# People´s options on forest land use

**- a research study of land use dynamics and socio-economic conditions in a historical perspective in the Upper Nam Nan Water Catchment Area, Lao PDR.**

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## PREFACE

The series of draft and finalised Working Papers of the Sida / Sarec funded research co-operation project "People's options on forest land use" has several objectives.

In conjunction with ongoing field work, the Working Paper serves as an instrument to make available to national research institutions and other interested parties a preliminary documentation, related to the field work. Consequently, the Papers are used for workshops and seminars, the objective of which is to discuss and further develop the issues considered relevant in the national and local context. They are also used as reference documents in conjunction with other work with the national authorities at central and local levels.

The Working Papers, especially in draft form, might lack in academic standards and style and there are few references to other research, but they could still serve the purpose of developing co-operation and further discussions. They should hopefully facilitate a better understanding of the issues at hand. No quotes from this paper are agreed upon unless written permission from the authors.

In this paper Bo Ohlsson is the author of the chapters 3 and 5 and Annex A – B while chapter 4.1 - 4.4 and Annex C is written by R. Kajsa Sandewall. The chapters 4.5, 6 and 7 and Annex D - F have been prepared by Mats Sandewall. The remaining parts have been written jointly by the principal researchers. All maps have been prepared by NOFIP.
The main findings were presented to the concerned villages, district and province authorities and the researchers of the Shifting Cultivation Research Project in a seminar at Thong Khang Station on August 19, 1997.

Photo: The participants in the workshop at Thong Khang Research Station in August, 1997

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The National Office of Forest Inventory and Planning
The Lao-ADB Forest Plantation Project
The Forestry Section, Provincial Agriculture and Forestry Office, Luang Prabang
Nan District Government Office and the District Agriculture and Forestry Office
The village leaders of Thali, Pha Haen, Pha Kuang, Thong Khang, Pha Tong Lom, Huay Oun and Tou Ho
Farmers - men and women

Sida/SAREC who provide the funds for our work

The staff of ISO/Swedforest Office in Vientiane for generous backstopping support.

Without the generous support and sincere interest provided by those mentioned above it had not been possible to conduct our studies.

Umeå in May 1998 (*)

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(*) This version of May 1998 is a reprint (with a few corrections and additions) of "Working Paper No 2" of the Project, dated Vientiane 1998-02-28.

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## 1. INTRODUCTION

"People's Option on Forest Land Use" is a multi-disciplinary research co-operation project carried out jointly by the Swedish University of Agricultural Sciences (SLU) and the Department of Forestry, Lao PDR Project activities have also been started in Vietnam. The Project, running for 3 years (1997-99), is funded by Sida/SAREC.

The objective of the Project is to develop approaches and methods that could improve the process of strategic planning in relation to a sustainable use of forest land.

The following report summarises some preliminary findings from the initial part of a case study in the Upper Nan Water Catchment Area, Nan District, Luang Phrabang Province, Lao PDR carried out as a part of the Project during February 14 - March 12 and August 19 - September 5, 1997 and February 10 - 25, 1998. It also includes results of photo interpretation carried out by the Forest Inventory and Planning Office (NOFIP) through the year.

The paper is considered as preliminary and primarily aimed for persons related to the Project in order to obtain their comments. Analyses of land use history and conditions of the villages and individual households require additional follow-up. Further analyses of air photos, satellite images and external data will be made with the purpose of verifying the preliminary findings.

Figure 1: Forest land use in the Upper Nam Nan Water Catchment Area

## 2. SCOPE OF THE STUDY

The study is carried out in a water catchment area of about 9 200 ha including seven villages and located within the Nan District, Luang Prabang Province (Figure 2). The area is also a part of the"Shifting Cultivation Research Project" of the Lao-Swedish Forestry Programme.

