Non-Timber Forest Product Use, Management and Tenure in Pathoumphone District, Champasak Province, Southern Laos

By
Ian G. Baird and Somphong Bounphasy[1]

Remote Village Education Support Project
Global Association for People and the Environment (GAPE)
P.O. Box 860, Pakse, Lao PDR
Tel: 856-31-251-427
e-mail: ianbaird@laonet.net

1) Introduction

Resource tenure is a fundamental aspect of all resource management scenarios, be it land, forests, river, non-timber forest products (NTFPs) or other natural resources. Therefore, when it comes to forest management issues, it should come as no surprise that issues related to tree tenure are critical, although the importance of tree tenure in forest management has often been underestimated or disregarded by resource managers and governments in the region and around the world (Fortmann and Bruce, 1988).

Pathoumphone District, Champasak Province, is one of the most heavily forested parts of southern Laos, and is located south of Champasak Province's Bachiengchaleunsouk and Pak Song Districts, west of Sanamxay District in Attapeu Province, east of Champasak District and Soukouma District in Champasak Province, and north of Khong District in Champasak Province and Siam Pang District, in Stung Treng Province, Northeast Cambodia. Over 70% of the district is included within two of Laos' most important National Biodiversity Conservation Areas (NBCA), and an even higher percentage of the district is considered as "forested". Xe Pian NBCA covers all of the southeastern part of Pathoumphone and Dong Houa Sao NBCA covers all of the northeastern part of the district. Rich semi-evergreen forests cover much of Pathoumphone District, and the district is also endowed with important wetland environments, including a large number of seasonal and perennial marshes (Claridge, 1996).

The local population of Pathoumphone district mainly consists of ethnic Lao people, as well as five predominantly ethnic Brao (Lave) communities, three ethnic J'rou (Laven) communities, and smaller numbers of indigenous peoples from other ethnic groups. Considering the rich natural resources included within Pathoumphone District, it is not surprising that the local people in Pathoumphone, regardless of ethnicity, are heavily

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dependent on forest products for maintaining their livelihoods, including a wide variety of NTFPs (Foppes and Saypaseut, 1996; Sly, 2001). Indicating the importance of NTFPs in Champasak Province, and the variety of NTFPs used by local people, Foppes (1996) reported that 300 different products had been identified as being collected from the forests of Champasak province. He roughly classified these NTFPs into five main groups:

1) Food products (bamboo shoots, fish, bushmeat, wild vegetables and fruits, wild tubers, insects and molluscs)
2) Construction materials (bamboos, rattans and other fibres for construction)
3) Gums and resins (wood resin, dry resin, "bong" bark and sticklac)
4) Medicinal plants (malva nuts, cardamom, fern roots, neam bark and vomica nuts)
5) Ornamental plants (orchids, ferns and curcuma flowers)

NTFPs are especially important for the villages situated in the eastern part of Pathoumphone, away from the Mekong River, which acts as the western border of the district. Since many villages in Pathoumphone are situated in remote areas that cannot be accessed by vehicle during the rainy season, most agricultural production is subsistence oriented, and wet rice cultivation is the primary agriculture activity of farmers throughout Pathoumphone District, although some villages also practice shifting cultivation. In addition, villagers gain a substantial proportion of their income from selling NTFPs, some of the most important being malva nut fruits, rattan, wild honey, dipterocarp wood resin, wild cardamom, along with various kinds of wildlife, including fish and other types of protected and non-protected wild animals (Berkmueller *et al.,* 1997; Foppes & Saypaseut, 1996; Sly, 2001).

The case study that this report is based on was designed to consider tree and NTFP tenure issues of particular relevance to forest-dependent communities situated inside and adjacent to Xe Pian and Dong Houa Sao NBCAs in Pathoumphone District, and their management of forest resources, including important NTFPs. We believe that a detailed understanding of long-practiced and more recently established management regimes for trees and other natural resources in the communities in Pathoumphone District is fundamental, especially before introducing any new natural resource management practices. Thus, this study is intended to directly contribute to a long-term process of determining appropriate forms of natural resource management in the forests of Pathoumphone.

2) Methodology

The first author began investigating tree tenure and NTFP management practices in Pathoumphone District in May 2001, when the first preparatory field survey of potential project villages was initiated in cooperation with the Pathoumphone District Education Office and the Education Division of Champasak Province (see Sly, 2001). At that time, the ten villages of Taong, Tavang, Nong Ping, Houay Ko, Nam Ome, Lao Nya, Som Souk, Houay Tone, Nong Ayk and Kala were visited. All of these communities are either inside are near to either Xe Pian NBCA or Dong Houa Sao NBCA, with the first four

being mainly associated with Xe Pian, and the latter six being mainly associated with Dong Houa Sao. Ethnic Lao people populate six of the ten villages, while ethnic J'rou (Laven) indigenous people populate the villages of Houay Tone and Nong Ayk, and ethnic Brao (Lave) indigenous people populate the villages of Taong and Houay Ko. In 2001, there were 2,922 people living in these ten villages (Sly, 2001).

This initial trip was followed up by initial investigations of wild honey and malva nut fruit production in Som Souk, Lao Nya, Nam Ome and Houay Ko villages in January 2002, and a trip designed to specifically observe malva nut fruit management in Lao Nya village was organised in the middle of April 2002. At that time, work with local villagers also began in order to prepare a short Lao language video regarding malva nut fruit management.

In November 2002, the second author conducted a village survey to particularly investigate tree tenure and NTFP management issues in all ten of the villages visited in May 2001.

During all of the above-mentioned field trips, information was collected through informal and semi-structured interviews with village leaders, including village chiefs and their deputies, village elders, teachers, and members of each village's five member project planning and implementation committees, which were set up with project support in 2002. Each village committee includes three male and two female members. These Lao language interviews were augmented with forest walks and other forest-based activities, which were all conducted in close cooperation with villagers. For example, we accompanied villagers during malva nut fruit collection activities, and during periods when Monty Sly was collecting video footage related to malva nut fruit collection and honeybee management activities.

The authors collected as much secondary information about NTFPs and tree tenure issues in the district as possible, including documents in both Lao and English languages. These included malva nut fruit regulations issued by Pathoumphone District, and documents related to past work related to NTFP management supported in Dong Houa Sao and Xe Pian NBCAs by IUCN and Danida. This documentation has proven extremely useful for understanding issues related to NTFPs in the study area, as has NTFP related literature from Ratanakiri Province, Northeast Cambodia, which borders with Attapeu Province, Southern Laos.

Considering the rapid and dramatic changes in the value of the Lao kip over recent years, it is important to recognise that at the time that this study took place, approximately 10,000 kip = US$ 1.

3) Results

The following ten sections consider various types of economically important tree or plant-based NTFPs identified during different stages of the research in Pathoumphone. Although various management issues are considered, we have paid particular attention to

resource, or tree tenure issues, as they have often been under emphasised in research regarding NTFPs and other important natural resources found in Lao PDR and other countries in mainland Southeast Asia.

3.1) Malva Nut Trees (*Scaphium macropodum*)

The malva nut tree (*Scaphium macropodum*) (Miq.) Heyne[2] is one of the tallest trees found in the rich semi-evergreen forests that surround all of the ten villages considered in this study. Malva nut trees are abundant throughout the study area because they generally inhabit semi-evergreen forests in hilly areas approximately 300-700 metres above sea level, which is a habitat that is very abundant in Pathoumphone District. Reaching 30-40 m or more in height at maturity, and well over 100 dbh (diameter at breast height)[3], these trees tend to begin fruiting at about 10-15 years, according to villagers in the study area.

Malva nut trees are notorious for their odd and irregular annual fruiting patterns, which remain difficult to verify even today. While much remains unclear regarding the fruiting cycles of malva nut trees, it is clear that they only fruit a maximum of once a year, and that their fruits are generally collected over a relatively short period between the end of March and the end of April or early May. Various researchers have reported on the annual fruiting cycles for malva nut trees. Baird (1995) reported that locals believe that malva nut trees experience mast fruiting years once every seven years, with an intermediate lower peak during the third year. However, villagers in other areas have reported three-year, four-year, five-year, and seven-year mast cycle fruiting cycles (Bann, 1997; Kun, 1998; Berkmueller & Vilavong, 2000; Foppes & Ketpanh, 1997; 2000; NTFP, 2001; Jorgensen, 2001; Phiapalath, 2001). The actual situation remains uncertain, and based on observations in recent years, it seems likely that the cycle is less specific than is generally portrayed. It is true, however, that malva nut fruiting is inconsistent from year to year. Local people in the study period claim that malva nut trees fruit every year, but that individual trees only have mast fruiting periods once every seven years. They report that some trees produce large amounts of fruit in one year, while others produce less during the same year, and then the next year the ones that produced large quantities the previous year produce only a few fruits, while the ones that produced less the year before produce large quantities. Villagers also report that climatic and rain patterns have a lot to do with the number of fruits, their quality, and the ability to local people to harvest them.

Villagers in Lao Nya have estimated that during mast years, one malva nut tree can produce up to 50-60 kg of fruit. Local people have also reported a positive correlation between years of heavy malva nut fruit production, and years with large quantities of wild honeybee nests (Berkmueller & Vilavong, 2000). This may be because honeybees play an important role in facilitating pollination of malva nut tree flowers, and honeybees are also likely to flourish if there are large numbers of malva nut tree flowers.

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[2] This species is often referred to in the literature as *Sterculia lychnophora*, but recent taxonomic work on the group tends to indicate that *Scaphium macropodum* is in fact the correct name. However, it will take a detailed taxonomic revision of the group to determine what the actual name of the species should be.

[3] Berkmueller & Vilavong (2000) reported that the largest malva nut tree in near Lao Nya village was 293 cm in circumference.

