Examensarbeten **2009:9**
Institutionen för skogens ekologi och skötsel

Traditional housing in northern Laos
– wood preferences and impact on the forest biodiversity

Namo Nua, 2005. Photo: Erik Kretz

Erik Kretz

Sveriges Lantbruksuniversitet Skogsvetarprogrammet
Examensarbete i skogshushållning, 30 hp, avancerad D
Handledare: Olle Forshed, SLU, Inst för skogens ekologi och skötsel ISSN 1654-1898
Examinator: Erik Walfridsson, SLU, Inst för skogens ekologi och skötsel Umeå 2009

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ISSN 1654–1898 Umeå 2009

Sveriges Lantbruksuniversitet / *Swedish University of Agricultural Sciences*
Fakulteten för skogsvetenskap / *Faculty of Forestry*
Skogsvetarprogrammet / *Master of Science in Forestry*
Examensarbete i skogshushållning / *Master of Science thesis*, EX4020, 30 hp, avancerad D

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I denna rapport redovisas ett examensarbete utfört vid Institutionen för skogens ekologi och skötsel, Skogsvetenskapliga fakulteten, SLU. Arbetet har handletts och granskats av handledaren, och godkänts av examinator. För rapportens slutliga innehåll är dock författaren ensam ansvarig.

This report presents an MSc/BSc thesis at the Department of Forest Ecology and Management, Faculty of Forest Sciences, SLU. The work has been supervised and reviewed by the supervisor, and been approved by the examinator. However, the author is the sole responsible for the content.

Preface

The thesis has been performed at the Swedish University of Agricultural Sciences (SLU) Department of Forest Ecology and management. The idea to the thesis was brought up by myself, together with Markus Steén and Carl Mossberg. The background to the study was given by Carl Mossberg and a delegation of forest scientist from Laos which performed a presentation about the Laos forestry, in Umeå 2004. The need of more knowledge about the community forest was mentioned and the idea for this thesis was then a fact. After that, an scholarship for a Minor field study was applied for and denied the first time. With the help of Olle Forshed and Carl Mossberg the second time we got an approval for the scholarship from Swedish International Development Cooperation Agency (Sida) to finance the field study in Laos. The 5th of October 2005 the field research started in Laos. The fieldwork was performed together with Markus Steen. Markus had a different approach to the study and have focused mainly on non timber forest products. Together we included most subjects the Lao villagers have in the forest. The fieldwork continued to mid December 2005. Two villages in northern Laos, Namo Nua and Phou Xang, were designated to be our research villages. The villagers were interviewed and forest expeditions were conducted to achieve the necessary information we were looking for. A major literature study about the subject was also included. Carl Mossberg welcomed us to Laos and to his home in Vientiane, his help and guidance was to be of most importance for our stay in Laos. The fieldwork in the villages were successful through.

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Abstract

The majority of the Lao people are living in a mountainous countryside in small villages. The people depend a lot on the forest for a better livelihood. However, in the last decades many changes have occurred in rural Lao, in ways that have ruined large areas of the forest. Laos has lost a little more than 25% of its forests coverage since 1950 and serious forest degradation is widely spread. Slash and burn and uncontrolled logging are the main explanations for deforestation and forest degradation. With an increasing population growth and high economic development there is an increasing need for more forest products. In the forest the local farmers gather and harvest firewood, building materials, medicine, food, and marketable products. However, in the last decades shortages of forest products have been noticed, together with deforestation and fragmentation.

This thesis describes the forest situation in two villages with different ethnicity and wealth standards, in northern Laos. The main focus has been on their traditional house constructions and what construction wood they are using. That has then been compared with what the villagers used for construction wood in the past. The results show that there are large differences in what kind of tree species they are using today compared to 50 years ago. Both villages has different historical backgrounds in wood usage and house design, but both show a negative trend in finding the wood they like to use when constructing their houses. The results show that many of the timber species have disappeared from the surrounding forests. The main explanation is that an intensive selective logging has occurred during periods when a large amount of new houses were required. The farmers do not harvest in a sustainable way and has no knowledge to mange the forest sustainable. Selective logging has lowered the abundance of many other valuable forest products; large parts of the villages' forest are no longer economically interesting as a natural forest. There are also examples of species which have totally disappeared such as some species of rattan and many wild animals.

Both villages have a high concern regarding their forests and are concerned that the forest will lose even more of its value and in the end totally disappear. They do not know how to manage their forests in a sustainable way or how to protect the forest from further fragmentation of slash and burn and selective logging. Many of the problems which are occurring in the local forestry are blamed on the "Tragedy of commons" and are a good explanation why the forest can lose so much of its value without anyone stopping it.

Key words: *Laos, house constructions, tropical timber, forest, deforestation*

Sammanfattning

Syftet med detta examensarbete var att undersöka hur människor i två olika byar i Laos väljer att konstruera sina hus och hur detta påverkar den omkringliggande skogen. Examensarbetet bygger på intervjuer samt fältundersökningar och observationer av skogen i de två berörda byarna.

Laos är idag ett land där den största delen av befolkningen lever på landsbygden med en nära relation till skogen. Mer än 70 % av landet består utav kuperade och otillgängliga bergsområden som för 100 år sedan var klädda av tropiska skogar. Laos har under det senaste århundradet fått en ökad befolkningsmängd som i norr främst livnär sig på jordbruk som i ett kuperat och bergigt landskap blir allt mer begränsande. Detta innebär att den befintliga skogen tillfälligt bränns och används för odlingar av bergsris eller majs och senare för bete, så kallat svedjebruk. Svedjebruket är den största avskogningsorsaken i det moderna Laos. Skogsarealen har sedan 1950 talet minskat med upp till 25 % och därutöver har ytterligare stora arealer påverkats av ett ogynnsamt skogutnyttjande.

Skogen i Laos är än idag en mycket viktig resurs för de flesta som bor på landet. De samlar mycket av sitt dagliga levebröd och skogsprodukter utgör ofta byarnas enda inkomster. Naturmediciner som samlas i skogarna är fortfarande den enda medicin många bybor kan tillgå. Men de viktigaste produkterna skogen tillför är bränsle, mat och byggnadsmaterial.

Denna studie fokuserar på huskonstruktioner i två olika byar i norra Laos, Phou Xang och Namo Nua. Byborna i de båda byarna är väldigt måna om att ha tillförlitiga hem och hyser därmed stor kunskap om de trädslag som växer i de kringliggande skogarna. Båda byarna har länge byggt sina hus på sitt traditionella sätt och använt olika sorters trädslag för det ändamål de passar bäst till. Beträffande den historiska bakgrunden skiljer den sig markant åt mellan byarna. Människorna som bor där är också av olika etnicitet. Likaså har byborna olika livsförutsättningar och det är stora sociala skillnader mellan dem.

Phou Xang består utav ett halvnomadiskt folk som nyligen har tvingats att bosätta sig högt uppe på en bergskam på grund av regeringens ”Land and Forest Allocation act”. Byborna i Phou Xang är fattiga, har det mycket svårt och lider tidvis av svält. De bor i små hus med trampat jordgolv.

Människorna i Namo Nua har däremot varit bofasta länge i området som ligger nere i en dal med gott om bördiga risfält. Byn är en medelklassby med stora hus som står på höga pålar. I Namo Nua är husbyggandet en stor konst och speglar hur rika och duktiga hushållen är. Den stora fördelen Namo Nua har i jämförelse med Phou Xang är att de har tillgång till stora låglänta risodlingar vilket producerar mycket med ris. Båda byarna använder skogarna för många olika ändamål och besöker dem nästintill dagligen för att samla skogsprodukter.

Resultaten påvisar att de båda byarna historiskt alltid har byggt sina hus utav virke från de närliggande skogarna. För femtio år sedan användes en rad olika trädslag i Namo Nua vilka i dagens huskonstruktion inte längre används. Detta påverkar hur de idag bygger sina hus när de inte längre kan finna de trädslag de föredrar. Båda byarna visar på att deras byskogar kraftigt har utarmats och till stora delar helt försvunnit. Hela området kring de båda byarna har under de senaste årtionden blivit starkt fragmenterat och stora delar av skogen används idag till svedjebruk. Skogsinventeringarna visar också att många av de bästa trädslagen för

konstruktionsvirke har avverkats så hårt att de helt har försvunnit från de kringliggande skogarna. Båda byarna tycker att avskogning är ett problem och de uttrycker en stor oro för att det finnas för lite skogsprodukter redan idag och att framtiden ser mörk ut. Detta kan i längden leda till stora svårigheter för byborna och många skogliga hushållstraditioner kan komma att försvinna. Det finns också en överhängande risk att skogarna inte kommer att kunna återhämta sig utan att permanent bli både glesare och biodiversitetsmässigt fattigare.

Nyckelord: *huskonstruktioner, Laos, tropisktvirke, tropiskskog, avskogning*

1. Introduction

Laos is located at the center of the Indochina peninsula with no direct contact with the ocean (Figure 1). Laos's neighboring countries are China, Vietnam, Cambodia, Thailand and Burma. Laos's long border with Thailand is largely formed by the course of the Mekong River and the border to Vietnam mainly goes through the Animate Range. The recorded history of Laos begins with the birth of Fa Ngum a Lao prince who grew up in Angkor. He established the Lao kingdom in 1354 AD and named his kingdom Lan Xang (the Land of a million Elephants and the white parasol) (Mortimer, 1994).

Figure 1: Map of Laos (National geographic)

Changes in civil society are consequently occurring in many countries in Southeast Asia, and poverty is decreasing fast (Globkom, 2001). Laos is not different but it is still a relatively primitive country with a fast economic development (Globkom, 2001). The high population density in Southeast Asia leads to a high pressure on the forest, land and water resources. Southeast Asia has already lost 90% of their wilderness areas. This is mainly a result of agriculture expansion, larger infrastructures and deforestation (Globkom, 2001). Laos is a country that differs a lot from its neighboring countries, it still has large portions of old growth forests and the population density is less than 20 inhabitants per square kilometer (NSC, 2000), which is one of the lowest in Asia.

Most people in Laos live in the countryside with a close relation to the forest. The forest in Laos has under a long period been degraded as a cause of poor forest management. The forest degradation is often caused by people practising shifting cultivation which is the dominant agriculture method in the highlands (Foppes, 2004). Roughly half of the people that live in the highlands are practicing shifting cultivation, often in combination with other farming systems (UNDP, 2002).

The total land area is 23, 68 million ha which is little more than half the size of Sweden (41 million ha). Roughly 70% of the country is dominated by mountains, highlands and plateaus. The fertile lowlands by the Mekong River are the most important agriculture and civil center where the largest cities are positioned. Nearly the entire country is drained by the Mekong River, which has served as the country's main channel of communication and trade (Persson, 1983).

1.1 Inhabitants of Laos

The majority of the Lao people are living in small villages. The village organisation in Laos has many similarities throughout the country even so different ethnic boundaries. The majority of the Lao people are Theravada Buddhists but with a touch of the traditional spiritual world. The population of Laos is 5, 9 million with a growth rate of 2, 3% from 2000 till 2005. The population has been classified into three groups according to the elevation they

live at, and linguistic language. Lao Lum (lowland Lao) constitutes 57% of the population. Lao Theung (midland Lao) 34% and Lao Sung (highland Lao) 9%, make up the rest of the country's population (Mansfield, 2000). How many ethnic groups that actually exist in Laos remains uncertain, figures range from lists of 68 to estimates of 120 or more ethnic groups. The biggest ethnic group is Tai-Lao. There are minority groups with fewer than 1000 people within the tribe with their own language and culture. Lao Sung was the last immigrants and nearly all of them settled in mountains where they live in small villages. They and many other highland people cultivate a mixture of upland rice, maize, and sugar canes. They also breed cattle, buffalos, pigs, chickens and complement their domestic food with gathering from the forest and rivers (Houmchitsavath, 2000). "The wealth of the Lao has been told to be in their rice, corn fields and animals while their welfare system is in the forest" (Ireson, 1989).

1.2 Forest and forestry

So far Laos has been saved from the heavy logging that has occurred in most other countries in Southeast Asia. However, the deforestation has been intensive in most provinces in Laos. The forest is in high pressure from local farmers and organized logging companies that are logging virgin hill-forest. In 1940 the country had about 17 million ha of forest, covering 70% of the land area. In 2000 the forest covered about 12,5 million ha, roughly 47% of the total land area (FAO, 2003). Laos lost a little more than 25% of its forests coverage in 60 years. Slash and burn and uncontrolled logging are the main explanations for deforestation and forest degradation. With an increasing population growth and high economic development there is an increasing need for more forest products. The forest is a very important resource to most Lao people in terms of firewood, building materials, game, wild plants, and marketable products. It also serves as a place of refuge in times of danger (Lewis, 1984).

Forestry represents an important resource which can contribute much more to the overall development and to the livelihood of most Lao people. Forest covers nearly half of Laos but the contribution to GDP in 2001 was only 3%, down from 5% in the 1990s (The World Bank, 2004). There are huge unexplored potential uses in the Lao forest sector such as a more profitable forestry, harvesting of Non Timber Forest Products (NTFP) and ecotourism. The Lao forestry has gradually decreased during the last two decades. From the 1960s to the middle of the 1980s logging was mainly done by the royal government and privately owned companies. At the beginning of the 1990s, privately owned logging companies were banned. Today logging is based on a quota system issued by different offices and performed mostly by state controlled forestry companies, larger illegal loggings are also of importance and is mainly done with military involvement (Thongmanivong, 2005).

