study are as follows:

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Value of NTFP's collected	Kip	Dollars (USD$1 = 8500kip)
Per year	140,590,000	$16,540
Per year per hectare	402,837	$47.39
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Forest area	Area (ha)	Total forest inventory value (Kip)	$USD	Inventory value per hectare (Kip)	$USD
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Phu Sangnoy	304	2,829,453,712	$332,877	9,307,414	$1,095

Ban Phontong:

Value of NTFP's collected	Kip	Dollars (USD$1 = 8500kip)
Per year	62,670,000	$7,372
Per year per hectare	172,170	$20.26
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Nonggeung	154	510,737,833	$60,087	3,316,479	$390
Nongmathag	211	1,827,518,946	$215,002	8,661,227	$1,019

While most values presented seem to be within a reasonable range of similar studies, there is considerable variation between the villages and the forest sites. As the WWF Sustainable Rattan Harvesting and Production Project continues, these variations will be explored, and more sites examined.

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