Importantly, malva nut trees produce the single economically most important NTFP in the study area – malva nut fruits (called "mak chong ban" or simply "mak chong" in Lao[4]) (Foppes, 1996; Xe Piane NBCA, 1998; Phiapalath, 2001; Sly, 2001). Indicating the importance of this forest crop to Pathoumphone District, it is the only NTFP for which a special district decree was issued in 2002. This decree specified a number of factors related to management and marketing of malva nut fruits (Pathoumhone, 2002). Specific regulations related to malva nut management were also developed in the three pilot villages of Tha Hou, Lao Nya and Som Souk in 2000 with support from IUCN's Dong Houa Sao and Phou Xieng Thong NBCA support project (see, for example, Pathoumphone, 2001). IUCN's NTFP Project also facilitated malva nut-related activities in Tavang and Nong Hin villages in Pathoumphone District up until their project ended in 2001, and in 2001 the Danida supported Xe Pian NBCA support project facilitated activities related to formulating malva nut regulations in Taong and Nong Ping villages (M.K. Poulsen, *pers. comm.,* December 2002).

There is also another species of tree in southern Laos locally called "mak chong hin" (*Scaphium* sp.). The fruits are similar to "mak chong ban", and are found in similar habitats (Phiapalath, 2001), but they do not expand as much when they are exposed to water. They are also not valuable as a commercial NTFP, and local do not collect them regularly.

In 2000, the Dong Houa Sao NBCA support project mapped malva nut tree resources near Lao Nya village, and found 580 mature trees and 408 young trees. One of the interesting results of this mapping exercise was that malva nut trees were found to be largely concentrated in dense patches within the forest. Local people knew exactly where all of these patches could be found. In addition, it became clear that there were potentially much too many malva nut fruits in the village's forests for people only from the village to harvest over the short harvesting season. Therefore, it seemed to make economic sense to set up a system for licensing the collection of malva nut fruits in Lao Nya's forests in order to generate revenue from villagers from other villages, thus providing the people from Lao Nya with income from licensing fees, which could act as an important incentive for local people in Lao Nya to protect the resource (Berkmueller & Vilavong, 2000; K. Berkmueller, *pers. comm.,* December, 2002). Mapping of malva nut resources was also done in Nong Hin village with the support of IUCN's NTFP Project.

Malva nut tree management is a complicated affair, as there are a number of possible ways to harvest malva nut fruits, each with varying degrees of governmental and social acceptance. Many years ago, when malva nut fruits had not yet become valuable as a marketable commodity, local people collected malva nut fruits off the ground after ripe fruits fell naturally, but they did not collect large quantities, as they only consumed them as family food. At that time, malva nut fruits were generally only used as an ingredient in a basic dish, in which they are cooked together with salt, monosodium glutamate, and hot chilies. There was no need for particular private ownership rights of the trees, since

[4] This species is not to be confused with another fresh edible fruit called "mak chong" or "mak chong Xieng Khouang" (*Rosaceae* sp.?), which is found in northern Laos in Xieng Khouang Province (Phiapalath, 2001).

malva nut fruits were abundant, and there were certainly more fruits than anybody would ever want. Moreover, the resource was not at all threatened by harvesting.

Later, in the 1980s and 1990s, the price began to rise dramatically, due to high demand by ethnic Chinese people who use malva nut fruits as an important ingredient of various traditional medicines. The Chinese consider malva nut fruits to be a "cooling" medicine, and also use it extensively for stomach problems and for soothing the throat and curing dry coughs, including those of singers and orators (Baird, In Prep., 2002; Jorgensen, 2001; NTFP, 2001; Phiapalath, 2001). Sometimes malva nut fruits are mixed with water and about 50 g of sugar. They are then left for about 30 minutes before being consumed (Phiapalath, 2001). As the price rose, so did the interest of local people in collecting malva nut fruits for sale. Thus, malva nut collecting and marketing has become one of the most important economic activities in the district.

As people started to compete with each other to collect the most malva nut fruits, some collectors began chopping down malva nut trees in order to harvest fruits – getting all the fruits on the tree, but only once! While this kind of destructive harvesting practice is clearly not beneficial to the environment or the long-term interests of local people, it sometimes made individual sense to harvest in this way. Consider, for example, that an individual arrives at a tree, and sees that it is full of fruits that have not yet fallen. Assuming that the person cannot ascend the tall and difficult to climb tree, he or she might be tempted to cut the malva nut tree down, since it would be likely that if he went away for a few days and returned once the fruit were ripe and falling to the ground naturally, by that time somebody else would have probably already chopped the tree down, or at best collected the fallen fruits, leaving the first person with few or none of the benefits of not cutting the malva nut tree down. Therefore, the lack of a clear system for ensuring benefits for any particular group, combined with dramatic increases in market value, has encouraged individuals to act in their own best interest in the short term, even though it is to the overall determinant to all malva nut fruit collectors, including themselves in the long-term. While Garrett Hardin called this scenario "tragedy of the commons" (Hardin, 1968), in fact, what was being created was a "tragedy of open access resources". This has been the primary problem with malva nut tree management in Ratanakiri Province, Northeast Cambodia as well (NTFP, 2001; Baird, In Prep., 2002; Baird and Dearden, 2002).

Fortunately, according to villagers in the study area, in recent years the people of Pathoumphone have largely overcome the destructive vicious circle of malva nut tree destruction. However, this problem continues to plague parts of northeastern Cambodia and other part of southern Laos (NTFP, 2001; Anon., 2002a & b). It is not entirely clear why Pathoumphone has been so much more effective at preventing the cutting down of malva nut trees to harvest fruits in recent years, as compared to northeastern Cambodia, but it appears to be largely due to high awareness levels of the negative livelihood-based impacts of cutting down malva nut trees. In addition, the local government and village leadership in Pathoumphone has shown considerable commitment to ensuring that violators of regulations banning malva nut trees cutting who are apprehended are punished (Phiapalath, 2001). In some cases, it may also have a lot to do with malva nut

tree resources being situated near villages, making it easier for locals to monitor the situation, and making it more difficult for malva nut tree cutters to chop down trees without being noticed or caught. However, in some cases malva nut trees are not situated near villages, such as for Taong village.

The punishment for killing a malva nut tree is 1,000,000 kip in Pathoumphone District, as well as other possible legal punishments (Pathoumphone, 2002; Phiapalath, 2001), and in 2000, two people from Thong Pha village were reportedly jailed for chopping down malva nut. Lao Nya villagers said that only one malva nut tree was cut down in 2001 (Sly, 2001). It also seems likely that the various conservation-oriented projects supported by international donors have contributed to the improved situation, and the Land and Forest Allocation process in Pathoumphone has also helped to clearly establish village boundaries and make it easier for villagers to defend resources within their borders (M.K. Poulsen, pers. comm., December 2002). Phiapalath (2001) reported that some villages inside and near Xe Pian NBCA actively patrol their forests to protect malva nut trees, and that some have numbered most of their malva nut trees so that they can keep track of them closely.

Despite the generally improving situation, locals from Houay Ko village report that they are still having some problems with outsiders cutting down malva nut trees in their community forests without receiving permission from the village. This may be because neighbouring ethnic Lao villages generally do not respect the ethnic Brao inhabitants of Houay Ko for reasons largely associated with ethnic prejudices. They sometimes tell Brao people from Houay Ko who try to stop them from doing destructive activities in their forest that, "nobody planted the trees, so you have no right to protect them." In addition, in 2000 villagers reported problems with the cutting down of malva nut trees in Dong Houay Khop, which is near the ethnic Lao village of Nabon (Berkmueller & Vilavong, 2000).

Although the chopping down of malva nut trees has generally decreased in the study area in recent years, the high value of malva nut fruits has led to other inventive and certainly less or even non-destructive methods of harvesting fruits. For example, some people have been known to strongly tighten pieces of strong woody vine around the trunks of malva nut trees in order to prevent essential nutrients from getting from the roots of the trees and the leaves and fruits. After tightening the vines for many hours, or even days, the leaves and fruits wither, and the fruits fall in large numbers (see, Baird, 1995).

While some people claim that if done properly this method need not be overly destructive, provided that the vine is not tightened to the point of causing permanent damage to the trees, and is not tightened for too long, villagers in both Pathoumphone and Ratanakiri province generally consider the practice to be destructive, either resulting in the death of the tree, or at least weakening it greatly (Baird, In Prep., 2002). However, the practice is not officially prohibited in Ratanakiri Province (BPAMP, 2001; Ratanakiri Governor, 2002), and Pathoumphone District does not specify if the method is legal.

A more modern and especially destructive version of the above harvesting method involves using metal wires to tighten around a malva nut trees to cut off nutrient flows, but if the wires penetrates the bark of the trees and cuts through their outer cambrium, the method can kill or cause serious damage to the trees. This method is illegal in Ratanakiri Province (Ratanakiri Governor, 2002).

Another method that has developed, and is apparently much less destructive than the above two tightening methods, is to light a small targeted leaf fire underneath the canopy of a malva nut tree when it is fruiting. The fire, which is watched over by the malva nut collectors, and is generally not allowed to escape the immediate area, causes smoke to enter the canopy and speeds up the process that leads the fruits to fall to the ground. The people below begin to collect fruits as they start falling shortly after the fire goes out below. The burnt undergrowth also makes collecting the fruits relatively easy. This method is used by indigenous Mon-Khmer language speaking peoples in both southern Laos and northeastern Cambodia. However, this method is illegal in Ratanakiri Province (Ratanakiri Governor, 2002), although it seems that the controlled burning of leaves is probably not destructive, provided that the fires are well controlled, and that the trunks of the trees are not burnt.

The most dangerous malva nut fruit collection method utilised by local people in the study area is climbing malva nut trees to either shake the branches that are found only high up in the tree's small canopy, or to cut off some of the high branches. There are four main ways of climbing malva nut trees. The first is used for tall trees that are producing fruits, but do not yet have trunks and stems that are much larger than those of coconut trees. For trees of this size, some daring individuals are able to climb up with a cloth or rope tied to both feet, in the same way as coconut trees are climbed.