The main actors in the study are the reserachers of the Department of Forest Resource Management and Geomatics at SLU, the Shifting Cultivation Research Project, the Forest Inventory and Planning Office (NOFIP), the Monitoring and Evaluation Section of the Lao-ADB Forest Plantation Project, representatives of Nan District and the people of the seven villages in the area.

Findings are regularly communicated and discussed with representatives of the Department of Forestry and Luang Prabang Province.

The Study involves:

(1) Analysis of the land use dynamics in a historical perspective;

- through development of inventory methods and the use of aerial and satellite photos of different years between 1953 and 1996 covering the study area
- through development of a GIS based multi-temporal map showing the land use in various years
- through participatory methods for obtaining village based data
- through analysis of official information

(2) Study of socio-economic and environmental consequences of the ongoing land allocation process.

(3) Analysis of people's decision making in regards to migration and forest land use.

(4) Seminars and participatory exercises for discussing land use strategies on village and government level.

(5) Development of planning tools, including "the Area Production Model, APM", a simulation model for use at village, district and province level.

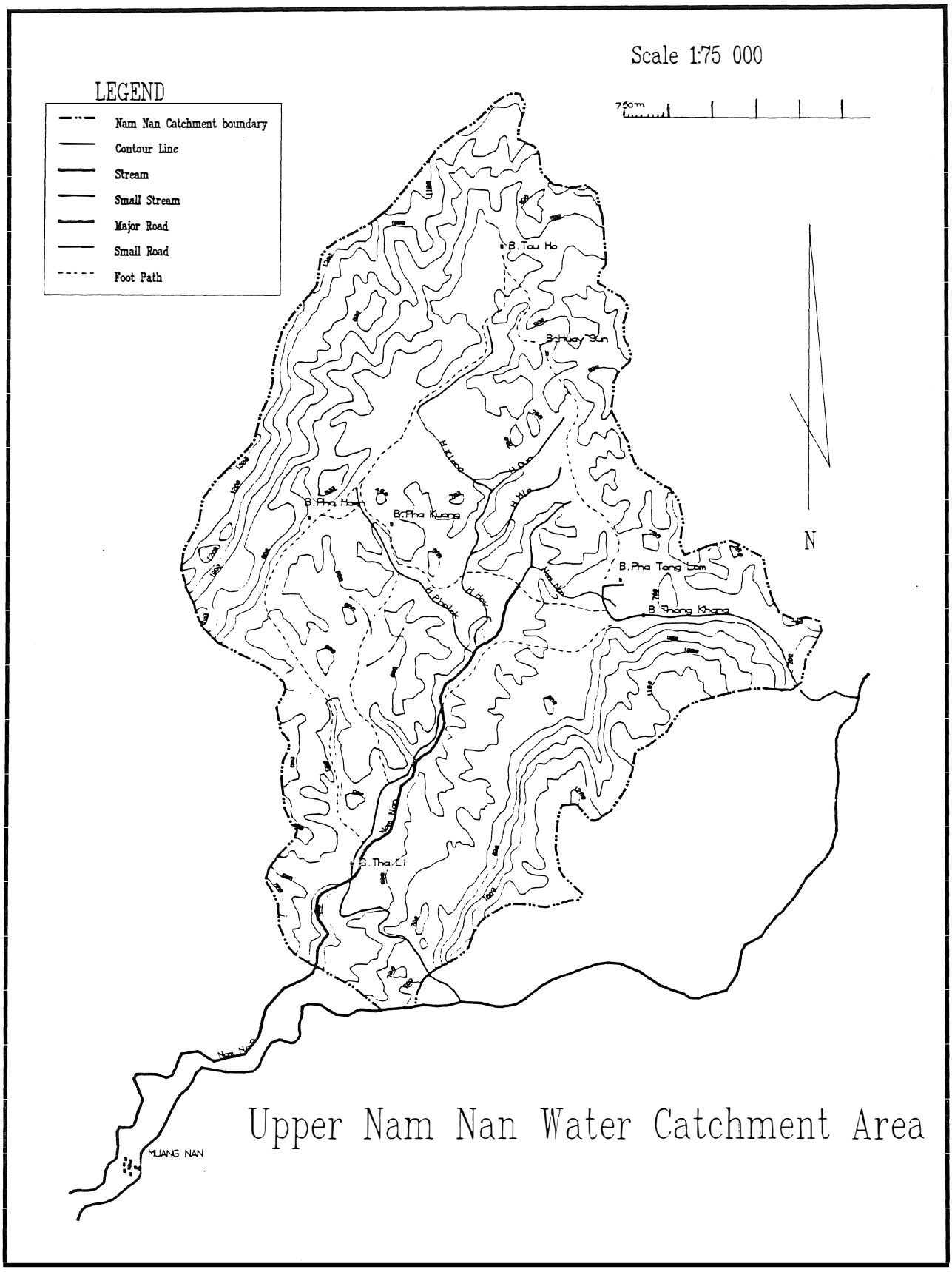



Figure 2: The Upper Nam Nan Water Catchment Area

# 3. DEVELOPMENT OF POLICIES, STRATEGIES AND A LEGAL FRAME WORK IN RELATION TO FOREST AND FOREST LAND USE

## 3.1 Government policies, strategies and legal framework

In general, government policies and strategies are expressed through the instruments of the state such as parliamentary decisions, decrees, resolutions or other expressions of will which is to be carried out through the administration and the citizens and their organisations. Out of the policies, there will be various strategies to implement the policies. The legal framework is providing the mechanisms required to this end. It is a reversible process. Actual implementation could very well also constitute the policy.

A strategy actually tells what to do in order to implement a policy with the legislation providing the framework, the "how to do it" and the rules and conditions. An example is the suggested National Plantation Forestry Strategy which outlines what to do in order to pursue plantation forestry. The Forest Law (as well as other legislation) provide the required legal framework to do this.