1.3 Forest policy and legal framework

"The basic directions for forest sector development were set in the first National Forestry Conference organized in 1989. During this congress, it was concluded that a new system of sustainable forest management needs to be established. The strategic directives agreed upon during this conference were:

· preservation of forests and improvement of management to increase production
· rationalization of the use of forests to increase their economic value; and
· permanent settlement by the year 2000 of 60% of the 1.5 million people currently engaged in shifting cultivation".(FAO, 1998)

"In August 1996, the Government of Laos signed the international Convention on the Conservation of Biodiversity. This has implications for the policy and regulatory framework for biodiversity conservation in Laos" (FAO, 1998). The first comprehensive Forest Law in

the country was set in 1996. The forest law promotes the participation of people in forest management, protection and conservation, e.g., through provision of incentives. The law has a provision for allocating degraded forests and forested land to individuals and organizations for management according to prescribed purposes. A national Land Management and Forest land Allocation Steering Committee was set up in July 1996 to assist the government in studying policies, plans, and regulations, and in coordinating, monitoring, and controlling land allocation. (FAO, 1998).

1.4 Deforestation and degradation of the forest

"Deforestation is a threat to the biodiversity" (Wilson, 1998). The habitat destruction that occurs in the tropics is driving thousands of species each year to extinction (Wilson, 1998). About 60,000-70,000 ha of closed-canopy forests are lost every year in Laos, while some 100,000 ha of forest fallow is cleared annually for shifting cultivation (FAO, 1998). Road and dam construction, hunting, and illegal trade of wildlife and plants are some other main threats to the Lao biodiversity. In many parts of Laos it is already to late to save the forest, the forests are gone. At the lowlands, fertile soils nearly all forests are gone to agriculture practices but apparently also intact highland forests are seldom without any human disturbance (Lehman et al. 2003; Garner et al. 2001). Most people in the highlands have to depend on what nature can provide. Because the population is increasing people are in need of more land which will cut down on natural resources. In the effort to find ways to survive, people are often forced to choose options which are not sustainable and cause the forests to disintegrate and fragmentize (Thongmanivong, 2005). At local markets those problems are easy to locate. There is often a shortage of some certain forest products that earlier were found in large abundance such as, construction wood, flowers, leaves, herbs, bamboo shoots, mushrooms, wild animals, etc. These products are today necessary for the only income many rural people have (FAO, 2002). The forest is also an important factor to make natural systems healthy and functional. Especially important is the role to protect watershed boundaries where the forests have a stabilizing effect and buffer ability to water quality. Protection against environmental disturbance like erosions, soil and nutrient flow is all of great importance to most rural people in the world and can be prevented with an efficient forest cover (Colin et al., 2003).

The most widespread form of disturbance at current time is fire caused by villagers when they perform slash and burn practices. Human activity strongly affects the development of the forest in northern Laos, either through collecting NTFP, logging, or by slash and burn practices (Foppes, 2004). Today larger commercial loggings are rare in the highlands of northern Laos, but are probably something that is going to increase in the future. On the other hand, small scale selective logging is much more common, both for household reason and smaller commercial loggings (Lehman et al. 2003; Garner et al. 2001). Selective logging has a considerable effect because it is highly species-selective. The highest valuable timber can theoretically be harvested to local extinction. Apart from the effects on the canopy structure and species composition small scale logging can make changes for NTFPs. Uncontrolled selective logging of valuable tree species undermines the sustainability in the whole forestry sector (FAO, 2002).

One of the toughest problems when trying to prevent forest degradation is "Tragedy of commons" which is a very common problem in developing countries (Timothy, 1996). These problems can be explained as a race by local people who need to harvest forest resources before their neighbor's. After a while the results are an avalanche of overuse. It starts with that the most valuable and vulnerable species are extinct from the local area and then it

spreads further out to the country. It later continues with harvesting of less valuable species which then escalates to the disappearance of the forest.

When the value of the forest is low after an intensive harvest of all kinds of forest products, the forest is often slashed and burned to a more profitable use by the farmers. To fully understand the farmers and foresters way to manage the old growth forest is it important to know what forest products they are interested in. Virgin forests are not always better than a disturbed forest for the rural people; some essential species are more found in disturbed forest, especially bamboo, but more valuable tree species are nearly all found in old growth forests. Most construction wood that is harvested needs a long time to mature and is often found in the main canopy layer and is therefore missing in most secondary forests (Lehman et al. 2003; Garner et al. 2001).

When the forest has been severely logged-over does it takes a long time for the forest to recover its wounds and once again be a natural tropical forest. When the forest has been severely logged-over it will take a long time for the forest to recover and once again be a natural tropical forest. If the forest is given a very long time there are good signs of a recovery capacity (Whitmore, 1990).

1.5 Community forest

In year 2000 all villages that were accepted by the government as a village has been designated a village land area from the local government. The theoretical purpose of the village land is to serve the villagers with essential products such as agricultural crops and products from the forests as well as it will serve as a clean water supply.

The ideal position for a highland Lao-village is a gentle slope with good forest coverage, sufficient water resource and enough land for cultivation. In villages with a population of 100-500 people farmers are usually organized as a collective. The best and most accessible land is often allocated for permanent rice or vegetable production. The rest of the village land can be considered as forest of various kinds. A large part of the village is designated as a community forest and is dominated by fallow forest (Eggertz, 1997). The community forest includes all forest types which are not protected by the government or are privately owned inside the village boarders and is controlled by the village. The Production forest is also included inside the community forest but has stricter regulations with privities the forest. In Lao forest law, the fallow forest is referred to Degraded Forest Land article 21 and Regenerated Forest article 20. That kind of forest plays a very important role in the farmer's livelihood. The farmers commonly cultivate upland rice, maize, jobs tear and livestock breeding in the fallow forest (Forestry Law, 1996). Many other products are also collected within this type of forest such as NTFPs as well as timber products for local constructions. Other types of forests are more permanent covering the land with reasons that the land is to steep for cultivation or the land is to far away from the settlements. These types of forests also contribute to the livelihood of the village in gathering of NTFPs and timber. Today parts of these permanent forests are protected to prevent a total degradation. They are divided into three different protection types.

Conservation Forest (ba sangoan), article 18: The objective is to conserve the natural habitat and biodiversity "which holds a special value for the environment, education and culture" (Forestry Law, 1996)

Protection Forest (ba pong kahn), article 17: The objective of the establishment of a Protection Forest is to prevent soil erosion, natural disasters, and destruction of water sources in the village or outside village area (Forestry Law, 1996).

Production Forest also called forest for use (ba palitt), article 19: The objective of the "Production forest" is to have a community owned forest which should supply the villagers with forest products such as fruit, eatable plants, fuel wood and building material (Forestry Law, 1996).

However, many rural Lao people only distinguish between two main types of forest: old-growth forest with large trees and wild animals (pa dong) and secondary forest with small trees and bushes and few wild animals (pa lao) (Ireson, 1989).

1.6 Village livelihood and house construction

Forest products are of significant importance, it contributes with energy, medicine, cash income, food and especially building material (Foppes et al., 2004; Halpern, 1959).The design of a house in the highlands, which is constructed with forest materials, differs from tribe to tribe. It is often possible to say which tribal group live in a village by simply looking at the design of the house (Lewis, 1984). The need of many forest products and the ecology of how to manage most products are poorly understood (Wollenberg, 1998). Many forest products have not been well studied or documented, especially community harvested timber (Wollenberg, 1998). This is a result of the traditionally consideration of their minor status, therefore is it important to not ignore the role of logging by small communities in their forests. Even if it appears to be a minor secondary activity compared to harvesting NTFPs, it may still be crucial to the economical viability of some community forests (Wollenberg, 1998). Most Lao villagers have long experience of local wood properties, and harvest their trees with high demands on the wood (FAO 2002). However, the importance of a harvested timber for local use and marketing by local communities have been difficult to understand and are today in the shade by the interests in NTFPs (Wollenberg, 1998).

Today the increase of forest practices and other economic land reforms are occurring with little information about the traditional interaction between the villagers and the forest (FAO 2002). Timber harvesting has often been associated with large commercial operations acting independently or in conflict to the local people. There is growing evidence that sustainable small scale harvesting done by local communities can be of more importance to the livelihood than large commercial operations (Wollenberg, 1998).

As above statements explain, little research has focused on the importance of locally harvested construction wood. At the same time most rural people in Laos are harvesting timber from the forest. Their knowledge and experience is very important to be documented to fully understand the Lao forest situation.

2. Objectives

The overall objective of this study is to document traditional house constructions in northern Laos and describe its related impact on the local forest.

2.1 Specific objectives

- Make an inventory based on the farmers´ knowledge of the wood/timber and NTFP for construction purposes. With a historic view: in terms of species, products, quantities and uses in selected villages.
- Describe the condition of the Production forest and community forests based on the farmers experience in two villages through interviews and field excursions.

3. Materials and methods

This work has been carried out as a Minor field study which is financed by the Swedish international development cooperation agency (sida). The field study in Laos was undertaken in October 2005 to the end of December 2005. My study was conducted together with National Agriculture and Forestry Research Institute (NAFRI) and Ramboll Natura (a Swedish consultancy firm employed by sida) in Laos. Two villages Namo Nua and Phou Xang were to be the main research place. The area that was designated to be the study area is located in the central development zone, Na Mo district, Oudomxay province in northern Laos (Figure 2).

Figure 2: Research villages in Oudomxay province in northern Laos.

3.1 General Description of Na Mo District

Na Mo District has an area of approximately 154 342 ha and shares borders with Xay and Bountay Districts of Oudomxay province to the East, and Na Lae and Namtha Districts of Luang Namtha province to the West and China to the North. Na Mo district is characterized by mountainous terrain with lower lying river valleys. There are three main river systems, the Nam Phak in the North, the Nam Pik/Nam Thong in the central area and the Nam Xe in the South. The rugged terrain limits the area of land available for paddy land development. Upland rain-fed farming systems and forest areas dominate the landscape. The total area of paddy land is approximately 2 248 ha. (Anon, 2004). The annual rainfall ranges from 1 380 to 1 730 millimetres. The average maximum temperatures range among 25° to 30° C and the average minimum temperature among 5 and 10°. In higher altitudes the temperature can go below freezing point during rare winter nights in January (Lonely Planet, 2005).

In 2003 Na Mo district had a total population of 32 045 people, composed of eleven different ethnic groups. Of the total number of 78 villages 41 are Khamu, 13 Hmong, seven Akha, four Thai Dam, three Lu, one Phou Xang, one Yang, and one Phou Yort. The remaining seven

villages are of mixed ethnicity. Of the 78 registered villages in the district six villages are categorized in the low poverty bracket, 21 villages are in the medium poverty bracket and 51 villages are classified in the severe poverty bracket. 20 villages have permanent clean water supplies. There are approximately 55 lower level schools, often inadequately staffed by teachers, one hospital at Na Mo, and nine permanent health centers. There are two secondary schools, both located in Na Mo town, one is an ethnic school. 27 villages have small scale irrigation systems (Anon, 2004). Na Mo district is divided into three development zones. Both Namo Nua and Phou Xang are positioned as neighboring villages in the central development zone (Figure 3).

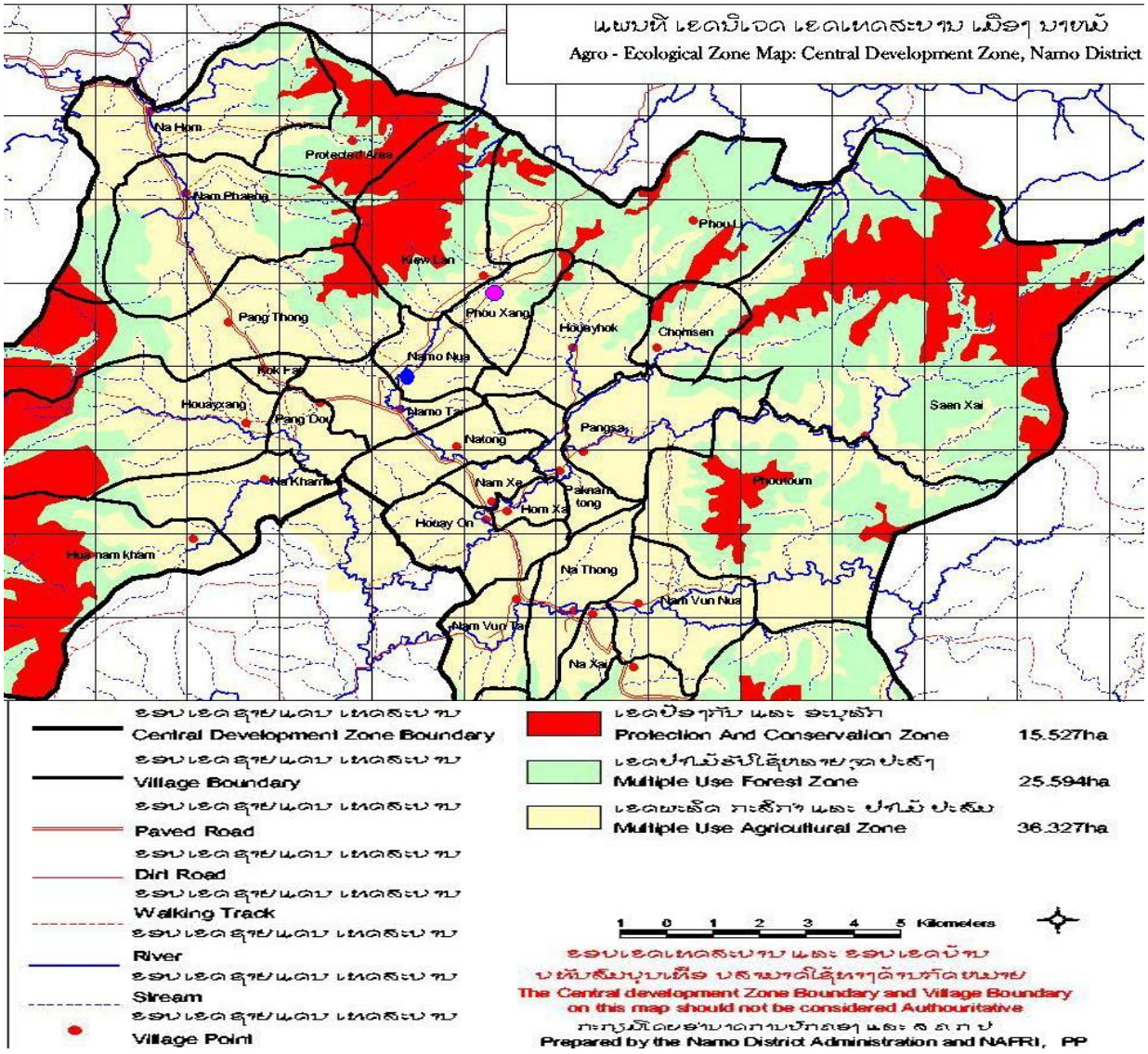

Figure 3: Map of Na Mo central development zone in Na Mo district. Blue dot represent Namo Nua and purple dot represent Phou Xang (Anon, 2000).