The second method is used with trees that have too large girths for people to climb them directly. Since there are no lower branches on malva nut trees, small pieces of wood (called "toke thoi" in Lao) are pounded into the trunks and stems of the trees, and these serve as temporary ladders for facilitating the climbing of the trees. The climbers of these trees can then reach the canopies to shake or cut down the branches. However, the pieces of wood can generally only be relied upon to remain secure and safe to climb for one to three days, before they begin to loosen, and become unreliable to use. Therefore, they have to be re-hammered in almost every time someone wants to climb a tree.

The third method of climbing malva nut trees involves tying long pieces of bamboo to the trunk and stems of the trees using strong woody vines. This method, called "fat pha ong" in Lao, is not easy to do with malva nut trees, as a single piece of bamboo is never long enough to facilitate a climber to reach the canopy, and adding a second piece of bamboo half way up a tree is far from easy. Yet the method was reported to be in use by some people in Nam Ome Village.

The fourth method of climbing malva nut trees involves opportunistically climbing up easier to ascend trees adjacent to malva nut trees, and then shaking or cutting the branches off the adjacent malva nut tree from the climbed tree.

For the second and third methods, which both involve a considerable amount of labour to prepare for the climbing of the malva nut trees, Sly (2001) reported that if somebody has invested the labour in such preparations, others are not allowed to climb the trees to harvest fruits.

It is clear that all methods of climbing malva nut trees are dangerous, and every year at least a few people in Pathoumphone have accidents in which they fall out of malva nut trees that they are trying to climb. These unfortunate individuals generally either die on impact, or if they are lucky, they survive with serious injuries.

Considering the potential risk to human life, and the possibility of harvesting unripe fruits through cutting down or shaking the branches, Pathoumphone District does not legally allow any climbing of malva nut trees for harvesting, and doing so is officially punishable by a fine of 700,000 kip as well as possible legal punishments. In addition, anyone found buying or selling green malva nut fruits is subject to having them confiscated, as well as having to pay a fine equal to two times the value of the fruits confiscated (Pathoumphone, 2002; Phiapalath, 2001). However, in 2002 climbing trees was one of the most important methods of harvesting malva nut fruits in most or all of the villages in the study area.

There is a specific management system related to malva nut fruit collection when trees are climbed. In April 2002, the first author viewed this system in Lao Nya village. Because it is very dangerous and difficult to climb malva nut trees, only strong young males are able to do so, and not even all of those. When one of the malva nut tree climbers in the village goes to collect malva nut fruits, many other villagers who cannot climb malva nut trees, including women and children, follow him into the forest. When the climber and up to twenty or more pickers arrive at a malva nut tree with fruits, he ascends the tree by whatever method is most suitable. He carries two sticks with a rope attached. These are used to shake the branches once the climber reaches the canopy. After he shakes the branches, the fruits fall to the ground, but the pickers below are not yet allowed to pick them up. After the shaking is completed, and the climber returns to the ground, everyone begins scouring the forest around the tree to collect as many fruits as possible at the same time.

After all the fruits have been collected by the group, all the pickers sit on the ground in a row, each piling the fruits that they have collected in front of them. The climber is then allowed a share of each of picker's fruits, since the climber's work is the hardest and riskiest. However, the amount that the climber takes from each picker depends on the amount that each picker has collected. If a picker has collected many kg, the climber may take half or more of the fruits, but if a picker has only managed to get a small quantity, the climber will only take a small quantity, and if a picker only gets a very small quantity, the climber may not take any fruits. In addition, sometimes the pickers combine their harvest and allow one person to sell them. They later divide up the money received between the pickers and the climber. In either case, the climber always gets a much higher share than pickers.

This system is well recognised by locals in the study area, and everyone in Lao Nya village is welcome to join a malva nut collection group involved in the above system. However, villagers often do not allow outsiders to join their groups, since they believe that outsiders have a tendency to not follow the rules, and therefore, they would rather not have any trouble by allowing them to get involved. In addition, they do not want outsiders to get fruit that they feel comes from their efforts in their village forests, and therefore rightfully belongs to them.

Villagers from Lao Nya explained that they initially agreed not to climb malva nut trees to harvest fruits in 2001, but their experiences that year led them to change their strategy in 2002. In 2001, the village vigorously prevented anyone from climbing up malva nut trees until the fruits were thoroughly ripe and ready to fall by themselves, but just when the fruits were ripe and ready to begin harvesting in earnest, rains arrived, and the harvest season was ruined, with very few fruits being harvested that year. The problem is that once it rains, any malva nut fruits that have fallen to the forest floor become saturated with water and expand in size and break apart, making them unmarketable. The fruits are only sellable as long as they are dry, but if they remain dry, they can apparently stay fresh for years (Baird, In Prep., 2002).

The second problem locals in Lao Nya encountered was keeping people from other villages from ascending the malva nut trees in their village area prior to the fruits becoming completely ripe. This also forced them to consider a new strategy for harvesting malva nut fruits.

While it certainly makes sense to try to harvest only ripe fruits, since the Chinese herbal medicine market does not want unripe green fruits, and if green fruits are mixed with ripe fruits, they tend to drive the quality and the price of all the fruits down. However, if the fruits are not too unripe, it is possible to dry them in the sun, partially ripening them in this way. However, tree ripened fruits are apparently much higher quality than fruits that are sun-ripened after collection.

Ultimately, in 2002, most villagers in the study area harvested malva nut fruits either by picking naturally fallen fruits from the forest floor, or through climbing and shaking the branches above. It appears that villagers accept part of the government law, but not all of it. For example, they agree that malva nut trees should not be cut down, and they also agree that those who climb up trees should not cut branches off. However, they do not believe that shaking malva nut tree branches after climbing the trees is overly destructive. It may not be ideal, but considering the circumstances, it makes the most sense to them. Interestingly, shaking malva nut trees to harvest fruits is not illegal in Ratanakiri Province, Cambodia (Ratanakiri Governor, 2002).

Some village leaders in the study area explained that despite the need for changing rules in recent years, they are still attempting to control some aspects of malva nut fruit collecting. For example, some villages organise meetings in their communities before the

beginning of the malva nut collection season. At that time, village headmen announce the district and village regulations regarding malva nut fruit harvesting methods.

In Lao Nya village, collectors are also told to make sure that they only collect malva nut fruits in the daytime, from 6 am to 5 pm each day. Lao Nya villagers do not allow outsiders to sleep in the forest of their village, and violators are required to pay 200 kip/kg of malva nut fruits that they have collected. This is because the host villagers are concerned that the outsiders will become injured, or cause damage to natural resources if they are sleeping in the forest, and the village does not want to be responsible for people who are injured in their village's forests, or for outsiders to damage their forest resources. However, villagers admit that while they were largely successful at implementing this rule for the two years of 2000 and 2001, they were unable to enforce it in 2002, as too much effort was required to enforce the regulations, especially since villagers themselves are interested in collecting malva nut fruits during that time of year. Taong village, however, does not prohibit malva nut fruit collectors from sleeping in the forest, since many malva nut trees are far away, and implementing such a ban would make it almost impossible to collect malva nut fruits in distant areas (M.K. Poulsen, *pers. comm.,* December 2002).

Historically, local people have mainly considered malva nut trees to be the common property of the village that controls the forests that they are found in. Private ownership of malva nut trees is uncommon, as nobody has ever planted the trees, and labour is generally not required for preparing a tree for harvesting. In addition, villagers in the study area even consider malva nut trees that grow up on private land to be common property resources. The only exception appears to be when labour is invested in preparing to climb malva nut trees, which provides those who have invested the labour with temporary private property rights over the trees and their fruits.

Tens of thousands of people, including many from Pakse, enter Xe Pian and Dong Houa Sao NBCAs to collect malva nuts in years with many fruits (Poulsen & Louanglath, 2001; Jorgensen, 2001). This temporary, and sometimes anarchic migration of people into the forest is mandated by the government, which states that all people have the right to collect malva nut fruits throughout the forest, although methods of harvesting are limited both by village determination and by local government decree (Pathoumphone, 2002). At that time, villagers living in the study area are also very busy with malva nut fruit collection, and schools often close so that teachers and students are able to collect malva nut fruits (Sly, 2001; Xe Piane, 1998). Essentially, the government considers all forestry resources to be property of the State, but villages are provided with specific long-term user rights (Pathoumphone, 2001; 2002). The implications of permitting malva nut fruits to be managed somewhat as an "open access" resource have been serious, and have been one of the fundamental management mistakes of governments trying to manage malva nut resources in both southern Laos and northeastern Cambodia. Managing resources as open access resources tends to lead to the "tragedy of the commons", and destructive resource use (Baird, In Prep., 2002; NTFP, 2001; Jorgensen, 2001). It would make more sense if local communities were given more harvesting rights than outsiders, as it would encourage them protect the resource. At present, villagers are

disproportionately burdened with the job of protecting the malva nut trees, but they receive almost the same benefits from harvesting fruits than people who do not protect the trees and come from outside villages (Baird, In Prep., 2002; Anon., 2002b; NTFP, 2001; Jorgensen, 2001).

In fact, some villages in the study area are trying to keep outsiders from harvesting malva nut fruits in their village areas, since outsiders often harvest fruits at night when they are not supposed to, as well as climb up trees and shake down fruits before they are ripe. However, this is not easy for locals to enforce, especially considering that the local government does not support their position to ban outsiders from collecting malva nut fruits in their village forest areas. They only specify that district regulations be followed (Pathoumphone, 2002).

In Ratanakiri Province, northeastern Cambodia, which borders Laos' Attapeu Province, malva nut fruits are also an important part of forest-based local economies. Therefore, beginning in 2001, the non-governmental organization (NGO), NTFP Project, began working with local ethnic Kavet[5] people in Kok Lak Commune, Veun Say District, Ratanakiri Province, in order to try to put a stop to destructive malva nut harvesting practices, particularly the cutting down of malva nut trees in order to harvest the fruits (NTFP, 2001). Then, in 2002, the malva nut tree protection campaign expanded in area to other parts of northern Ratanakiri Province, and Siam Pang District, in Stung Treng Province. A provincial decree was issued (Ratanakiri Governor, 2002; Anon., 2002a & b). Together, the empowering of communities to help manage resources and raising awareness regarding the need to protect malva nut resources have assisted in reducing the amount of malva nut tree cutting, although problems remain (NTFP, 2001; Anon., 2002a & b; Baird, In Prep., 2002).

Although malva nut trees are tall, straight and large, they are not desirable as timber, since the wood is weak and considered low quality. However, logging, nonetheless, poses an important threat to malva nut resources. Villagers in Lao Nya explained that when one large timber tree is cut down it is common for one or up to five or more malva nut trees to get caught in the path of the falling tree, resulting in their destruction. Road construction to facilitate logging is also known to impact on malva nut tree resources (Berkmueller & Vilavong, 2000). Therefore, logging has already caused substantial negative impacts to malva nut resources. However, it is unfortunate that timber considerations generally take priority over NTFP resources, even though local people in the study area rely on malva nut fruits for income much more than on timber sales. It is not clear if logging companies that kill malva nut trees during their operations are subject to 1,000,000 kip fines specified in Pathoumphone government regulations - it seems that they certainly should be, although no instances of fining have been reported.

In Pathoumphone District a large number of people become involved in trading malva nut fruits each year. According to district regulations, all traders are supposed to register with the district Commerce Office (Pathoumphone, 2002), and according to some village leaders in the study area, traders are also supposed to pay the villages 200 kip/kg for the

[5] The Kavet are a sub-group of the Brao, a group of Mon-Khmer Western Bahnaric language speakers .

malva nuts purchased in each village, although this is not specified in district regulations (Pathoumphone, 2002). Jorgensen (2001) reported that in 1999 Taong village was able to generate 300,000 kip in fees from about 100 outsiders who entered the village area to collect malva nut fruits and dry resin (see section below). However, Taong villagers were unable to totally control the situation. Thus, they were not capable of collecting all the fees that were owed to them by outsiders.

Apart from paying villages, traders are required to pay the district Commerce office 2% of the value of the malva nut fruits that they trade in the district. Anyone who is caught transporting malva nut fruits without registering with the district is subject to having all the fruits confiscated as well as being fined two times the value of the malva nut fruits (Pathoumphone, 2002). Apart from that, the District Agriculture and Forestry office collected 3% of the value as a "forestry maintenance fee", the Finance office of the district collected 5% as tax. Therefore, together the government collects a 10% tax on malva nut fruits (Chief of Commerce Office, Pathoumphone District, *pers. comm.,* November 29, 2002).

In 2002, 12 companies were licensed to buy malva nut fruits in Pathoumphone, as well as 24 individual traders. According to the head of the district Commerce office, there were 80.3 tonnes of malva nut fruits traded through the district in 2002. The total revenue for the district was 75,553,920 kip (Chief of Commerce Office, Pathoumphone District, *pers. comm.,* November 29, 2002). However, there were probably many more unrecorded malva nut fruits harvested in the district.

In 2002, the Pathoumphone District government tried to control the prices of malva nut fruits in order to ensure that unscrupulous middlemen did not pay villagers excessively low prices for their product. However, the attempts to control malva nut fruit prices have largely been unsuccessful, as many of the traders who buy malva nut fruits in the villages are not licensed, as they are supposed to be according to district regulations (Pathoumphone, 2002), and sometimes only low numbers of traders manage to get to remote villages, providing those few that do make it there with the opportunity to buy at low prices, since there are not competitors near-by offering higher prices.

Villagers in the study area report selling malva nut fruits for about 10,000 kip/kg. However, in October 2002, the retail market price for malva nut fruits was 25,000 kip/kg at the market in Pakse, and bulk traders in Pakse claimed that they sold dried fruits to Chinese traders for between 20-22,000 kip/kg in November 2002. Malva nut fruits are apparently sent from southern Laos directly to China via the border at Oudomxay Province. In 2001, malva nut fruits were apparently priced at about US$ 10/kg at the Chinese border with Laos (M.K. Poulsen, *pers comm.,* December 2002), indicating that traders are marking up the price of their product quite a bit, and are profiting substantially. It is not entirely clear how many malva nut fruits are exported from Pathoumphone District each year, and the amount certainly varies considerably from year to year. In 2002, traders in Pakse estimated that 300 metric tonnes came from Champasak Province, although the actual amount could be substantially higher.

Phiapalath (2001) reported that 421 metric tones of malva nut fruits were exported to China from Laos in 1998.

It is generally believed that malva nut fruit prices are low at the beginning of the season, and increase after the end of the harvesting season. Therefore, some traders buy at the beginning of the season, and then hold onto the fruits, which do not rot provided that they are not exposed to water, until prices rise a few months later. In this way traders can make considerable profits. For example, we heard that a few years ago one local trader bought malva nut fruits for 8,000 kip in the field, and was later able to resell the same fruits for 25,000 kip/kg, which provided him with over a three-fold profit.

However, considering the rapid devaluation of the Lao currency over recent years, the prices of malva nut fruits have fallen. It is not clear why this has happened, but some suspect that it may be due to low quality product, particularly mixing ripe and unripe fruits together. The same declines have been reported in northeastern Cambodia (Baird, In Prep, 2002), where prices received by fruit collectors in 2001 were reported to be the equivalent of US$ 2.50/kg (NTFP, 2001).

Since traders from outside the villages tend to benefit more from malva nut fruit harvesting than local people, both in Laos and Cambodia, it has been suggested that organising cooperatives to help local people market malva nut fruits themselves could help direct more of the benefits to the communities (Anon., 2002b; NTFP, 2001).

In recent years there has been increasing interest in planting malva nut trees, especially in southern China. However, it is not easy to do so, as the species apparently has quite specific habitat and climatic preferences. Nevertheless, some initial trials in southern China have apparently been successful, although it is unclear whether the planted trees will fruit well (Baird, In Prep., 2002). In Laos, some people have also begun planting malva nut trees. In Kaleum District, Sekong Province, some villagers in Jareh village have collected saplings from the forest and replanted them near their villages, and one village apparently has about 200 planted malva nut trees now (A. Mittelman, *pers. comm.,* November 2002). In 2001, malva nut tree planting and management on 10 ha of land near Nong Meung Matka and Nong Hin village was planned (M.K. Poulsen, *pers. comm.,* December 2002), but it is unclear how the work was planned, and whether it was actually done or not.

3.2) Wood Resin Trees (*Dipterocarpus alatus*/spp.)

A number of species of large perennial trees that are members of the genus *Dipterocarpus* are well known in mainland Southeast Asia for the wood resin or wood oil (called “nam man nyang” in Lao) that they produce when tapped. In Indochina, including southern Laos, the most popular of the tapped species is *Dipterocarpus alatus* (called “mai nyang” in Lao) (Ankarfjard and Kegl, 1998; Foppes and Saypaseut, 1996). This is also the species most often tapped in the study area, although *Dipterocarpus intricatus* (called “mai tabeng” in Lao), *Dipterocarpus tuberculatus* (called “mai koung”

in Lao) and *Dipterocarpus obtusifolius* (called "mai sat" in Lao) are also occasionally, but rarely, tapped in the study area.

Dipterocarpus wood resin is actually considered to be an oleoresin, which means that the resinous faction is mixed with an essential oil (Ankarfjard and Kegl, 1998). It has a number of uses, both local and industrial. Locally, unfiltered and non-distilled wood resin is mainly used for making torches for illumination, and for caulking boats and repairing holes in buckets. For making torches, wood resin is mixed with rotten wood (called "khone doke" in Lao) and is wrapped in large *Dipterocarpus tuberculatus* leaves (called "bai tong koung" in Lao). These torches can be used for providing lighting at night, and they are also used in urban areas with electricity as fire-starters when charcoal or wood is used for cooking. Torches are usually marketed by the "leum" – each of which includes ten torches. In Pakse, one "leum" of presently sells for about 5,000 kip retail, which is quite a low price. In May 2001, long wood resin torches using bamboo tubes were selling for 1,000 kip per torch in Som Souk village. Tavang and Nong Ping villages also reported selling torches (Sly, 2001; Xe Piane, 1998). Some people in the study area, including Nam Ome village, also paint blackboards using a mixture of wood resin and broken glass (Sly, 2001).

Apart from local uses, filtered and distilled wood resin is used for various other purposes, including making varnishes and paints. It is also used as a base for perfumes, and *Dipterocarpus* tree wood is popular for construction purposes, although it is not considered to be high quality wood (Ankarfjard and Kegl, 1998; Baird, In Prep., 2002).

Unlike most other tree species that grow in the forest, *Dipterocarpus* wood resin trees are considered to be the inheritable private property of local people. If these trees grow up naturally in the forest, they are initially considered to be common property owned by the community, but if an individual invests labour in cutting a hole in the trunk of a tree in order to facilitate tapping, the tree becomes the exclusive property of the person who cut out the tap hole, and anyone else who wants to tap the tree must first ask permission of the owner before being able to tap the tree. Tap holes are generally 20-30 cm deep, about 20 cm high, 30-40 cm wide, and are backwards sloping and wedge shaped in order that resin can collect in them without spilling out. Tap holes tend to be situated in the tree trunk about a metre from the ground. Most trees have a single tap hole, but in some cases trees may have between two and five (Ankarfjard and Kegl, 1998; Baird, In Prep., 2002).

Once a tap hole has been made in a tree, fire is used to stimulate resin production. The hole is ignited for a few minutes before being put out by the tapper. In the study area, villagers reported waiting about three days after lighting before returning to the tree to collect the resin. Therefore, collecting resin takes place about two times per week. However, in other parts of Laos and Cambodia tappers may wait from five to seven days after lighting before collecting the resin (Ankarfjard and Kegl, 1998; Baird, In Prep., 2002). In the study area, large wood resin trees are reportedly able to produce up to about five litres of resin per lighting.