Na Mo district is served by the main paved road connecting Oudomxay and Luang Namtha provinces (Figure 3). There are several secondary gravel roads; one is a good standard all-weather road that links Na Mo District directly to China. There is a secondary service road that provides access to Phou Xang and Phouly villages. The total length of paved roads is about 55 Km, and the length of gravel roads is about 101 Km. 46 villages have access to roads, mostly all weather roads while 32 are reliant on walking tracks. Na Mo is classified as one of the 47 poorest Districts in the country (Anon, 2004). This status is rapidly changing as

commercial and agricultural trade with China increases. Commercial growth in Na Mo village is evident and large transport trucks travel the road between Boten on the Chinese border and Oudomxay.

3.2 Land use and forest in Na Mo district

The mosaic landscape of Na Mo district is a result from a long history of shifting cultivation. It consists of a variety of forests and fallows, which provides a basis of valuable food, NTFP and construction material for rural families. The District still has rich areas of natural old growth forest, most of which are located along the district boundaries where the higher altitude and more inaccessible land are located. These areas are still fairly rich forests and support a range of protected wildlife species. They are also important contributors to the livelihood with supporting the people with timber and NTFP. Several areas in the district were declared as Provincial Conservation and Provincial Protection Forests in 1996, occupying up to approximately 60% of the land area in the forested agro-ecological zone (Anon, 2004). The land surrounding the villages can be divided into three main distinctive land use types and can be seen in figure 4.

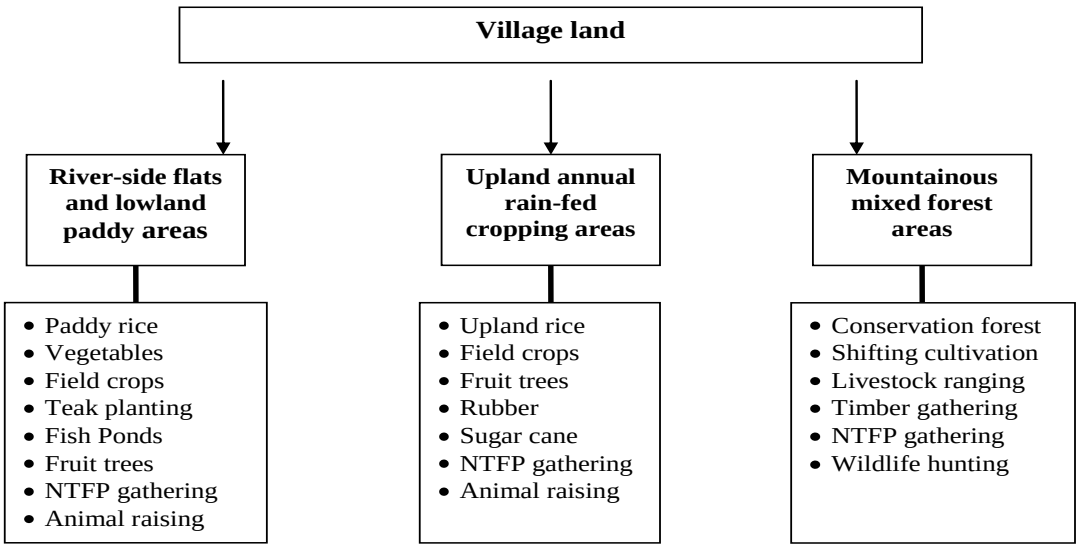

Figure 4: Land systems of Na Mo district (Anon, 2004)

Natural forest types of Na Mo district are evergreen as well as deciduous forest patches as a result of the complex topography. It is referred to in this paper as mixed deciduous forest and covers most of the land in the district. There is a wide range of different kinds of specific forest types and subtypes within the mixed deciduous and evergreen forest. The most common forest type is secondary forest which has been severely disturbed by human activities such as logging and slash and burn. In the most valuable forest is important tree species like Pterocarpus macrocarpus (Mai dou), Tectona grandis (Mai sak) and Xylia xylocarpa (Mai te kha) found. The main broadleaf species found in this region are Schima wallichii (Mai thalo) and numerous species of the Fagaceae family. The Fagaceae family is represented by tree species of three genera: Castanopsis, Lithacarpus and Quercus. Mainly, people of Northern Laos refer to them as “Mak ko”, the nut family, and when it is about the wood Lao people refer to them as “Mai ko." These oaks and chestnuts are distinctive in moist evergreen and dry evergreen hill forest. They are mainly evergreen and frost-hardy species with some oak species being deciduous. Fagaceae trees are very important genus and are the most common fuel wood and charcoal source in the uplands of northern Laos (Lehman et al. 2003). The

balance of tree species in a natural forest patch depends on three main factors: moisture, altitude and disturbance. The map in figure 5 shows what the terrain looks like around the villages. The green patches are forest of various kinds. Close to the villages most of the forest is secondary dry forest. Higher up in the mountains larger natural forest types are located.

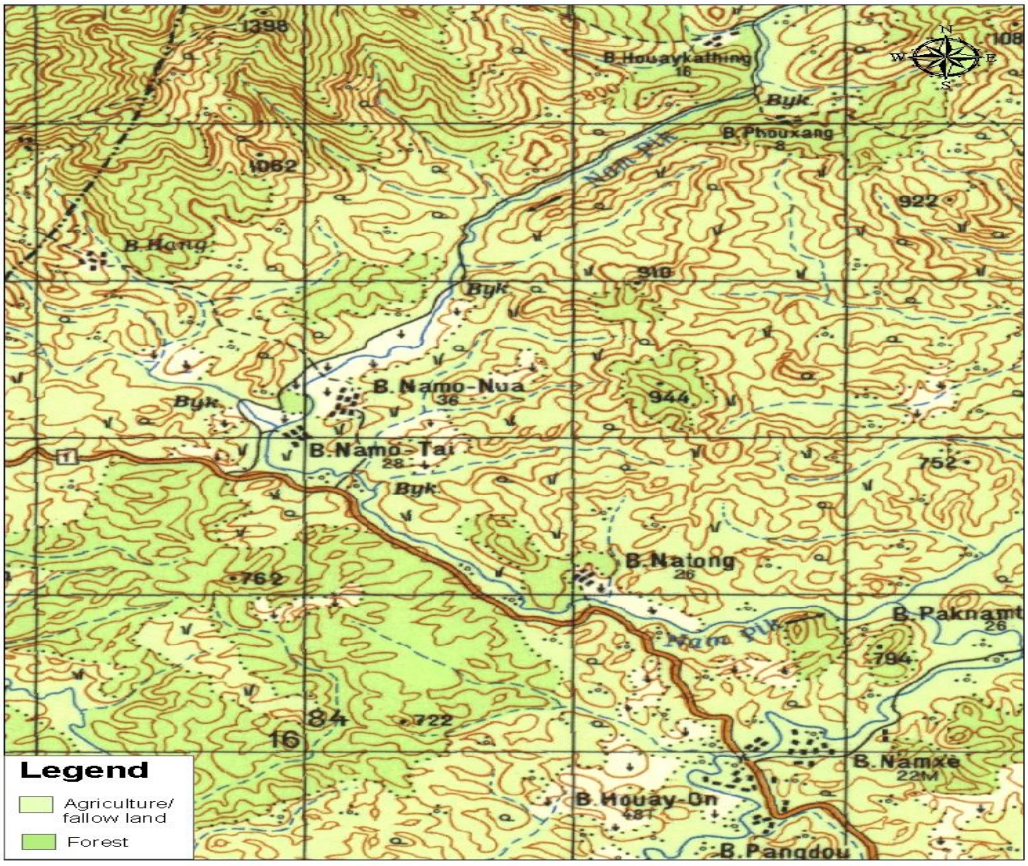

Figure 5: Terrain map. Namo Nua is positioned in the middle and Phou Xang can be seen at the top right corner (NAFRI, 2004).

4. Village description

Both villages are located in the same valley and are neighboring villages which can be seen in previous maps (Figure 3 and 5). Namo Nua is close to the valley foot and close to the river which can be seen in Picture 1. Phou Xang is positioned close to the ridge on the west hillside Picture 2. A rough gravel road follow the ridge from Namo Nua up to Phou Xang.

4.1 Namo Nua

Picture 1: Namo Nua from the West (2005-11-22). Photo: Erik Kretz

Thai Dam ethnicity (Lao Lum)

Village headman: Mr Noysuni (2006)

Population size of the Village 2006:

- Families: 87
- Households: 59
- Population**:** 453

Village land:

- Total land 1156 ha
- Pasture land 19 ha
- 3 years fallow: 103,11 ha
- Village size 2,5 ha
- Other land(road, river, etc) 87 ha
- Forest land 998 ha
- Agriculture land 47,15 ha
- Average agriculture land/family 3 ha

Namo Nua village is located seven km west of Na Mo town close to the main paved road between Oudomxay and Luang Namtha. The village land varies in elevation from 670 meter to 770 meter above the sea level. It is positioned in the lowlands with a comparably large proportion of irrigated paddy fields. The village is graded as medium poor (Anon, 2005). The village is organized with one headman and two-three deputies; one of these is usually a women. Under the headman is the village organized in six groups. Three groups consist of nine families, two groups of eleven families and one group of ten families. Each group has one or several leaders. The groups have the function to help each other with larger tasks and with working duties within the village community.

According to village elders was the village established 150-300 years ago, by people who immigrating by foot from the area close to Vietnam, as a result of bad cropping years and with too many new immigrants moving in from China. The oral histories suggest that approximately 15 households moved from the region beyond the Mekong River, each family

carried 80 kilo of upland rice for propagate, tools, daily needed clothing and herded a few livestock throughout the unexplored tropical forest. The villagers settled along the small river of Nam Pik, the oldest recorded village in the area. The villagers started to slash and burn the area so each family got approximately one ha land to grow their upland rice. Their main food was different kinds of bamboo species, fish, wildlife, vegetables and mushrooms gathered from the forest and rivers. The forest provided the village with a rich supply of forest products and ecosystem services to the 1950s when they first started to lack some important forest goods. In hundreds of years the forest and rivers were full of food, medicine and construction wood. One day of fishing could provide a household with fish for a week, and there was sufficient of construction wood in the forest to all kinds of constructions and tools. In the middle of the 1800s the villagers started to cultivate their land along the river by creating paddy fields for rice production. With more food the population started to increase rapidly and provided for a longer life expectancy. In 1958 according to oral history 42 families were recorded in the village.

In 1962 most of the village was burned downed in American military raids. During 1962-64 the village was attacked several times, with heavy destruction of buildings and cultivated land. The villagers gained protection in the forest during these attacks. The rice harvest was all ruined, and many of the livestock were killed or scattered, the villagers were forced to gather most of their food from the forest and rivers. Due to the attacks more trees were harvested for constructions to build up the village. Initially temporary huts were made of bamboo and rattan leaves. After some time with gathering of more and better construction wood better buildings were set up. The war had accelerated an over use of the forest and the villagers had to move further into the forest to find the forest products they were looking for. At the same time new tribes moved into the area and settled around Namo Nua. The pressure and concurrence of the land increased even more which Namo Nua disliked.

From earlier reports Namo Nua are classified as a middle class village. Most of the households have a well-mannered household with motorized farming equipments and other tools that has to be purchased. Most households own a tak-tak machine, which is a common farming tractor in Asia, or rent one during the most needed periods which is a big help during the rice harvest. Motorbikes are also common in the village that can easily take people to Na Mo town for buying items and for trade. Trade is also possible by the road to China that goes through Namo Nua village land. The government has recommended the villagers to move their homes closer to the road for better trading opportunities. However, most villagers are against a move and so far only one household has moved to the new location across the small river.