During the research in Pathoumphone it was found that there are slight but important differences between villages with regard to the exact nature of "private ownership" of resin trees. For example, villagers from Tavang consider that all *Dipterocarpus* wood resin trees are community property, but that once a hole for tapping has been made by an individual, that person has the exclusive right to tap the tree, and those rights are inheritable. However, that person does not have the right to cut the tree down and sell the wood. Instead, only the community has the right to sell wood resin trees, and the revenue received from selling resin trees must be given to the whole community, not just single individuals. This obviously discourages individuals from cutting down and selling resin trees for their timber, and protects the overall interests of the community.

Som Souk village, on the other hand, considers that individuals who make tap holes in trees have exclusive and inheritable rights to tap that tree, just like Tavang. However, unlike Tavang, they consider that the individuals who own the trees have the right to sell the timber and receive all the benefits individually. The owners are only required to pay a 5,000 kip tax to the village for each tree sold.

The second author also reported that the tenure arrangement for wood resin trees is different in Outhoumphone District, Savannakhet Province, southern Laos. There, wood resin trees that grow up naturally in paddy rice fields are not necessarily the property of the owner of the rice field that they are growing on, even though the field is privately owned. Therefore, others can come to tap resin from untapped trees without asking permission from the landowner, provided that nobody has tapped the tree in the past. In such cases, the owner of the land must ask permission from the first person that tapped a wood resin tree before being able to tap the tree.

However, this is not exactly the case in Pathoumphone District. According to villagers from Nam Ome, a person can only tap a wood resin tree growing in somebody else's paddy rice field if the individual has first received permission from the landowner to do so. However, if such permission has been provided, and the other person has tapped the tree, the landowner must ask permission of the first tapper of the tree if he or she wants to tap it. Therefore, the tree is considered to be the property of the landowner if it has never been tapped, but once it has been tapped, it is considered to be the property of the tapper, regardless of whether the tapper is the landowner or not. It would also be possible for a landowner to provide a tapper with one-time tapping rights to a tree on his or her land, but tappers might not be willing to invest the time and labour required to make the tap hole in the tree, unless they felt that they had the right to tap the tree over a long time.

Finally, most villages do not specify how large a tree has to be before it can be tapped, although trees under 50 dbh (diameter at breast height) are generally not tapped in the study area or other areas in the region (Baird, In Prep., 2002). However, Lao Nya village specifies that wood resin trees under 80 dbh should not be tapped. This is apparently because smaller trees do not supply much resin, and it is also considered more likely that tapping could damage or kill the small trees if they are tapped.

Although it is not common for wood resin trees to die as a result of tapping, especially if the tapper is mindful to put out fires used for stimulating resin production (Baird, In Prep., 2002 Ankarfjard & Kegl, 1998; M.K. Poulsen, pers. comm., December 2002), the second author noticed that at least a few wood resin trees near Nong Ping village have died due to careless tapping. The details regarding the situation are, however, presently unknown.

Berkmueller *et al.* (1997) reported that consultations with local people living in villages located within and around Dong Houa Sao NBCA resulted in locals and the NBCA agreeing that wood resin tapping would generally be allowed inside the park, but with conditions. Namely, users would be required to be careful not to cause damage to resin trees and the surrounding forest through the careless use of fire, not to tap trees under a certain size (not specified), and not to have too many active tap holes in individual trees (number not specified). It was also agreed that the selling of wood resin would also be allowed, although some types of NTFPs were prohibited for selling (not specified). This was, however, prior to the issuing of new regulations regarding the management of NBCAs in Laos issued in 2001 (Ministry of Agriculture and Forestry, 2001), and it is unclear whether the government presently recognises previous agreements with local people.

In the past, wood resin was collected in large quantities and purchased raw by private trading companies that exported it to Thailand for sale in international markets. However, in 1996 the Lao government decided to ban the commercial sale and export of wood resin, apparently based on the reasoning that resin tapping damaged forest resources and also contributed to forest fires (Enfield *et al.,* 1998; Foppes & Ketpanh, 2000; Ankarfjard, 2000). However, researchers tend to believe that wood resin harvesting is generally not particularly destructive, especially if done properly (Foppes & Ketpanh, 2000; Ankarfjard and Kegl, 1998; Baird, In Prep., 2002), so the ban does not appear to make much sense. Nevertheless, the ban in exports of Lao wood resin appears to have resulted in a dramatic decline in wood resin prices in Laos, from US$ 0.86/l in 1995 to US$ 0.75/l in 1997 and finally US$ 0.35 in 1998 (Foppes & Ketpanh, 2000). However, the Lao government has not banned carrying small quantities of wood resin to Thailand from Laos (Enfield *et al.,* 1998). At present, wood resin from Pathoumphone is generally only traded locally for boat caulking and as torches.

Foppes & Ketpanh (2000) suggested that the ban in wood resin exports might actually be associated with promoting the commercial logging of *Dipterocarpus* trees, because if people are gaining high benefits from tapping wood resin, they are not likely to damage wood resin trees, or agree with loggers who want to cut them down. However, if villagers are unable to generate benefits from tapping wood resin trees, they are likely to be more inclined to allow loggers to cut them down. Therefore, it seems possible that the ban in wood resin exports has actually promoted logging rather than protecting resin trees from tapping, although the government has never explicitly stated this to be the case.

3.3) Dry Resin (*Shorea* and *Parashorea* spp.)

Dry resin (*Shorea* and *Parashorea* spp.), called "khi si" in Lao, is another type of NTFP collected by local people in the study area. It is sometimes mixed with *Dipterocarpus* wood resin, with the resulting combination being used for caulking wooden boats.

Villagers in the study area report that "khi si" is mainly produced on three types of large perennial forest trees - "xi dong" (*Parashorea dussaudii*), "chik khok" (*Shorea obtusa*), and "tabeng khok". The latter two species are mainly found in dry dipterocarp forests, while the first species is predominantly found in moister and denser semi-evergreen forests. For example, since the forests near Lao Nya village are mainly dense semi-evergreen forests, the main source of "khi si" there is apparently *Parahorea dussaudii* trees. Most of the trees that produce "khi si" are between 15-20 m tall, although some are taller. Collection takes place all year round. However, December to February is considered to be the best season for collecting dry resin. In the study area, most villagers collect "khi si" only after it has fallen naturally to the ground after growing on the side of the tree. In some cases villages find large pieces of dry resin covered with dirt on the ground, and they harvest this "khi si" by digging it out of the ground. However, in 1997 Sengkeo and Siphongsy (1997) reported that over the previous two years much of the buried "khi si" had already been dug up and sold by villagers in Pathoumphone. Villagers rarely climb trees, or try to knock resin growths off of trees with sticks. Neither was the cutting down of trees to collect dry resin reported. Therefore, the harvesting of dry resin is considered by local people to be sustainable, since no damage is done to the trees that produce this resin. Sengkeo and Siphongsy (1997) also reported that the harvesting of "khi si" apparently had no negative repercussions for the trees. Sengkeo and Siphongsy (1997) estimated that a single tree can produce about 3-5 kg of "khi si" per year, and they also reported that no grading or sorting takes place, and taxes are reportedly only paid at the district level by traders and amount up to 3% of the selling price.

However, dry resin production is threatened by logging, since the large trees that produce dry resin and sometimes cut down for their timber, or are damaged when other trees are chopped down.

Unlike *Dipterocarpus* wood resin trees, which are generally considered to be private property, the trees that produce dry resin are the common property of the inhabitants of whatever village has jurisdiction over the forest area where the resin is collected. Illustrating the common property nature of this resource, as opposed to open access resources, in some villages, like Tavang and Taong, outsiders who come to collect "khi si" are expected to pay 500 kip/kg as a fee to the village. This village "tax" was not, however, reported in any other villages, and it seems likely that these regulations were developed during the time that IUCN's NTFP Project was working in Tavang, and then adapted by neighbouring Taong, although this requires confirmation.

In most cases, traders come to the villages to directly buy "khi si" from villagers, or sometimes individuals buy dry resin and transport it to sell to large traders in the district centre. Dry resin generally sells for about 6,000 kip/kg. However, prices tend to

fluctuate depending on the time of year (the beginning or the end of the season). The government makes no attempt to regulate the price of dry resin.

3.4) Cardamom (*Amomum villosum*)

Cardamom *(Amomum villosum)* (called "mak neng" in Lao) is an important NTFP in some of the villages in the study area, and cardamom (*Amomum* spp.) is one of the most important agricultural exports from Laos, second only to coffee. It is used as an ingredient in various Chinese medicines (Foppes & Ketpanh, 2001), particularly one called "sha ren" (Foppes & Ketpanh, 2000). It is a small plant grows between one and two metres from the ground, and flourishes in secondary forest areas or swidden agriculture fallows. While cardamom is planted or enriched in secondary forest areas in some parts of Champasak Province, particularly Bachiengchaleunsouk District (Foppes *et al.,* 1996; Foppes & Ketpanh, 2001), most of the cardamom produced in Pathoumphone District grows wild in secondary forests that are managed by local people (see, for example, Bounsou *et al.,* 1996).

In the study area, the tenure arrangements associated with cardamom vary depending on the circumstances. If, for example, a cardamom plant grows up naturally in the forest, that plant is considered to be common property, and anyone in the village is allowed to harvest its fruit. However, if an individual discovers a cardamom plant in the forest and digs it up and replants it in an agriculture field or a fallow field, that plant is considered to be the private property of the one who has transplanted it. In addition, if cardamom plants grow up naturally in swidden fallows, those plants are considered to be the property of the one who previously did swidden agriculture in the area, since the opening up of the forest for agriculture is the factor that has led to the cardamom growing up in that area. In 2002, Pathoumphone District Forestry Office report that there is a total of 70 ha of cardamom gardens in the district, including 60 ha of wild cardamom forests that have been managed by local people, and 10 ha of planted cardamom that have not yet produced fruits. The average production was reported to be 60 kg/ha.

Although most outsiders do not steal from the private cardamom fields of others, villagers from Houay Ko reported that they sometimes have problems with outsiders stealing cardamom from their fallow fields, even though the outsiders have no right to do so. However, villagers from the more remote community of Houay Tone reported that they do not have these types of problems with outsiders.

Although there are no government mandated regulations related to cardamom harvesting, villagers from Houay Ko try to collect a collection fee from outsiders who come to their village to collect cardamom from the forest. However, some still collect without informing the village leaders, resulting in the village not being able to collect this fee in all cases. Cardamom harvesting generally begins in October.

Traders sometimes come to the villages to buy cardamom, or in some cases village chiefs buy cardamom from other villagers and then resell it to other middlemen. However, there are generally not a lot of cardamom traders who are active in the study area.

Villagers generally receive between 5-9,000 kip/kg for dry cardamom, which is a low price, although for the five years prior to 1998 the export price for dried cardamom was relatively stable at about US$ 7/kg (Foppes & Ketpanh, 2000). There is reportedly a five-fold decline in weight from wet to dry cardamom.

In 1996, the prices received for wild Cardamom in Sanot village, Pathoumphone District, were reported to be significantly lower than those received for planted cardamom in Kouangxi Village in Bachiengchaleunsouk District in Champasak Province, possibly due to more difficult transportation conditions from Pathoumphone, and also probably because the quality of wild cardamom is lower than planted cardamom produced in Bachiengchaleunsouk (Bounsou *et al.* 1996). Foppes & Ketpanh (2001) reported that by weeding and other cultivation measures, including pruning, farmers have created almost pure stands of cardamom in Bachiengchaleunsouk.

Because the local market price of cardamom has fallen in recent years, villagers are not harvesting as much as they did in the past, and in some cases villagers are not even bothering to harvest cardamom from fallow fields where cardamom has grown up naturally or has been planted by villagers in the past. This situation has led to the deterioration of cardamom agro-forestry systems, since villagers are no longer cutting the underbrush to facilitate the good growth of cardamom.

In 1996, when the cardamom business was better, Bounsou *et al.* (1996) reported that Sanot village harvested a considerable amount of wild cardamom. At that time, an average of about 108 kg of fresh cardamom was harvested per family each year, and on average, four days were spend per family per year on harvesting cardamom, with the average person collecting 5 kg per day. Richer villagers tended to harvest more than poorer villagers. The average yield was reported to be about 165 kg/ha, and the forest was divided up into plots, each of which was controlled by one family. The forest where the cardamom grew consisted of mainly second growth trees, which grew up after the area was heavily logged in 1980 (Bounsou *et al.,* 1996).

3.5) Rattan (*Calamus* spp.)

There are at least seven well-known species of rattan (*Calamus* spp.) (called "vai" in Lao) known to villagers in the study area. They are known in Lao as:

1) vai taleuk
2) vai xeuay
3) vai xavang
4) vai deng
5) vai hang nou
6) vai kam lao
7) vai vian

However, only "vai deng" and "vai hang nou" are commercially marketed in Pathoumphone District. They are mainly sold for making cabinets, chairs, tables, basket

handles, and parts of rice containers, and local villagers also use rattan for making various household items.

Rattan is generally considered to be a common property resource by villagers living in the study area. In Lao Nya, people from other villages are only allowed to collect rattan in forest areas belonging to Lao Nya if they have received permission from the village chief. If rattan is collected only for local family use, there is no need to pay anything to the village, but if people from the host village or from other villages intend to sell rattan, they are required to inform the village chief, and pay the village a fee equal to 2% of the value of the rattan sold. However, villagers in Tavang appeared to believe that rattan near their village is so abundant that it is in no danger of being depleted through over harvesting, and therefore, they do not regulate harvesting. This was also reported to be the case at Nong Ping village in 1998 (Xe Piane, 1998). Villages from Tavang allow villagers from inside their community and from outside their village to harvest rattan freely. Nevertheless, experience from other parts of Laos indicates that in fact, rattan can be quickly depleted if intensive harvesting takes place (Baird, 1995).

Rattan pieces that are sold are generally at least 20 m long, and at present they are generally sold for 200 kip/piece. NTFP Project tried to introduce value-added production of rattan handicrafts in Tavang village, but local people have not widely taken up the activity. In Nong Ping village, rattan is apparently the second most commonly sold NTFP, after malva nut fruits (Xe Piane, 1998).

3.6) Piper Betel leaves

The piper betel leaf, called “bai phou” in Lao, is a type of non-woody climber vine that produces leaves that are chewed together with betel nut palm fruits (*Areca catechu*) (called “mak” in Lao), lime (called “poun” in Lao) and *Pentacme siamensis* bark (called “si siat” in Lao). There were three types of “phou” leaves identified by local people in Pathoumphone:

1) phou kham
2) phou khao (green leaves)
3) phou kham si thong (yellow leaves)

In the past, “phou” leaves were widely cultivated in some of the villages included in the study as part of agro-forestry systems, and they are still cultivated in small quantities in Som Souk and Houay Tone villages. “Phou” leaves are cultivated by planting them in old growth forests after cutting down some of the underbrush and small trees. Then the “phou” vines are allowed to grow up the larger trees, where they flourish, and require little maintenance.

Once a “phou” garden in the forest has been established, the area becomes either private property or the common property under the strict control of the whole village. In both cases outsiders are not allowed to harvest “phou” leaves without receiving permission from village leaders or the private owner of the area. Harvesting is done after climbing

the large trees where the "phou" vines are growing. Small sticks ("toke thoi") are hammered into the trees in order to facilitate the climbing. It is prohibited to cut the vines or damage them in any way. Leaves should be carefully picked so as not to damage the vines.

Unfortunately, this agroforestry system has fallen into disfavour in recent years due to the very low market price of "phou" leaves. The long distances that must be traveled to get the leaves to market makes selling "phou" leaves uneconomical. Therefore, whereas "phou" leaf selling was once an important economic activity for Som Souk village, presently "phou" leaves are mainly only collected for local use, or are traded locally in small-scale barter trade. A brunch of 100 leaves presently sells for just 50 kip, while 1000 leaves, or 10 bunches, can sometimes bring in 600 kip. At present, betel nut chewing is becoming less popular, and young people are not chewing as much as the older generation. Thus, demand is gradually declining, and to make matters worse, forest grown "phou" leaves are not considered to be as good quality as farm grown leaves, thus the low prices. Moreover, in the mid-1990s a large part of the old "phou" agroforestry area owned by Som Souk village at a place called "Kouan Mou" was cut down by local people and converted to coffee and fruit tree plantations because the "phou" gardens were not considered economically viable. Before being converted the "phou" agroforestry area at "Kouan Mou" was reportedly four km long and 1.5 km wide, or about 600 ha.

3.7) Wild Bee Products (Superfamily Apoidea)

Wild bee (Superfamily Apoidea) honey and wax are important NTFPs in the study area, and some villagers harvest a large amount of wild honey each year. The tenure arrangements related to wild bee nests vary considerably depending on various factors, especially the varieties of bees involved.

There are three main types of honeybees recognised by local people in the study area[6]. They are:

1) "pheung phoum" (makes nests on all types of trees)
2) "pheung ton" (makes nests only on "deua han" trees (*Ficus* sp.)
3) "pheung kon" (makes nests in the hollowed insides of trees)

Of the above, villagers in the study area mainly harvest honey from the nests of "pheung phoum" and "pheung ton", since these types of bees tend to produce the largest quantities of honey.

The tenure and harvesting methods used for each kind of bee nest differ. For "pheung phoum", a temporary private ownership system for particular trees with bee nests in them is used. The system works as follows. If somebody is walking in the forest and notices that a bee nest has been established in a particular tree, the person marks that tree by cutting into the bark of the tree trunk a few times, and then putting a small branch into

[6] Some villagers claim that "pheung ton" and "pheung phoum" are the same species, but this seems unlikely, considering the different sizes of their nests, and their different nesting patterns.

one of the cuts in order to make it clear to whoever might pass that the tree later already has an owner. Then, in March or April when the nest is large and the honey is most plentiful, the owner of the tree (the one who marked it) harvests the honey and wax. After harvesting, the tree reverts to being the common property of the village, and the individual rights to the tree are no longer recognised.

If somebody who did not mark the tree tries to harvest the honey, the temporary owner of the tree can fine the thief, based on the size of the nest and the amount of honey harvested. The more honey harvested, the higher the fine. Villagers rarely steal each other's bee nests, and the system seems to generally work well.

The situation for "pheung ton" bees is, however, quite different, because this type of bee only makes its nests on one type of tree, called "deua han" in Lao (*Ficus* sp.) and if bees make nests on a particular tree one year, they tend to make nests on the same tree each and every year. Therefore, these "deua han" fig trees become the exclusive private property of the individual or family that first harvested honey from them, and ownership rights are inheritable. Moreover, it is strictly prohibited for anybody but the owner(s) of a tree to harvest honey or wax from that tree. These private ownership rights are inheritable, and in the case of one "deua han" tree owned by Nong Ayk villagers, there was originally a single owner. However, when he died his children inherited the tree, and his six people now jointly own it, and share the honey harvest from the tree each year. The situation with regard to "deua han" tree tenure appears to be similar to the private tree tenure system in place for "honeybee trees" practiced by Paku Iban indigenous peoples in Sawawak, Malaysia (see Sather, 1990).