In the last decade other changes have moved into Na Mo district and Namo Nua with “human aid projects” and are based from different human aid programs and organizations. There are agriculture and agro-forestry projects in the village financed by (sida).

4.2 Phou Xang

Picture 2: Phou Xang from the North (2005-11-27). Photo: Erik Kretz

Phou Xang ethno-linguistic (Lao Sung)

Approximately 500-1000 people within this tribe in entire Laos

Village headman: Mr Boncham

Population size of the village 2006:

- Families: 46
- Households: 30
- Population**:** 167

Village land:

- Upland rice: 30 ha
- Average agriculture land/family 1,9 ha
- Conservation forest: 8 ha
- Bitter Bamboo: 20 ha
- Sweet Bamboo: 1 ha
- Song Bamboo: 3 ha
- Hok Bamboo: 7.5 ha

Phou Xang is located on a mountain ridge 900 meter above sea level. The village moved eight times over the entire region before they settled at this position. The villagers expressed that they want to stay were they are because the health situation is good and they have a good road connection. Phou Xang village established on the location in early 1980s arriving from the north and become a neighboring village to Namo Nua. The village is lead by a village headman. There is one small school in the village for children to participate in their own language. One school teacher is working with the children and he is also one of few villagers that can speak Lao and work as a translator. There is one road connecting to the village, the road is in bad shape and in great need of maintenance. Phou Xang is classified as a poor village (Anon, 2005). Compared to Namo Nua houses are not more than shelters in Phou Xang and only two tak-tak machines exist in the whole village. The wealth difference within the village is easily viewed; one household has built their house of cement when the poorest households live in houses that consist of bamboo and softwood. Most house designs are very simple and using the soil as the floor. The village is overall in rough shape and has a complicated village design. Some families in Phou Xang do not have enough rice for the whole year and malnutrition is a common problem. Upland rice is the dominant food source; maize is on the other hand the most important cash income and is used as fodder to the livestock. The village is organized in two livestock groups which also are a sida project. Twelve families care about 52 goats and share pasture and fodder, another group of seven families care about 32 beef cattle. This is the first year of the project, they are moderate about

how effective the project is working and some families do not understand what cooperation means. In the past Phou Xang was a semi-nomadic tribe that moved from one place to another after they had used up most of the natural resources on one site. Today the situation is different and they are not allowed to move around as they did before. This causes severe problems; they still have the old traditions of land exploration and land use which are not sustainable.

5. Project plan

The project plan was set up together with NAFRI in Vientiane. The initial working schedule was planed to three different field periods in Na Mo district and between them go back to Vientiane or Luang Phrabang for short briefings (Figure 6).

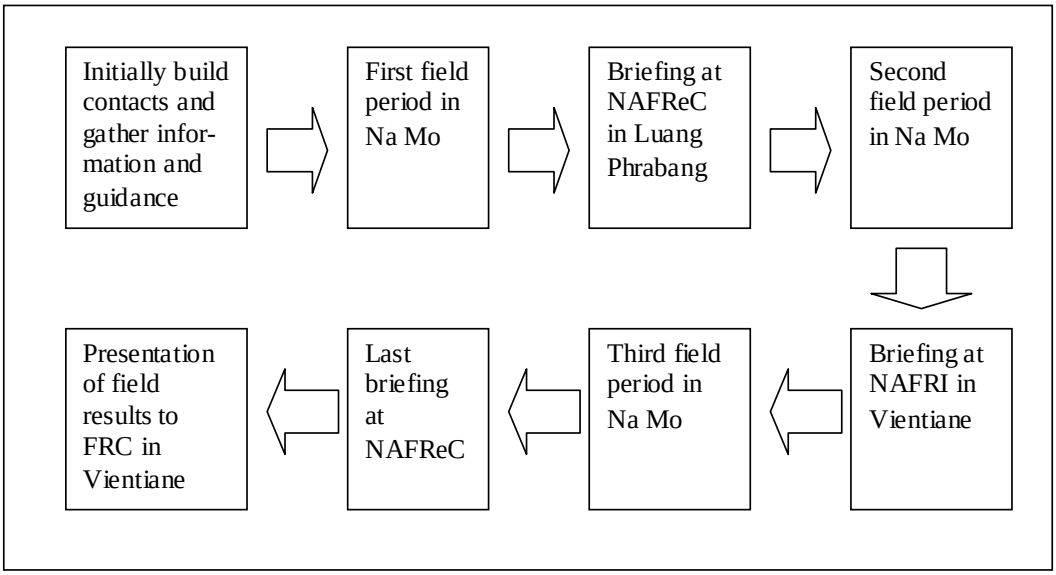

Figure 6: Flow card of working period in Laos

At the initially stage before leaving for Na Mo several semi structured interviews and informal meetings were conducted both with forest experts at NAFRI, Northern Regional Agriculture and Forestry Research Centre (NAFReC) and with non-governmental organizations in Vientiane. The interviews provided us with necessary information for the study and about the study area. During these meetings knowledge about interview techniques and guidance of Lao culture were provided. Maps and ortho-photon were assembled to give a better overview of the study area at NAFRI.

Before conducting the field interviews the study needed to gain approval from the national, provincial and district governmental instances namely 1) NAFRI 2) Forest Research Centre (FRC), 3 NAFReC 4) District Agriculture and Forest Organisation DAFO. After these steps, acceptance for the study also needed to be given by each village headman. The field periods were first organised at Na Mo village in Lao Swedish Upland Agriculture and Forestry Research Program (LSUAFRP) headquarters together with one forest expert from FRC and one forest expert from NAFReC. The work was organized into three main interview phases. First phase was to get an overall view and knowledge about the two concerned villages and the villagers´ situation and interests of the forest and forest products. This was done through participatory mapping and first stage household interviews. When the initial stage was finished further interviews were conducted which focused on more specific questions about house constructions, forest products and the forest situation. During this stage most household and group interviews were conducted. During the second stage also a smaller research outside the concerned villages was performed with a field trip to a small sawmill and furniture factory

and a screening of the neighbouring villages were performed. The last main stage focused mostly on the forest with field expeditions into the forest together with additive household and group interviews. In between the field periods briefing meetings with NAFRI and NAFReC were performed. During these briefing sessions evaluation of the interview material was analysed together with personnel from those offices. New guidelines and focus points were set up for the next field period.

After the latest field period in Na Mo FRC requested a presentation of the results and methods regarding the performed work in Na Mo. The presentation was presented at the FRC headquarters outside Vientiane, this worked out very well as an evaluation of the study and some new focus points were brought up.

5.1 Village Selection

This study was conducted at the villages at Namo Nua and Phou Xang. The decisions to single out these two villages were made together with DAFO in Na Mo. Selection criterion were one lowland village with good road connection and one fairly remote village in a mountainous location. The idea behind this was to get a broad perspective of the dependence of natural resources throughout two villages with different natural surroundings and different possibilities for trade. These two villages were also selected due to their ethnicity and on previous projects that have been conducted in the area. A previous social-economical study was carried out in Na Mo district where seven villages where included in the study. The social-economical study provided necessary background information about the concerned villages, with wealth classification of the entire villages and households in each village.

5.2 Interviews

Throughout the fieldwork a qualitative approach of open semi structured interview technique was used in a few different shapes. The idea of this interview method is to have a prepared questionnaire brought to the interview. The interviews were always conducted as an open discussion. All respondents had the possibility of developing their answers during the discussions. In the early stages, interviews and meetings with both governmental and non-governmental stakeholder-organisations were conducted. Here both semi-structured interview technique and snowballing were used. The concept of snowballing originates from social sciences were the researchers utilize on existing interview contacts for reaching new interview objects. This technique was used at this initial stage. Here, background information on the subject and on the actual location was collected. After the initial stage a field interview manuscript was designed. This material was designed strictly to a questionnaire, the questions were later asked randomly, in line of the immediate situation. During the interviews the answers were noted on the questionnaire for that specific interview group and were later compared for answers and analysis. Whenever the answers were mentioned in the discussions they were also noted. This technique allowed other important, not expected, facts to surface. New interesting questions were brought up, and passed on to following interviews. In this way the interview manuscript was always in development.

Four main interview types were used in field. In both villages was participatory mapping used as a start together with semi-structured interviews. These initial interviews were conducted both with single households and with small villager groups. After the initial interviews were more specific interviews performed. These interviews were designed to answer questions and issues about specific forest products and house constructions. Furthermore a forest inventory was accomplished inside the village boundaries together with local foresters. During the forest inventory was also informal discussion in the forest performed which was noted.

Fieldwork was organized into four main interview groups.

- Participatory mapping.
- Group interviews
- Household interviews.
- Forest inventory.

5.2.1 Participatory mapping

Participatory mapping was the first interview method used in the concerned villages. This type of interview was made to improve local participation in forest queries and to achieve more information that in other types of interviews would be hard to achieve. The overall objective with participatory mapping was to let the villagers describe the surrounding land in their own words and draw the features at a blank sheet and so on creating their own map. This gave important knowledge and understanding regarding how the villagers looked at their village land and gave a good base to continue with other interview methods such as household interviews. The map was later a good tool in household and group interviews to derive interesting focus points and to easier show where and what the concerned questions and objects are positioned. In participatory mapping the session starts with the large blank sheet of paper as mentioned above, and ends with a hand drawn map over the village surroundings. The headman of the village, the deputy headman and elderly villagers was present during this mapping session. Picture 3 show a participatory mapping event in Phou Xang. The villagers are first asked to add simple features like roads and rivers to the paper, after a while when the map gets more and more details the researcher asks about geographic, numeric and nominal features concerning the study and adds them to the map.

Picture 3: Participatory mapping in Phou Xang. Photo: Erik Kretz

5.2.2 Household interviews

Interviews were conducted in households of different wealth class. Here facts concerning the direct scoop of the study was collected such as “most used forest products”, “most preferred forest product," “quantities collected of these," “time spent on collecting," “values of major forest products," “most used construction wood," “most preferred construction wood," “quantities and time spent," “management practices for increasing quantity and quality of certain species," “most important forest and why this is important, " etc. Open ended discussions were also promoted during these interview sessions. The most common situation was to have the interviews inside the house of the household or on the ground outside the house. This brought many good opportunities to point out interesting construction features and made the interview much smoother to accomplish. The household interviews were mostly planned and organized together with the headman or someone from the village the day before the interview. The household interviews could be divided into two different types; stage one and stage two household interviews. Stage one was more basic based questions asked during the first field period. The objective was to give the researcher a better knowledge of the concerned villages and households. The second stage was more specific forest queries of interest. The focus was to get answers on the forest and house construction queries from the households, the village chief and the village taxman.

5.2.3 Group interviews

Group interviews were a complement to get better information than what could be accomplished during household interviews. In group interviews were specific people asked to participate, and sometimes other people were asked to not be present during the interview, like men, otherwise the interview could be disturb and make the concerned people quiet. The objective of these interviews was to gather information that single households could hardly answer. Group interviews were conducted with: women groups as shown in picture 4, elder groups and forestry workers. Groups were both brought together informally when an opportunity came along or more formally organized together with the village headman. The specific questions asked during group interviews were similar to those questions asked in the household interviews for example; “values of major forest products," “most used construction wood," “most preferred construction wood," “quantities and time spent,". All group interviews were unique in the terms of the composition of participants. For example in women group interviews subjects regarding women forest work were more of the issue. In elderly group interviews the history of the forest was the major focus. Specific interview questions were designed for those interviews. Most of the group interviews were spontaneously achieved when opportunity came along, for example one group of women and a forest harvesting group in action.

Picture 4: Small women group interview in Phou Xang. Photo Erik Kretz

5.2.4 Forest inventory

Together with village farmers and foresters expeditions in the village forest were carried out with the purpose of getting a better picture of the forest situation. The villagers showed and told about different forest types, trees, products and uses. The objective of these expeditions was to let the villagers describe and point out interesting forest subjects and forest products, inside the actual forest. The expeditions went to a few important forests that the villagers had described in the participatory mapping interviews. Examples of visited forests types were; Conservation forest, Protection forest and Production forest. The idea was to walk through the most important forest types and make a more detailed liner inventory inside the Production forest. It was decided that a seedling inventory was to be carried out in the Production forest together with the farmers. The liner inventory method was used and plots were scattered on a line drawn on a map. From the first plot a compass direction was taken, from that direction 50 steps were paced out to the next

Picture 5: Forest inventory in Production forest in Namo Nua. Photo: Markus Steén.

plot. GPS and maps provided from NAFRI were used during the plotting and when finding the plots in the forest. It was necessary to improvise during the pacing to the next plot when the forest size on the map was incorrect. Plot data was collected in terms of: large trees, number of tree seedlings, species, bamboo, lianas, and important NTFPs. 21 plots were made inside the Production forest to make a sample of tree seedlings and mature trees. In the large plots a diameter of ten meters was used and trees larger than seven and half cm in dbh were noted. In the seedling inventory a square of one times one m was used which was positioned at the center of the larger tree inventory plots. The larger tree plots had an area of 314 m^2, the factor to multiplies is (10000/314) = 31, 85 to get the number of trees in one hectare. The seedling plot is one m^2, the factor which is used to multiply is then (10000/1) = 10000 to get the number of seedlings in one hectare.

5.3 Tree names and identification

Identification of tree species has been done together with local villagers. In both Namo Nua and in Phou Xang Lao language were used, which was provided by villagers in Namo Nua and Lao speaking villagers in Phou Xang. The FRC-researchers were also contributing with their knowledge of local names and general descriptions of the tree species.

6. Results

6.1 Namo Nua

6.1.1 History of house construction

According to the villagers in Namo Nua have the village been positioned at the same place for many generations. The inhabitants of the village have during this time period acquired their own knowledge about the surrounding forest. This knowledge has been past down through generations of people living in the village. Construction skills and knowledge about timber is one of the most cared about traditions. During the war Namo
Nua village was burned down three times. The villagers constructed temporary shelters to live in. They worked together as one group and helped each other to construct new houses. In post-war time the need for new houses was high and many traditional house designs could not be followed. The houses were constructed on 50 cm poles instead of the usual two meter poles. Leaf from rattan or grass was used as roof. The largest houses consisted roughly of one tree for the walls and one tree to the floor; the stem was about one and the half m in diameter and six-ten meter long. Mai saw was the wood mainly used and most of the house designs looked the same during this time. Difference between the wealth classes was hard to see. With the co-operation within the village each house took two days to be completed. It was around 50 people that helped with the actual construction work. After a few years most households started to construct new and better houses. Those houses where built with the knowledge of their ancestors and with the skill of the man holding the saw and cutting knife. Those houses are still standing and are used as their main dwelling homes. Some of them are close to 40 years old and are still in good shape.

Namo Nua villagers build their houses on high poles, several meters over the ground, and use many kinds of tree species in their constructions. The main reason is to get rid of diseases which are spread by animals and insects on the ground. The houses have a typical design for the village. The villagers look upon the houses as a wealth standard. How the actually house is constructed is closely related to what wealth class the household belongs to. The situation regarding why and when the house was constructed is also of interest for the house design. New and modern materials are being more frequently used in the house constructions. The most obvious is the sheeted metal roof that is used instead of wood, grass, rattan or bamboo roof.

When production of a house begins it is usually household's oldest man that leads the work. It takes about two weeks to build a good house and about 14 people normally work with one house. They mostly use handmade tools made by the village blacksmith. Only a few nails are used in the construction, it is built to be fixed together like a puzzle. The wood and the material that are used in the house is gathered and processed by the household. Men and boys within the family and some kinsmen usually help out to harvest the trees and process it to planks, beams and poles. The wood used in houses is processed for one purpose and one place in the house, the properties of the wood is well recognized and is put into concern when it is used. It is high requirements on the wood and it needs to be able to stand for a very long time. A house can easily stand for more than 50 years if it is properly built. The villagers in Namo Nua expressed an increasing agony regarding how to find acceptable timber to build new houses or repair old ones in their old traditional way. Household interviews showed that most houses are constructed with timber species that does not exist today in the community forests

or in the neighboring villages´ community forests. Today all wealth classes have problems to collect sufficient good quality wood to constructed new houses.

6.1.2 Timber extraction and wood usage

According to villagers, wood is the most used material in house constructions. Selective logging is the main source of construction wood. Today, the wood mainly is harvested in the community forest, but also in the Conservation forest and Protection forest. Wood is also bought from neighboring villagers, which is more frequently done in recent years. According to the villagers, are they today focusing on secondary quality wood and are harvesting immature trees and tree species that in the past seldom were used. In the past a larger area was used for timber extraction and the villagers could harvest trees in unlimited amounts in walking distance from the village. Harvesting wood is usually done during the cool season when there is little other activities. Namo Nua villagers use many different kinds of wood species. House constructions are the main use of wood from the community forest where whole trees are cut down. For tools, fences and small shelters is secondary wood mainly used, such as young trees, bamboo and spare-wood from timber extraction.

Firewood is commonly gathered in old slash and burn sites and in the Production forest. Young trees with a small diameter are harvested for charcoal production and as firewood. The most preferable trees for charcoal and firewood are species within the Mai ko family (Fagaceae family); they are characterized by a high energy value and create a small amount of smoke.

Processing wood, from debarking to sawing it into planks, beams or poles is all made by the villagers themselves. Harvesting and processing the construction wood is traditionally men work. Only men are working with the felling and processing operation. According to the village elderly people the knowledge is past down from father to son and is often a household's most cared about secret, especially where to find the best wood. They process the wood with hand tools and manpower. Skidding and transportation are done by manpower or with buffalos and in some rare times with a tak-tak machine. The wood is usually processed were it is felled and using the elevation for the best felling result. The beams and planks are sawed in situ often with large two to three-manned handsaws. They cut down the trees with knives and smaller handsaws. The actual felling and processing of one large trunk to beams and planks can take two weeks or even more. Some of the villagers have come up with new methods of processing the wood. When poorer quality wood is used some kind of treatment of the wood is necessary to make it more repellent against insects and fungus. The wood is put into a pool of water for at least a month; the time in the pool depends on what kind of tree species. The water treatment will later prevent insect and fungus attacks when the wood is used in constructions.

6.1.3 Wood consumption and preferred timber species

2004 Namo Nua constructed two new houses. In average one and a half new house are constructed every third year according to the taxman. New shelters are constructed in the rice fields and community owned buildings, such as school buildings, which always demand more wood. According to the taxman a house consist of roughly 28 m^3 of processed wood and shelters consist of 2-6 m^3 processed wood. From discussions with the taxman the entire village uses approximately 40 m^3 of good quality wood and more than 30 m^3 of lower quality wood from large trees each year. It includes one house, one shelter and repair wood.

During the last 50 years thirteen different timber species and three bamboo species are the most common used construction materials in Namo Nua (table 1). Eight of those tree species are more frequently used and preferred (table 2). Mai kang deng, Mai dou, Mai saw, Mai fasien, Mai thon, Mai thalo and Mai ghen are all tree species that were more commonly used in house constructions in the past (table 1).

Tabel 1: Tree species used in constructions which is divided into different kinds of buildings and compared to the abundance and in what wealth classes it belongs to. The data is also compared to what kind of trees is used today and 50 years ago.

Timber species	Main houses	Shelter	Poor households	Middleclass Households	Used today	Used 50 years ago
Mai dou	X	-	-	X	-	X
Mai kang deng	X	-	-	X	-	X
Mai saw	X	-	O	X	O	X
Yellow-ko	X	X	X	-	X	O
Mai jar	X	X	X	X	X	X
Mai tien pet	X	-	-	X	O	X
Mai thalo	X	X	X	X	O	X
Mai deng deu	X	-	-	X	-	X
Mai hien	X	X	X	-	X	O
Mai ko hit	-	X	-	-	X	O
Mai law	-	X	X	X	O	X
Mai fasien	X	O	-	O	-	O
Mai ghen	X	X	O	X	-	X
Bamboo						
Bong	X	X	X	O	X	X
Hok	X	X	X	O	X	X
Hien	X	X	X	X	X	X

X = are used. O = sparsely used. - = are not used.

Today many of the preferred timber species has been replaced by other timber species which are easier to obtain. One example is Mai thalo that today is very hard to find in the forest and has been replaced by Yellow-ko, other examples see table 2

Tabel 2: Most preferred and used timber species at Namo Nua.

Timber species	Wood use and properties
1.Mai dou	Mai dou is the number one preferred timber tree. It is very strong and resistant to most kind of rot and insect attacks, but also relatively easy to process into beams and planks. It is used as beams, wall and floor planks. Today it is close to impossible to find for the villagers, and is more or less replaced by Mai jar.
2.Mai saw	Mai Saw is easy to saw to planks, it takes 20-30 years before it is mature to be harvested, it was used more in the past and today is nearly impossible to find. Mai saw is a soft to medium hard wood and is very easy to saw and have many similarities to teak. It is used mostly in walls but also as floor. Today replaced by Mai jar and bamboo.
3.Mai kang deng	Was in the past commonly used as beams but is today very hard to find.
4.Mai deng due	Can be made thin but still be very strong, is mostly used on important places as beams to support and carry a lot of load. It is mainly used as roof and floor beams. It is resistant against fungus and insects. Today it is very hard to find and is replaced by Mai jar.
5.Mai thalo	From Mai thalo they mostly make poles. The tree does not grow that tall but can have a large diameter. It is strong and reliable and used mostly as poles to support the house. It is coming harder to find but is one of few timber species which still be found as seedlings in the Protection forest. Is today replaced by Yellow-ko
6.Mai tien pet	Is used as beams and is light but still very strong. Today, it is very hard to find.
7.Mai jar	Mai jar is of good quality and has moderate resistance against insects and fungi attacks. It is still easy to find in the Conservation forest and outside Namo Nua village boundaries. Has historically been used by poorer households in all places at the house. The most common use is beams to support the house but also wall planks. It is one of the most common timber species which is used in today's houses and in all wealth classes because of its accessibility and good wood quality.
8.Yellow-ko	Is in the Mai ko family and is today a very important timber tree which is used for poles instead of Mai thalo. It is easy to find and has moderate wood properties and resistance to fungus and insects. It is commonly used by poor families.

6.1.4 Poor households in Namo Nua

There are a few poor households in Namo Nua. Poor households use mostly wood of lower quality, which is easier to obtain. There is often a lack of equipment and most work is done manually. The most commonly used tree species by the poor families is Mai jar as beams and planks and Yellow-ko as poles and other supporting constructions (table 1 and 2). These two tree species are used in most constructions, not only today but also in the past when other better tree species existed close to the village. Bamboo is an important construction material. It is commonly used as floor and wall instead of sawed planks. They use Hien bamboo for the wall. Bong and Hok bamboo are used for the floor. Over the floor are carpets made of very small strings of Hien bamboo which is used to make it steadier and more secure. In more heavily used places, like the kitchen, is the floor mostly made of planks to decrees the amount of accidents.

Picture 6: A typical house design for poor households. The walls are made of bamboo and there is some repair wood under the house. Photo: Erik Kretz

Peng Sai Household
Classified as a poor family
Six people in the family one woman.

As an example of poor households Peng Sai's house was chosen, its family consists of only one woman that can provide the household with basic work and products; cooking, childcare, collecting firewood and food. They do not own any motorized equipment but hire a tak-tak to help with the rice harvest. During most years they survive on their own rice harvest, but occasionally they have to buy external rice.

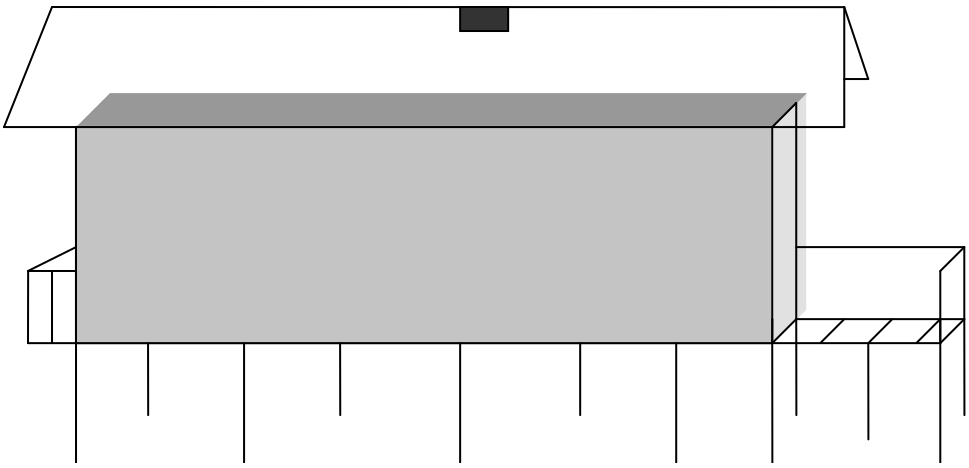

Figure 7: An illustration of Peng Sai´s house design; it is simple with no unordinary features. It has no windows and only one big room.

The house was constructed during 1973-76. Compared to other houses in the villages it is one of the smallest and is lacking a big veranda and windows that most other has. There are only a few tools and extra repair wood found underneath the house. The house is estimated to be five meter wide and eight meters long with a small veranda in front of the entrance and is standing on two meter high poles. The family would like to invest in a Zink roof; the maintenance of the existing grass roof is too labor intense. Earlier they used rattan leafs as roof but today rattan is hard to find and is not used. The house was built by the grandfather and the father of the household. They used Mai jar, Mai saw and Mai thalo. Most of the house is built by Mai jar and Mai thalo.