While "deua han" trees are not particularly common in Pathoumphone District, they are apparently abundant in Nong Mouang Village in neighbouring Sanamxai District, Attapeu Province. However, there are a few honeybee "deua han" trees near the ethnic J'rou villages of Nong Ayk and Houay Tone, but there was reported to be two near Houay Tone village, and one near "Kouan Mou", which is between Som Souk and Houay Tone villages. These large and tall trees have fruits like other fig trees, but humans apparently do not eat the fruits often.

The harvest regimes for the two types of bees outlined above differ considerably. For "pheung phoum" bees, harvesting is done during the day, and local ecological knowledge has led locals to believe that harvesting "pheung phoum" honey at night is destructive, leading to the demise of the bees. If a fire is made on the ground at night, and then the bees are chased out of the nest, they will fly directly into the fire and die. Therefore, it is strictly prohibited to harvest "pheung phoum" honey at night if I fire is made.

Wild bees reportedly begin to make nests in around the middle of 2nd Lao lunar month (approximately January), and by the 5th Lao month (around April) villagers harvest the honey, since that is the time of year when the largest amount of honey is available. They manage the resource so as to protect the resource and generate maximum benefits from it.

For “pheung phoum” smoke is used to chase the bees out of nests. The harvester climbs up the tree with the nest in it and then lights a bundle of small dry sticks wrapped in a dried banana leaf that have been prepared in advance. The harvester blows the smoke towards the nest, and the queen bees soon fly away with all the other bees, leaving just the nest, which can then be cut down and brought to the ground without difficulty.

However, the process for harvesting the nests of “pheung ton” is much more complicated, and it requires an expert harvester. For the ethnic J’rou people from Houay Tone and Nong Ayk villages, the practice is closely associated with cultural practices and their strong Animist beliefs. The people who harvest “pheung ton” nests must have special abilities related to local spirits, and must conduct a detailed Animist ceremonies before harvesting the nests. These ceremonies must include the sacrifice of a chicken and the drinking of fermented rice wine from a large jar. The one who conducts the ceremony must have special powers, and every year it is necessary to do the ceremony, because the J’rou believe that if the ceremony is not done, the next year not many bee nests will be made on the “deua han” tree.

After all the appropriate ceremonial aspects of harvesting have been completed, the harvester goes to the tree with his assistant waiting on the ground below. “Pheung ton” honey is only harvested at night, unlike “pheung phoum” nests. The head harvester hammers small pieces of wood into the trunk of the tree in order to climb it (“toke thoi”), but he must repeat the correct chant after hammering in each of the first three pieces of wood. He can then finish hammering all the pieces of wood and climb up the tall tree. It is important to realise that unlike “pheung phoum”, which generally only makes one or two nests per tree, “pheung ton” may have tens of nests in a single tree, even up to 100. Therefore, the one who climbs the tree must be very careful, and this is also the reason why harvesting must be done at night, since it would be too easy to disturb the other nests in the tree if harvesting was done in the daytime. Once the harvester reaches a nest, he takes out especially prepared implements for harvesting the honey. A type of woody vine called “kheua koung” in Lao is harvested from the forest and pounded in preparation for harvesting the bee nests. The woody vine can then be pulled apart and dried in the sun. Finally, the dried vine is tied up in bundles of strips that are about 1-1.5 m long each. Later, the harvester takes these strips up the tree, and lights the end of the “kheua koung” vine, which creates a bright red coal at the lighted end. The vine is then tapped against the bee nest, causing part of the coals to fall to the ground below, still shining brightly. Since this harvesting is done during the dark part of the month, the queen bees soon leave the nest and follow the bright shine of the coals to the ground. However, the bees are not injured, since there is no fire below, just bright coals. Once all the bees have left the nest, the harvester carefully cuts it down and slowly lowers it using a rope to his assistant below, in order not to waste time. The main harvester then moves to the next nest, and he does the same thing until all the nests in the tree are harvested. The harvester then climbs down the tree, pulling out the small pieces of wood used to climb it. The J’rou believe that the “deua han” trees will die if the pieces of wood are left lodged in their trunks and stems, although they do not believe that other types of trees will die if the pieces of wood are left lodged in them. Locals claim that while production varies from year to year, overall production over many years is sustainable.

For harvesting "pheung kon" honey, people take galangal rhizomes (called "kha" in Lao) and cut them into small pieces before pounding the pieces in a mortar and pestle. The harvester then puts the pulverised galangal into his mouth and spits it into the hole of the bees. Soon after, the queen bee flees the nest. The harvester then cuts the trunk of the tree open so that the nest can be accessed. There are usually still some bees remaining in the nest, but when they sting, they apparently only hurt a little. Locals believe that the galangal neutralises the poison of the bees.

One nest of "pheung ton" or "pheung phoum" generally has one or two kg of bees wax, which sells for between 60-80,000 kip/kg.

According to villagers, one "pheung ton" nest can produce about five to ten litres of honey, while a single "pheung phoum" nest generally produces about five to thirty litres of honey, depending on the number of queen bees. "Pheung kon" produces much less honey, only about one litre per nest, making it unattractive to harvest the honey most of the time.

Traders generally come directly to the villages to buy honey, and they generally pay 10,000 kip/litre. The price is the same regardless of the species of bee that produced it. In some villages, such as Houay Tone, traders are required to pay the village 500 kip in tax for each litre of honey that they purchase. However, this tax is only paid for honey harvested from "pheung ton" nests. The price of honey in urban areas is much higher than in the villages, and is usually mixed with water by the time it reaches the market, resulting in a lower quality product.

Apart from the systems of honeybee tenure and management applied in the study area, ethnic Dak Kang indigenous peoples in Ayeun Sub-district, Dak Cheung District, Sekong Province, southern Laos, reportedly have a different method of managing one type of honeybee, since the species lives in the hollowed out insides of large trees (possibly "pheung kon", but the species has not yet been confirmed). In these cases, individual families privately own particular trees where honeybees make their nests. The owners make holes in the sides of one particular type of tree (species not identified) where the bees nest in order to access the nests inside the trees. They then build small "doors", which open from the top down, at the front of the holes in order to close the hole at times when the villagers do not want to access the bees. Unlike in other parts of southern Laos, honey is reportedly harvested from these nests in September, while another type of thick sugary honey is harvested from the same trees in April. It may be that the types of bees are different than those found in Pathoumphone, since the altitude in the Dak Cheung is significantly higher up than in Pathoumphone (Steeve Daviau, pers. comm., November 2002).

3.8) Wild Fruit Trees

Apart from malva nuts, which are the economically most important NTFP in the study area, local people also harvest a large variety of other kinds of forest fruits. In fact, there are too many species to mention here, but the most popular forest fruits are "mak kho len" (wild lychee), "mak fai", "mak neo" and "mak nyang". The first three come from perennial trees, while the last one grows on a vine that climbs up trees. All become ripe at the end of the dry season in April and May.

Most of the four types of fruits mentioned above are only consumed locally, in the villages, but they are also sometimes marketed, usually for about 500 kip/bunch.

Villages in the study area have varying approaches to regulating the harvesting of wild fruits of the above species. To begin with, the resource is considered to be common property owned by the villages. Trees that are planted are considered to be private property, regardless of whether they are planted on private or public land. In Som Souk, the village fines anyone who cuts down wild fruit trees or their branches 5,000 kip per tree. However, Lao Nya does not specify the amount that people should be fined if they are caught cutting down wild fruit trees to harvest the fruit. They just specify that cutting down wild fruit trees is not allowed.

However, in ethnic Brao villages in the northeastern Cambodian province of Ratanakiri, villagers commonly cut down small "mak kho len" trees and "mak nyang" vines, or the trees that the vines are growing up, in order to harvest fruits. However, they also generally climb up "mak fai" trees and larger "mak kho len" trees to harvest fruits. According to villagers, it is acceptable to cut down smaller fruit trees, especially if they are situated in a forest area that is slated for doing swidden agriculture in the next year or two. Moreover, "mak nyang" and "mak kho len" trees are considered to be abundant, and therefore people do not worry much about them becoming depleted. However, for those who are able to climb larger fruit trees, this is generally a preferable option, as it requires less labour than cutting a large tree down, and also ensures that there will be fruits available from the tree in future years. However, if the trees cannot be climbed, villagers justify cutting them down, since unlike malva nut fruits, which are usable once they have fallen naturally, "mak nyang" and "mak kho len" fruits are rotten and inedible once they fall naturally from a tree.

3.9) "Hem" Vines *(Coscinium usitatum)*

"Hem" vines *(Coscinium usitatum)* are another type of NTFP that local people in the study area sometimes harvest and sell. This thick woody vine grows up trees and can reach 10-15 m long within 2-3 years. Once the vine is cut, the plant does not die, but sprouts again from its base. Therefore, if over harvesting is not done, it should be possible to harvest the vine sustainably over a long period of time.

"Hem" vine is presently in demand as a base ingredient for the modern medicine known as "berberine", which is very effective against stomach problems. It is an effective drug against amoeba and various intestinal bacteria. The medicine is popular in Vietnam and

Laos (Foppes *et al.,* 1997), and the vine is also used as an ingredient in herbal Lao medicines, where it is also used for curing stomach problems and diarrhoea.

According to villagers in the study area, only mature vines are supposed to be cut, since smaller vines are not considered to be good quality by the medicine companies that use them. The best quality vines have wood with a deep yellow colour. However, presently both mature and immature vines are often cut, resulting in a lower quality product, and finally, a decline in the price of "hem" vines to collectors.

This woody vine is considered to be a common property resource. For forest areas in some villages where it is collected for sale, local villagers cutting for commercial purposes are required to inform the village administration that is responsible for the forests where the vines are cut, and must pay the village 200 kip/kg for all the vines that are collected and sold from the village area. Outsiders must follow the same regulations, but must pay their fee before being allowed to cut the vines, in order to ensure that the fee is paid, and that people do not just promise to pay the fee and then run off without paying. However, some people do not inform the villagers before cutting, but if they are caught, they are required to pay a fine equal to 2% of the value of the product collected.