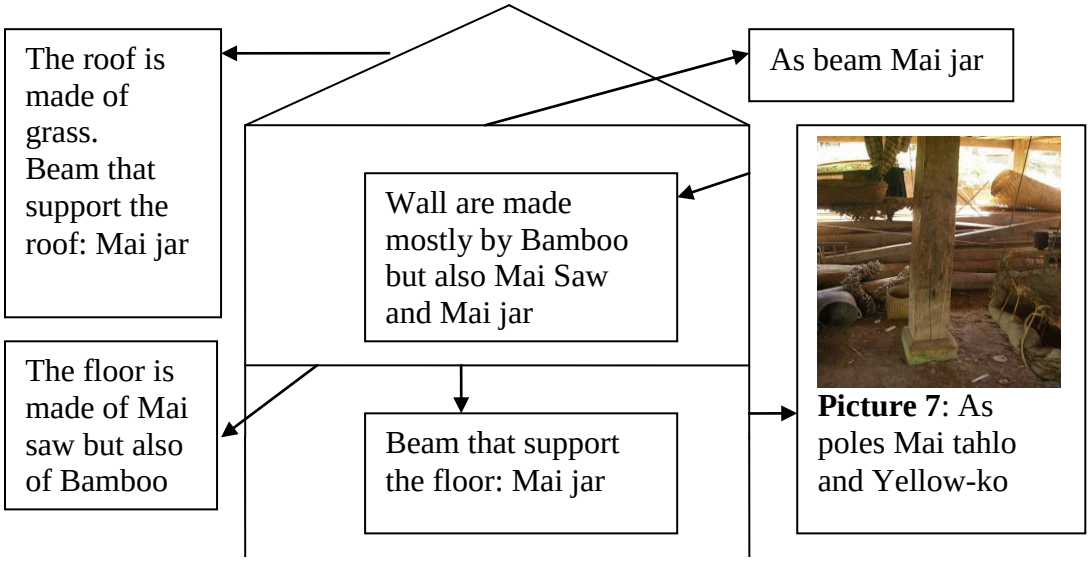

Figure 8: Species used in Peng Sai`s house. Photo: Erik Kretz

According to Peng Sai Mai jar is the most commonly used construction wood. Yellow-ko is the dominant tree to make poles of. If he would build a new house Mai jar would be used, it is easier to find and there is still big trees that can be cut down. Mai thalo is very hard to find there days and Mai saw nearly impossible to find. Instead of Mai thalo he would use Mai ko species and especially Yellow-ko. He would cut down the trees in the Conservation forest or maybe in Phou Xang where he still can find big trees. He doesn't see the Production forest as a good source of construction wood. His father and the oldest son would help him to cut down the trees, debark and saw it to planks. If the tree is felt at a complicated position would he cut

it into blocks and carry the block to better place and process it there. It takes about ten minutes to cut down the tree and two hours to process it to a single stem with cutting of the branches and the top. It will take approximate 2-14 days to saw it to planks or a block which depends on the tree size. December is the best month to do logging and house building when there is little other activities to be done.

6.1.5 Middleclass households

Middleclass households use a complex variation of different timber species in their house constructions. It can vary between 3-10 different tree species, the most common wood to be found in their houses is Mai saw, Mai thalo, Mai jar and Mai tieng pet. Middleclass households usually have plenty of repair wood underneath the house. The repair wood can be older than the actually house and derives from earlier constructions and are of the same good quality as the actual house. Many of the middleclass households have more than one house; usually there are one large main living house and one working house. The working houses stands on high poles but are usually without walls and not that well constructed as the dwelling house.

Picture 8: Small middleclass household in Namo Nua village. Photo: Erik Kretz

As the figure 18 shows there is plenty of repair wood underneath and traditional grass roof is used. In the front is a larger veranda positioned. This specific household is a moderate wealthy household, the house have no windows on this side and only one window on the other short side. The walls are made of wood as well as the floor inside the house which is something that most poor household's lack.

Singokham household

The household origins from 1954

As an example for middleclass households Singokham´s house was chosen. His family house burned down during the war. The family lived in a small shelter during the hostilities. The shelter was mainly built of Bong and Hok bamboo and Mai ko species, it was small and stood on short poles. When the direct threats of attacks were over the family started to build a better house that could stand for several years. This house was quickly built when many other families in the village needed help with their houses. The house was built in two days and the process to get the wood took two weeks. Mai saw was used for walls and floor. One big tree was cut down to be the wall and one to be the floor, it had a diameter of one and half m and a

useable stem of ten meter which was sawed into boards. The house was standing on 50 cm high poles, but it did not give sufficient protection against diseases; several persons got sick and died. When the village had recovered from the hostilities and the food was secured, they started to plan and gather good construction wood for a new and better house. The plan was to build a new house that was in the same size or larger than the house before the war. They decided to move the location away from the existing house and higher up on the hill, as they believed that the existing house stood on a place with bad luck and death. The house Singokham have today is twelve meter long and six meter wide and stands on two meter high poles. The house is divided in two rooms, kitchen and living room. The living room has a removable textile wall with the purpose of separating the living room from the sleeping quarters.

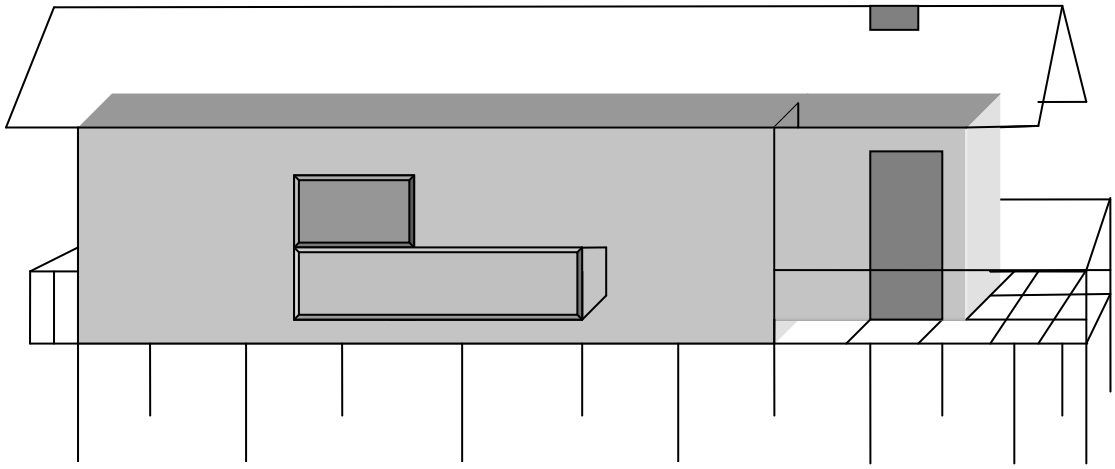

Figure 9: Design of Singhokam's main house.

The house is 35 years old. There are two small balconies and one bigger veranda. Mai tieng pet is used as roof beams, Mai saw for the walls and Mai thalo as poles, the house stands on stones so they will not have direct contact with the soil. Mai deng deu is used for the floor. Singhokam preferred Mai dou as the best wood, it works very good as beams and as wall and floor planks, it is very hard and resistant against all insect attacks and rot. Some of the beams are made of Mai dou which Singhokams is very proud of. Singokham has plenty of extra wood underneath the house; most of the wood is from the old house. Singokham has thoughts about improving his house with a larger external veranda. He is truly proud of his house and would not like to build a new one in the nearest future.

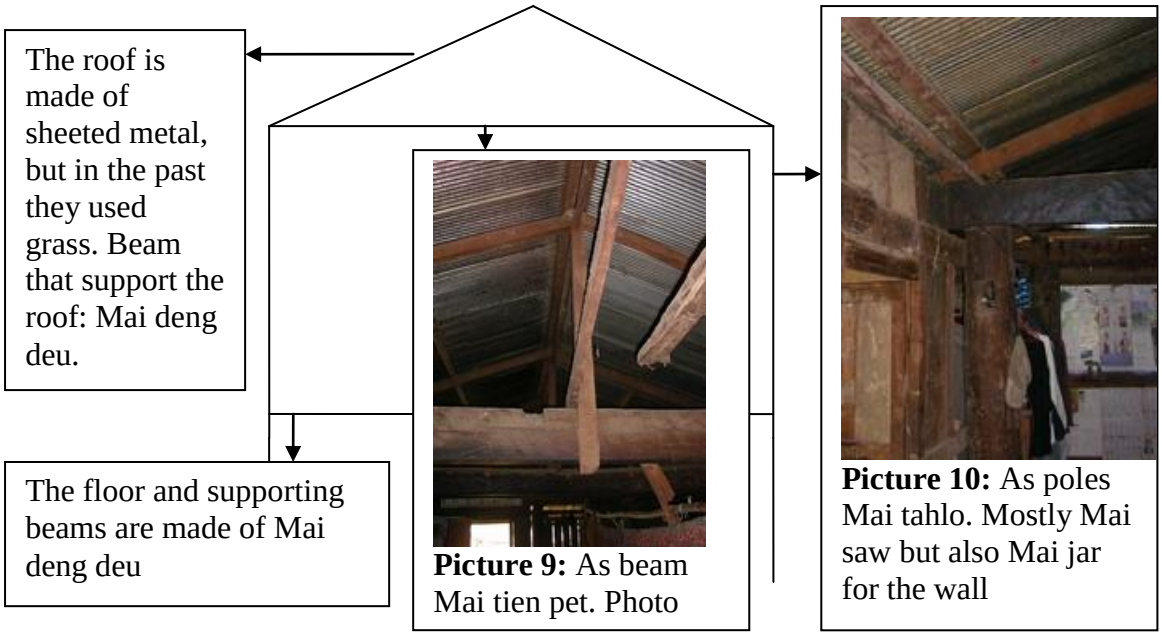

Figure 10: Timber species used in Singokham's house. Photos: Erik Kretz

6.1.6 Forest and Land-cover changes

Since the 1980s agriculture land has increased rapidly. Paddy fields have expanded, and unused lowland areas have all been converted into permanent agriculture land. Significant forest degradation done by human activities is noticed everywhere in the village community forest. Some parts of the community forest have lost close to all of its values which was explained and showed during the forest expeditions. Ortho photon and maps of the village territory support the stories told through the oral histories and interviews. The interviews and field research showed a significant reduction in dense forest with notable increase of fallow land, degraded forest and shrub-land. The forest degradation has been intense; close to all of the dense forest is gone, it only exists in the remote Conservation forest and partly in the Protection forest and spiritual forest. In both of these protected forests have logging and gathering of NTFP has occurred. All lowland is cultivated and most other land is covered by secondary forest or fallow land. Today there is a need for more land for cultivating food and cash crop plantations such as: rice, maize, grass, rubber trees, teak, aga wood and puak muak which was noted during the household interviews.

6.1.7 Forest inventory in Namo Nua Production forest

The Production forest is located along a ridge with dry conditions to intermediate moisture close to the valley base. The ridge is also scattered with old trenches made by the Chinese after World War II. The forest has historically been important as a source of timber and many NTFPs for the villagers. It was pointed out by the DAFO to be a Production forest. The forest's size is decreasing rapidly and is divided into three separate forests. Close to half of the protected area has been transformed to agriculture land and fallow land after it was designated as protected forest in 2000. This has been made clear when making GPS waypoints around the forests which has been taken along the existing forest boarder of the Production forest and compared to the designated area in year 2000. According to the villagers the forest today is mostly used for collecting firewood and harvesting a few NTFPs and low quality timber. Most valuable tree species and NTFPs have been harvested extensively hard and are today not found in the forest or are in very low abundance. The forest inventory showed only a few valuable timber trees and NTFPs in the Production forest. Six tree species which had some valuable interest for the farmers were found in the mature

tree and seedling inventory (table 5 and 6). Two Mai thalo trees were found which were too small to be harvested and also three seedlings of Mai thalo were found (table 5 and 6). The farmers were only concerned about Mai thalo and some of the Mai ko species found in the forest inventory. The other trees which were used in constructions were all common in most types of forest and fallow land. In total 59 different tree species, 16 NTFP species, five liana species, five bamboo species were found during the forest inventory, as well as a number of unknown trees and NTFP species without any local names.

Table 3: Species list of timber species inside the production forest which had some construction purpose in the village and in what abundance they occur.

Trees used as construction wood	Sample	trees/ha
Mai ko nam	25	38
Mai ching mone	13	20
Mai ko sp	8	12
Mai pao	8	12
Mai muat	7	11
Mai thalo	2	3
Total:	63	96
Total of other tree species	96	146
Total number of trees in all 21plots	159	241

Table 4: Seedlings of interesting construction wood found in the Production forest and in what abundance they occur.

Seedlings used as construction wood	Sample	Seedlings/ha
Mai ching mone	30	14286
Mai ko sp	20	9524
Mai pao	15	7143
Mai muat	11	5238
Mai thalo	3	1429
Mai taou	3	1429
Total:	82	39048
Other tree seedlings	120	57143
Total number of all tree seedlings	202	135238

6.2 Phou Xang

6.2.1 History of house constructions

The forest surrounding Phou Xang has so far not been devastated to the same extent as in Namo Nua. The forest has been intensively searched to find important timber long before Phou Xang settled in the area. Most old forests are found in deep ravines or at steep hillsides and hilltops. In the past Phou Xang had a semi-nomadic lifestyle and moved from one place to another, there was little time and resources spent on their houses. Today, the situation is different and they are not allowed to move around as they did before. However, most villagers still live in their old traditionally deigned houses. Phou Xang was one of the latest immigrants to the area. During the time of settlement the surrounding hills were covered by dens forest.

Houses in Phou Xang are generally small and made simple. The design depends on wealth class, available construction material, technology and traditions. Most people in Phou Xang build their houses on the ground and use only a few tree species. They use the soil as the floor. How the actual house is constructed is closely related to what wealth class the household belongs to. The situation regarding why and when the house is constructed is also of interest for the house design. New and modern materials are more frequently used in the house constructions. One house in the village is constructed of cement. Other new modern materials are sheeted metal roof which is used instead of wood, grass or bamboo roof and can be seen in picture 11.

Picture 11: On the left side of the picture old traditional wooden roof can be seen, on the right side a modern sheeted metal roof. Photo: Erik Kretz

6.2.2 Timber extraction and wood usage

According to the villagers' wood is the most used material in constructions. Harvesting the wood is usually done during the cool season when there is little other activities. Today the people are focusing on secondary quality wood but are still finding sufficient amounts of wood in their community forests. House constructions are the main use of wood from the community forest. Some wood is also sold to other villages. For tools, fences and small shelters secondary wood is mainly used, such as small trees, bamboo and spare-wood from timber extraction and young trees. Firewood is commonly gathered in old slash and burn sites.

They are processing their own wood; from debarking the wood to saw it into planks, beams and poles. In figure twelve a trunk of Mai jar is sawed into beams, it is going to be used to repair a house in the village. Harvesting and processing the construction wood is traditionally men work. Only men are working with the felling and processing operation. The knowledge is past down from father to son. When processing the wood they use tools driven by manpower. Skidding and transportation are done by manpower or with buffalos. The wood is usually processed were it is felled and using the elevation for the best felling result. The beams and planks are sawed in situ often with large two to three-manned handsaws. They cut down the trees with knives and smaller handsaws. The actual felling and processing of one large trunk to beams and planks can take two weeks or even more.

Picture 12: Three manned handsaw used by local villagers. Photo: Markus Steén.

6.2.3 Wood quantity and preferred timber species

In Phou Xang only a few new households has been formed in the last decade, even if there is a high population growth. The never ending need for repair wood is always an issue. New shelters are constructed in the rice fields and community owned buildings, such as the school building, demands some wood. How much wood that is brought out from the forest is very hard to estimate but there is a constant flow of good quality wood harvested from the community forest. In contrast to Namo Nua wood is also sold to neighboring villages. Most buildings are badly constructed and there is a never ending need for more wood for repairing the old houses or to build new extension to the buildings. Nine different timber species and four bamboo species are the most used construction materials in Phou Xang (table 3). Phou Xang villagers focus mostly on a few tree species such as Mai thalo to make poles for the house, Mai mout is good in all types of constructions, Mai hien is good for roof cover, Mai kang deng is good as beams in all constructions and Mai jar is the most commonly used construction wood (table 4)

Tabel 5: Tree species used in constructions which is divided into different kinds of buildings and compared to the abundance today and 20 years ago. It is further divided in what wealth classes it is used in.

Timber species	Main houses	Shelters	Poor household	Middleclass households	Used today	Used 20 years ago
Mai saw	X	-	-	X	O	X
Mai ko hit	X	X	X	-	X	X
Mai jar	X	X	X	X	X	X
Mai ha	X	-	-	X	-	X
Mai thalo	X	X	X	X	X	X
Mai deung	X	-	-	X	X	X
Mai ham	-	X	X	O	X	X
Mai mout	X	X	X	X	X	X
Mai kang deng	X	X	X	X	X	X
Bamboo						
Bong	X	X	X	O	X	X
Hok	X	X	X-	O	X	X
Hien	X	X	X	X	X	X
Poa	-	X	X	X	X	X

X = are used. O = sparsely used. - = are not used.

Tabel 6: Most preferred and used timber species used in Phou Xang.

Timber species	Wood use and properties
1. Mai saw	Mai saw was more used in the past. Mai saw is a soft to medium hard wood and is easy to saw into planks and has many similarities to teak. It is mostly used in walls but also as floor.
2. Mai jar	Mai jar is of good quality and has moderate resistance against insects and fungi attacks. It is easy to find in the forest, it is used in most places in the house. The most common use is for beams to support the house but also as wall planks. It is one of the most common timber species.
3. Mai ha	Mai ha is used as poles for the house and is made into blocks. It is resistant against rot and can be used directly on the ground and still be fresh after 20 years. It is very hard to find in today forest and often replaced by Mai thalo.
4. Mai thalo	From Mai thalo they make beams and poles, the tree does not grow that tall but can have a large diameter. It is strong and reliable and used as poles and beams to support the house.
5. Mai mout	Good timber tree and can be used in most places in the house.
6. Mai deung	Is used for beams under the roof and is of good quality which is very resistant against rot.
7. Mai kang deng	Is good to use as beams in all types of house constructions but is hard to find today. It is strong and resistant against pathogens.

6.2.4 Poor Households

The poor people in Phou Xang live in houses that are not more than shelters. Some families in Phou Xang do not have enough rice during the whole year, malnutrition is a big problem. Most houses are very simple and stand right on the ground and use the soil as the floor. Usually it is only one room in the house which functions as both a kitchen and sleeping room. The roof is commonly made by grass or sheeted metal. For roof beams Mai ko species and especially Mai ko kit are used. For the main frame in the house Mai ko nam is often used. As walls Hien bamboo used but there can also be Mai jar as a wooden wall.

Picture 13: Poor household; walls are partly made of bamboo and planks. It is roughly constructed and in great need of maintenance. Photo: Erik Kretz

Ehen household

The family consists of the parents and one child

As an example the Ehen household was chosen to represent the poor households. There are only three people left in the household, three of the children died recently in accidents. The old house burned down by lighting, the same lighting that killed two of the children. Today they live in a temporary building which is going to be replaced with a better one when the household has enough food and time to build a new one. The existing building was rapidly built with the help of the village. They used Mai moon for the poles, the same species Namo Nua use to feed their silk larvae with. They have Mai ko kit and Mai ham for beams. They use Hien bamboo for their walls. They plan to build a new house within five years. Then they will use Mai ko kit and Mai jar for the main frame of the house. Bamboo and Mai jar will make up the walls and the sleeping quarters. The design of the new house will be similar to the existing house, but made of better wood. On the existing house the walls are full of cracks and large holes and the roof leaks. The floor is made of stamped soil with a pit fire in the middle. A bench at one of the short sides is used as a bed. There are only a small amount of tools in the house to be used at the fields.

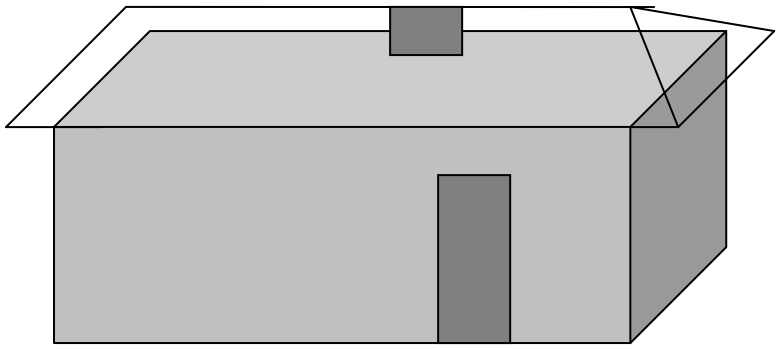

Figure 11: Ehen house design is simple and with only one entrance and no windows.

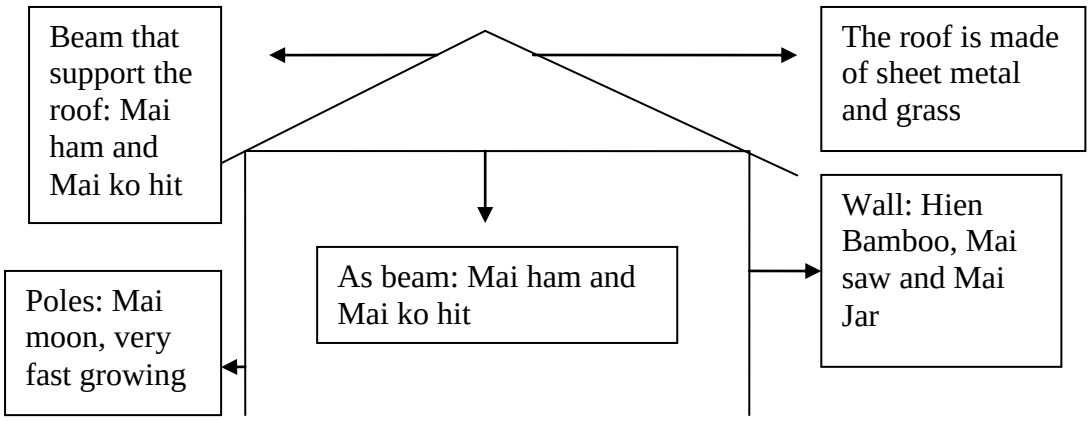

Figure 12: Wood used in Mr Ehen house

6.2.5 Middleclass households

The households that are classified as middleclass all have similar houses. Most houses are built on the ground and use the soil as the floor and have parts of the house on short poles. The parts of the house which are standing on short poles are used by the family members as the sleeping room. There is often a separate kitchen where they have one pit fire to cook on. The kitchen is also used as a storage room for tools and food. Mai saj, Mai deung, Mai jar and

Mai thalo are all main tree species for house construction. The most common used tree species are Mai thalo and Mai jar.

Picture 14: Middleclass household in Phou Xang. The house is partly on short poles and has sheeted metal roof. Photo: Erik Kretz

Name: Mr Tok
Size of family: Unknown
As an example Mr Tok´s house was chosen to represent the middleclass household. The grandfather in the household planned the house. He gathered and processed the wood for the house together with his grandson. Every day during a thirteen day period they spent time gathering and processing the wood. Than twelve days it took to build the house with the help from a few other neighbors. The house is seventeen years old. During this time they have changed the roof to sheet metal and built a new kitchen. They mostly used Mai jar for the main frame, Mai saw was used for the walls and Mai thalo to the poles. The trees were big, with a diameter of about one meter. They made some of the most important poles of Mai ha, it is very resistant to rot in the ground, and after seventeen years in the ground the wood is still in good shape. Today, Mai ha is very hard to find. Mr Tok said that he had to walk for several days to find a mature Mai ha which he could use as a pole. Today, he sells food to buy construction wood, they do not have time to gather by themselves. Last year he ordered wood from a neighbor in the village to make him new beams and planks to repair the house. He paid about 400 000 kip to get all the wood he needed, that is about 40 % of his yearly income.

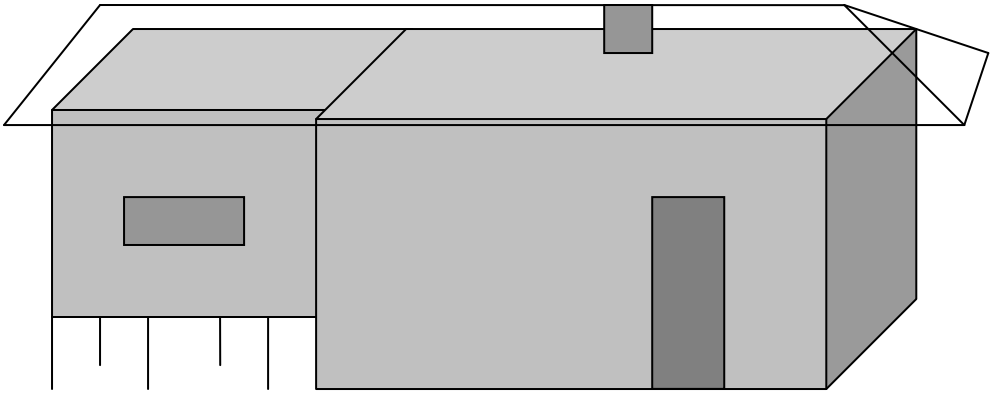

Figure 13: Design of Mr Toks house

The house is partly standing on short pole where the family sleeps. There is a window on both long sides of the house. The kitchen is separated from the sleeping quarters by a wooden wall. The kitchen has stamped soil floor and a pit fire in the middle used for cooking.

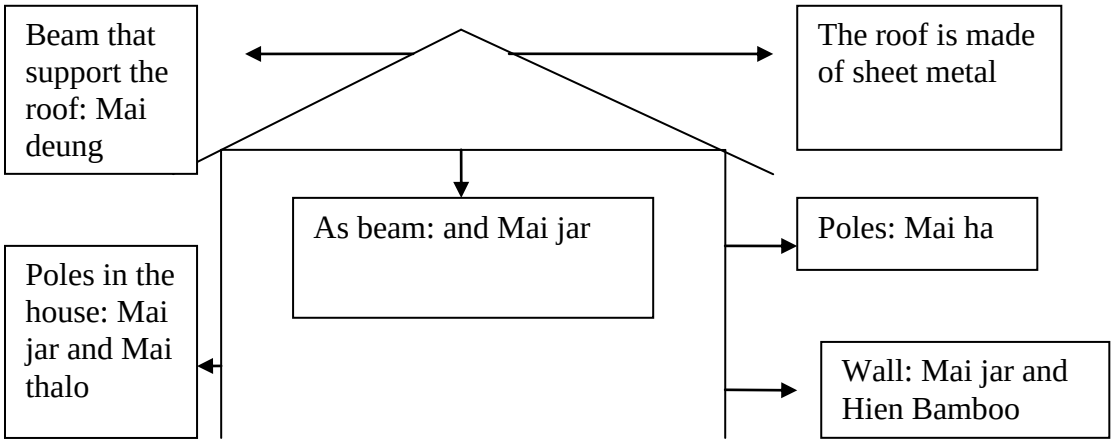

Figure 14: Species used in Mr Tok´s house.