In most cases, traders collect the cut up and sun-dried woody vines from villages, and these companies are required to pay the district a 2% tax on the buying price of the vines that they purchase. During the first year that "hem" vines were purchased on a commercial basis, the price was quite high. A Vietnamese company apparently paid 5,000 kip/kg. This high price encouraged a large amount of harvesting, and soon there was an oversupply. This glut resulted in a sharp decline in the price of "hem" vines, which eventually bottomed out at just 50 kip/kg, according to Tavang villagers. Now, due to the very low prices, no villagers in the study area reported selling "hem" vines anymore, but villagers from the Phapho and Phalay village areas, which are both in Pathoumphone District, and are easier to access by road, are still selling "hem" vines on a regular basis. Villagers in the study area are not sure what price others are receiving for the vines at present. However, wet vines are reportedly purchased in Pathoumphone district for 150 kip/kg, and dried vines sell for 1,000 kip/kg.

3.10) Eaglewood Trees (*Aquilaria cf. crassna*)

Eaglewood *(Aquilaria cf. crassna)* is a type of naturally occurring tree known in Lao as "bo heuang" (in study area), "mai ketsana" or "mai ken chan", and is one of the most valuable NTFPs growing in the forests of the study area. However, it is also becoming one of the rarest NTFPs in the area, due to overexploitation, even though it is presently illegal to harvest eaglewood.

This resource is considered to be village common property, but because it is so highly valued, it is virtually impossible for villagers to protect "bo heuang" resources in the deep forest. For example, villagers from Houay Ko village surveyed their community forests and marked all the eaglewood trees remaining in their area of control. However, despite

these efforts outsiders have still dared to enter the village's forests and cut down the marked trees.

The prices of eagle wood can vary greatly depending on the quality, since eaglewood occurs in many grades. The insects that bore into the trees are the key to getting high quality eaglewood, since they are the vector for the fungus infection that creates the valued eaglewood oil, which is the trees immune response to the infection. If insects have not bored into the wood, and the fungus has not infected the tree, the quality and prices received are low. Eaglewood is used to make expensive incense and perfume, especially in the Middle East and Japan (Foppes & Ketpanh, 2000). It is called agar wood in some markets. Unfortunately, the trees must be cut down and killed to facilitate harvesting.

Even though it is illegal to harvest eaglewood, some people trade in it without letting village administrations know, or in some cases collectors of eaglewood take the product to unknown traders in urban areas. In the study area, villagers say that traders often pay 150,000 kip/kg, although the price varies greatly depending on quality. Because of the danger of getting caught, the profit margin for traders is high, and they often resell their product for twice what they paid for it.

Despite the problems related to protecting eaglewood trees, and the rapid depletion of the resource in the study area, and many other parts of the region, it has been reported that some villagers in Bachiengchaleunsouk District, also in Champasak Province, have been able to develop a profitable and sustainable business based on these trees. According to Forestry officials in Champasak Province, in those communities villagers are strictly protecting their eaglewood trees from outsiders who would like to cut them down to sell the inner wood. In some cases villagers are reportedly even sleeping near the eagle wood trees that are growing in their paddy rice fields in order to guard them and prevent outsiders from destroying them. In turn, each year the owners of these trees are collecting the seeds from these mature trees and sprouting and bagging the seedlings. They can make considerable profit from selling the seedlings to outsiders who want to plant them, as they are able to obtain 1,500 kip for each seedling. This system encourages local people to protect their mature eagle wood trees so that they can collect the maximum number of seeds for planting.

Historically, eaglewood was not highly valued in the study area, but the wood was boiled in water, and then the water was drunken as a cure for malaria. However, it is not clear exactly how effective this traditional remedy was, or how widely it is used now and in the past.

Although people in southern Laos and north-eastern Cambodia only report the harvesting of eaglewood through cutting down the trees, Ironside *et al.* (2002) reported that during the 1960s, people in O'Som Commune, Veal Veng District, Pursat Province, south-western Cambodia, searched for eaglewood in their spare time, and only gouged out the valuable diseased heartwood, leaving the tree standing and alive.

There is increasing interest in cultivating eaglewood trees, and the Australians are near commercial success with artificial propagation in plantations, while the Japanese are working on tissue culture (Andrew McNaughton, *pers. comm.,* December, 2002).

Ironside *et al.* (2002) reported that eaglewood was selling in the Arabic part of Bangkok for between US$ 500 and US$ 1,000 in March 2002.

4) Discussion

This study is not meant to be comprehensive, or to cover all types of NTFPs harvested in the study area. It is instead designed to illustrate how different plant-based NTFP resources are managed under different tenure and management arrangements. As has been shown, even the same resource can be managed under different tenure arrangements, depending on the circumstances. Tenure arrangements can be permanent, or they can be temporary, and they can certainly change based on circumstances. They are often multi-layered. Overall, management regimes are generally much more complicated than are generally conceived by outsiders (probably including us too!).

This paper demonstrates the importance of forestry planners considering multiple and varied forest use patterns and tenure arrangements for the different forest resources, including NTFPs, that local people use and manage in particular ways, based on their local ecological knowledge. This study also illustrates that different communities, even in the same district and within the same ethnic groups, can have quite different resource tenure arrangements, based on local circumstances. Many of these arrangements are not mandated by government decrees or are even written down. Therefore, these important nuances are often overlooked, especially in relation to broad planning for logging.

What is clear is that there are a multitude of factors that need to be carefully considered when developing plans for logging of any kind, even so-called "sustainable logging", but multiple resource tenure analysis has not yet been integrated into the planning processes for any logging operations in Laos, or apparently other countries in the region as well. Instead, timber harvesting remains the primary concern of governments and companies, as well as international agencies involved in promoting reform in the forestry sector in Cambodia and Laos.

In addition, it is important to recognise that land and tree tenure arrangements are not the same for different resources. For example, for wood resin trees it is possible to have privately owned trees on commonly owned land, while with malva nut trees it is possible to have commonly owned trees on privately owned land. Or for honeybees, tree tenure is temporary for one species, and permanent for another, based on biological characteristics of each species. It is therefore critical to have a detailed understanding of resource tenure arrangements as a fundamental basis for considering appropriate natural resource management regimes in areas like the study area, where more complicated and resource specific tenure arrangements are already in place, either implicitly recognised by authorities, or legislatively supported by local government, as has been the attempt made for malva nuts.

The NTFPs covered in this paper represent but a small number of products that local people in the study area rely on for their livelihoods, and the focus have mainly been on plant or tree-based forest resources with specific non-timber values, and honeybees, since tree tenure has very specific implications for their management and use. It includes species identified by local people as "important forest-based NTFPs"[7]. In addition, all the NTFPs discussed here either presently represent economically important resources in the study area, or were at least previously important, although some have declined in recent years. Nevertheless, the people in the study area, as with most of the Lao population, place value on the NTFPs found in forests, which are the basis for their livelihoods, rather than the timber that forests can produce (Foppes & Ketpanh, 2001).

It is useful to reflect on the work of Bann (1997). She attempted to conduct an economic study in part of neighbouring Ratanakiri Province, northeast Cambodia, and found that the average annual return from NTFPs was about US$ 4,000/ha, compared to US$ 1,697 for timber logging. When the benefits of watershed protection and biodiversity protection are further consider, the alternative becomes even more attractive, although it is difficult to put an exact dollar figure on many forest products and values (Foppes & Ketpanh, 2001).

As is illustrated, the situation in terms of tree-based NTFP management in the study area is far from perfect, both in terms of management and in terms of marketing. In some cases, local management regimes continue to provide important forest protection mechanisms, such as with *Dipterocarpus* wood resin trees and honeybee nests, which are privately owned and vigorously protected by local people under traditional tenure systems in southern Laos. In other cases, local management systems appear unable to adapt to rapidly changing circumstances, including rapidly growing human populations and rapid deforestation, and therefore harvesting becomes unsustainable (Foppes & Ketpanh, 2001). In this other cases, it is also sometimes government-mandated regulations that actually damage the systems that local people are already using, leading to resource destruction and the actual decline in resources. This has certainly been the case in the study area in terms of wood resin trees. The ban in wood resin commercial trade and exports from Laos was implemented in 1996, causing drastic declines in prices and markets for wood resin. Thus, villagers now have less incentive to protect the trees for resin production, and more incentive to cut them down or allow outside loggers to do so.

It is also clear that there is considerable need to develop and support marketing NTFPs in Pathoumphone, or in terms of improving the quality of NTFPs to meet market standards. Some agro-forestry systems, such as the one for "phou" leaf production, and the system for managing wild cardamom, certainly encourage forest retention, either as old-growth trees for the "phou" leaves to climb up, or as natural secondary forest suitable for

[7] Fish are, in fact, a very important NTFP in the area, but they are not included here because they are considered, for purposes of convenience, to be "water-body based", rather that "land-based", although it is recognized that this distinction is purely arbitrary, and it generally makes more sense to consider all NTFPs, including aquatic resources, in broad-based assessments of NTFPs.

cardamom production. It is certainly unfortunate for both protected area management and for local people that both systems are now in serious decline due to market factors.

As a non-formal education support project concerned with environmental protection and the conditions of local peoples living in heavily forested areas in Pathoumphone District, Champasak Province, southern Laos, the field work that this paper is based upon represents but a first step in an ongoing process. Our investigations, that are taking place together with local people and government officials, represent a basis for beginning to find ways to improve natural resource management and livelihood strategies in the study area, so as to provide maximum long-term benefits for local people and the ecosystems that they depend upon. In this regard, we recognise that local processes are complicated, and thus, we are carefully studying the situation and investigating opportunities at various levels. But it is already quite clear that tree-based NTFPs are critical to the livelihoods of all the villages considered during this study. Therefore, it is essential to develop sustainable natural resource and livelihood systems through carefully considering the management, use and tenure arrangements for various tree-based NTFPs, and we will be happy if we can contribute positively to that process.

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