6.2.6 Forest and land-cover changes

The landscape surrounding Phou Xang is heavily fragmentized and there is no notice of any slowdown of further fragmentation. In figure 15 a satellite image is shown of the land surrounding Phou Xang village and the Northern lands of Namo Nua. Most farmlands are positioned close to the roads. In the household interviews the road was to be the best advantage at the location. In the early 1980s was according to the villagers most of the land was covered by old growth forest. The gray/brownish areas are newly slashed and burned areas and the light green patches is older agriculture land. The darker parts are older dense forest. Most of the older forest can be seen in small strings following valleys, steep hillsides and ridges. In the household interviews the villagers thought that most of the old growth forest will be gone. The villagers are very concerned about their bitter bamboo stands. The Production forest has been transformed to fallow land and no forest inventory can be accomplished.

Figure 15 Phou Xang village land from satellite image (Google earth 2008-02-21)

7. Discussion

The two studied villages: Namo Nua and Phou Xang are very different in terms of language, culture and traditional life, which reminds of what Mansfield (2000) found when he studied cultural differences among villages in northern Laos. It is then also easy to believe that these two villages or people groups would have different behaviors or relations to their surrounding forest. In some ways that has been found in this study, but in other ways the different cultures use similar behaviors in that sense. For example is the consumption of wood and bamboo relatively similar.

Most wood which is gathered in the community forest is used as construction wood or as fire wood in both villages. The wood used for house constructions is used in many different ways depending on tree species. The house designs within a village depend on wealth class, available construction material, technology and traditions. The major difference between the villages is a relatively complex house construction in Namo Nua, in contrast to Phou Xang which tends to have smaller and simpler houses. This is most likely a result form old traditions. Phou Xang who traditionally is a semi-nomadic tribe had no need of large well constructed houses. These traditions resulted in less experience and knowledge about local trees and wood properties. A Namo Nua villager invests a lot of resources into their houses, these is probably a result from long traditional use of the surrounding forest. A result of these traditions is a high experience and knowledge of local trees and wood properties.

Namo Nua middleclass households are using a complex mix of different timber species in their constructions. It can be as many as 3-10 different tree species in a single house (table 1). For the people in Namo Nua it is important to have a rich forest with a high biodiversity to be able to provide the villagers with all their preferred timber species. The Namo Nua villagers have a unique knowledge on how to use wood found in their nearby environment. A well constructed house is believed by the villagers to be a good investment for the future since a good house can be used for many generations. Today the villagers found it very hard to build new houses in their traditional style and design since it become more and more difficult to find preferred timber trees. Actually very few of all wanted timber species are today not possible to find, in desired dimensions, around the village. Many of the villagers in Namo Nua are worried about the future for their traditional house constructions. A consequence of the preferred timber shortage is that people are focusing on new types of woods. These new woods are of poorer quality; it will lead to shorter repairing intervals and the house will be a poorer investment than before.

The forest situation in both villages is fragile. There is a great need of more forest products for both villages but for different reasons. Phou Xang village needs new buildings, most buildings are badly constructed and there is a never ending require of more wood for repairing. The villagers also express worries about the decline of good timber in the forest. There are solutions to the housing problems and income in Phou Xang. Most villagers in Phou Xang would be happy if they could afford to build their houses in cement. The villagers would even like to transform most of the land to agriculture land, pastures or bitter bamboo stands so they could earn more money to afford to build their new houses in cement. It is obvious that Phou Xang villagers do not really care about their natural forests and traditions of essential forest products. The opposite can be shown in Namo Nua, where the future for traditional house constructions seems to be bad. Most villagers in Namo Nua are proud of their houses and are dubious about the benefits of new cement houses. However; this was

mostly mentioned by the men in the household interviews were the women had a more positive approach to cement houses. Namo Nua villagers express a desperate need of more forest with a good storage of forest products and especially preferred timber trees.

There are differences and variations in traditional usage of construction wood within the villages. The most obvious differences are between poor and middleclass households (table 1 and 5). Poor households are generally focusing on only a few timber species which are of moderate quality. Wealthier households are usually using many more timber species of good quality in their house. When it comes to repair old houses are wealthier households in Namo Nua not so worried as they usually posses a large amount of spare wood of good quality. Poor households, on the other side are mostly lacking that kind of spare wood. This strongly affects the poorer households, to harvest new construction wood more frequently. The lower quality wood leads to a larger need of repairing and to shorter harvesting intervals of more construction wood. When it comes to build new houses both wealth classes are having problems with finding sufficient with wood of good quality. Poor households use fewer tree species in their constructions than wealthier households which in this case would give them an advantage of easier finding the wood they need. Even if both rich and poor wealth classes uses the same type of timber is it often used for different purposes.

Harvesting timber has affected the villages' forests by reducing the amount of preferred timber trees. The governmental solution is to have a designated Production forest which will be managed for providing the villagers with the necessary forest products. This implantation was only a small part of the larger implementation of the Land and Forest Allocation Act (LFAA) in 1996. The purpose was to further formulize private ownership of land and at the same time forbid shifting cultivation (Thongmanivong, 2005). However, in both Namo Nua and in Phou Xang shifting cultivation still increased after implementation of the LFAA and new areas with forest were slashed and burned for agricultural use. In year 2000 the villages formalized its official village boundaries through the LFAA-process and the official village area was formed. Namo Nua and Phou Xang were no longer parts of the village's customary territory. The villagers did not longer possess rights to access the land outside their village boundary for resource extraction or to reclaim forests for agricultural use. The forest within and outside the village boundary were however still used by villagers to collect both timber and NTFP. Families that required supplementary rice for household consumption also slash and burned the forest for agriculture. All this resulted into boarder conflicts with neighboring villagers with different kinds of land control. Households gained temporary access to forest and fallow areas simply by occupation. On this kind of land, households possessed exclusive rights to harvest the benefits of their own labor, but access to other food and firewood was opened to members of the village and sometimes also neighboring villages. The government solution to simply force the villages to only use their own village lands has so far failed.

Today is the Production forest in both villages not possible as a single source for vital forest products and especially not for construction wood. Most villagers express that they need more help and resources from external organizations and especially from the government to increase the knowledge about sustainable forest management. Reforestation and nurseries could be a key factor to help the villages with. However, the most crucial work would be to educate the villagers in sustainable forestry and to make the villagers respect each other and get out of the "Tragedy of commons".

The relatively intense selective logging by the farmers that has been going on in the production forests has lowered the value of the forests not only in terms of a reduced potential

as a timber source. This activity has also damaged the forest composition which has affected the production of many important NTFP. The decline of NTFP has led to a negative economical effect for the villagers. It is important for the villagers to have a forest with high NTFP-diversity as well as a high diversity of timber trees. The forest habitat has changed a lot during the last 50 years, the forest that is here today differs in many senses from the forest that grow on the site 50 years ago, according to Namo Nua villagers. This gives the farmers different possibilities or scenarios. In the worst case, nearly all valuable forest products would be gone; the only option than would be to slash and burn the degraded forest and convert it into agricultural land. This process can already be seen in some areas in both villages. Both villages' follows the same pattern; when the forest loses most of its original values it will instead be burned and converted into agricultural land instead of letting the forest to rebuild its values of forest products.

The forest is a very complicated resource. In the past the forest was the main essential resource for food and other necessary products. Today it is more considered as a supplementary resource of cash and food. Especially that can be seen in Phou Xang which is the most poor village of the two studied. A major problem is that many poor people still lack food during parts of the year and therefore rely on the forest for finding extra food. This food shortage creates a need of more land to cultivate. Phou Xang villagers are lacking food and are starving during bad crop years and are expressing a need of more agriculture land. Wealthier villagers, like some in Namo Nua, have enough with food during the year and are more interesting to produce cash crops as supplementary products. Namo Nua villagers are expressing a need of more forest land to achieve more economical profit and timbers to be able to keep their old traditional house constructions. In today forestry Namo Nua villagers are not capable to gather the forest products which they like to, and have been used in their daily life for generations.

What are then the underlying reasons that can explain this relatively fast forest degradation in these two villages? The main reason is probably that timber has been harvested very intensively during some periods in the past. The first such periods can be related to times of war. In the late 1960s the valley where Namo Nua is positioned showed the first signs of heavy natural destruction. During that time the valley was repeatedly damaged by raging troops. First the actual village was destroyed by the French troops during the independence war. A few years later, in the end of the 1960s, the Namo nua village was again attacked and burned to ashes two times, by the Americans. The village was than rebuilt at least three times with timber and wood from the surrounding forest. Probably the forest than became heavily over-logged, because of that need for rebuilding the entire village many times during a relatively short period. During war times the villagers also had to hide in the forest and survive only on forest food, which probably also increased the over-harvesting of forest food species. All wealth classes mentioned that those periods showed the same pattern of smaller harvests of forest products such as mushrooms, bamboo- shoots, vegetables, rattan, fish in the streams and shortage of game. The last tiger, leopard and bear were last noticed during that time.

The second main reason is probably that the valley has become more densely populated the last decades. After the wars more people moved into the area and constructed new villages. Those villages settled in the forest surrounding Namo Nua which already suffered from the intense harvest of forest products during the years of war. Those new settled villages put even more pressure on the fragile forest situation. The Phou Xang people were one of the latest immigrants to the area. Both Phou Xang and the other newly settled groups increased the

pressure on the forest for their need of construction wood, food and other essential products from the forest

This study was associated with several difficulties which probably can have affected the results. The main problem has been the language. In some interviews two interpreters were used; from English to Lao and then from Lao to Pou Xang. This translation process could have led to misunderstandings in some cases. Further also harsh working conditions as well as cultural differences and opinions between the villagers, interpreters and students also could have lead to misunderstandings and maybe wrong conclusions. The identification and classification of tree species have also been a continuous problem during the whole study. The FRC-researchers had sometimes different ideas of identification than the villagers had of a tree species. It has also been a great disadvantage that it was not possible to get the scientific names of the tree species. Because of that it has been more or less impossible to read about existing knowledge of the trees found and described in this study.

8. Conclusions

- Traditional house constructions consist of many different tree species and a high forest biodiversity is needed to be able to provide the people with the preferred construction wood.
- Villagers are today forced, when building a new house, to choose secondary choices of timber trees since their most preferred choices are gone.
- Construction wood has been harvested in an unsustainable way and driven the most preferred and important construction wood to the rand of local extinction.
- War and a high population growth speeded up the need of more construction wood and have been the main causes for the relatively fast and intense forest degradation and fragmentation.
- Traditionally knowledge of local wood, wood properties and house constructions are threatened to be lost in the future.
- Middleclass households suffer more on timber shortage and low timber diversity than poor households.

9. Acknowledgement

I am ever thankful to sida who financed this MFS and gave me the opportunity to go to Namo and try to help but mostly show how the circumstances are for the local forests in Namo Nua and Phou Xang.

The MFS were a team work accomplished by many different people from many different organisations. I will give my best thanks to Markus Steén how I planned this MFS with and also worked together with in Laos. Very warm thanks to the people at Namo field station which is financed by LSUAFRP, without their help this could never have been accomplished. The local staff and students helped with most practical things such as food, cooking, local guidance and help during the long working sessions in field. At least one student did always go with the team when interviews or forest research were carried on.

I am ever great full to Sara Carlsson who helped me with the writing and composition of the report.

The working sessions in Laos were always conducted together with staff from NAFReC and NAFRI. The help given from Carl Mossberg, Paulo Pasicolan and Daniel Talje is of most significant importance. They contributed with good comments and brought up a lot of interesting information for the study. During the time in Vientiane Ramboll Naturas office was used to our assistance and the office personnel was of great help. During the second field period Martin Greijmans came on a short visit and with many wise words he help to narrow down the forest inventory to the most important forest areas.

The working team in Namo consisted mostly of Erik Kretz author, Markus Steén, Laykham Sihanat (translator and forest expert from NAFRI) and Kikeo Singhalath (forest expert from NAFReC). Depending on the work more people could be included such as represents from DAFO, NAFRI and NAFReC personnel, forestry students and staff from the field station.

Picture 15: From the left, Mr Erik Kretz, Mr Kikeo Singhalath, Mr Markus Steén, Mr Laykham Sihanat, Mr Saysana Intavong and Mr Tan and Mr Singokham villagers, Namo Nua.

Participants and advisers during project preparation

Organization	Name	Position
SLU	Mr Erik Kretz Mr Markus Steen Mr Olle Forshed	Student Student Supervisor
In Laos	Mr Carl Mossberg Mr Paoulo Pasicolan Mr Daniel Talje Mr Josthe foppes Mr Peter Jones Mr Martin Greijmans Mr Susamkham Mr Khamphone Mounlamai	

Participants in Field Activities and District Briefing Meetings

Field Activities	Name	Position
MFS Project	Mr Erik Kretz Mr Markus Stéen	Forestry Student, SLU Forestry Student, SLU
Na Mo District,	Mr Kikeo Singhalath Mr Laykham Sihanat Mr Khamphan Intahakhamsone Mr Kampho Mr Saysana Intavong Mr Sulivhan Vanasok Mr Inkhame Mr Thounthongchai Mr Noyvongsa Mr Sifhong Ms Sutana Ms khambo Ms Fhong Ms At Ms Nou Ms Mo Siamphai	FRC, station at/NAFReC FRC and NAFRI Head of Namo field station DAFO Staff NAFReC Staff in Namo field station Driver at Namo DAFO Staff Staff at Namo field station Cooking Cooking Forest student Forest student Administrator Administrator Administrator

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