The basic issue at hand is man's relation to the natural resources. In this particular case, the concern is the forested land and the forest land, (as defined by the government and the farmers) in the Upper Nam Nan Water Catchment Area in Luang Prabang Province (the Study area).

Governments can and do have explicit policies and strategies concerning forest land use. They are expressed through different means - policy decisions, strategies, legislation, funds and resources directed towards specific ends. Frequently, specific issues are the concern as is the case with e.g. shifting cultivation or forest protection. Sometimes, the policies are not known by those mainly affected.

In the context of Lao PDR, the early policy development in forestry has not yet been researched by the author. During the colonial period, not much of external influence has been recorded in the Study Area, although it appears as if commercial logging has taken place in parts of the area. During the post colonial period, the Study Area was still isolated, although the road connection with Sayaburi was opened in the 1960s. The 1963 - 1973 period was dominated by the war which in itself led to different strategies, one of which was the relocation of villages to cut off the possibilities for the other side to get food and other support from the villages.

In 1973, at the end of the hostilities, the government advised the villagers to return to their original villages. This is also reflected in the population increase in the Study Area during the 1970´s. After the 1975 change of government, a period of co-operativisation followed, although it was never implemented and probably not even attempted in the Study Area.

Below are listed some policy and strategic initiatives by the Lao Government:

- New Economic Mechanism, NEM at the end of the 1980´s
- First National Forestry Congress in 1989

- Tropical Forestry Action Plan 1989/90 which eventually became the National Forestry Action Plan, NFAP (Decision on TFAP 66/PM September 1992)
- Various legislation such as the Logging Ban (Decree 67/PM August 1991) and others to gain government control of different forest categories
- Shifting cultivation strategies
- Land - forest allocation
- Development of National Parks, Protected areas etc.
- The new Forest Law

Legal development

The chart in Fig 3.1 illustrates the legal development concerning forestry since ca 1985. (Lao ADB Plantation Forestry Project, Working Paper)

## Issuance of Legal Documents

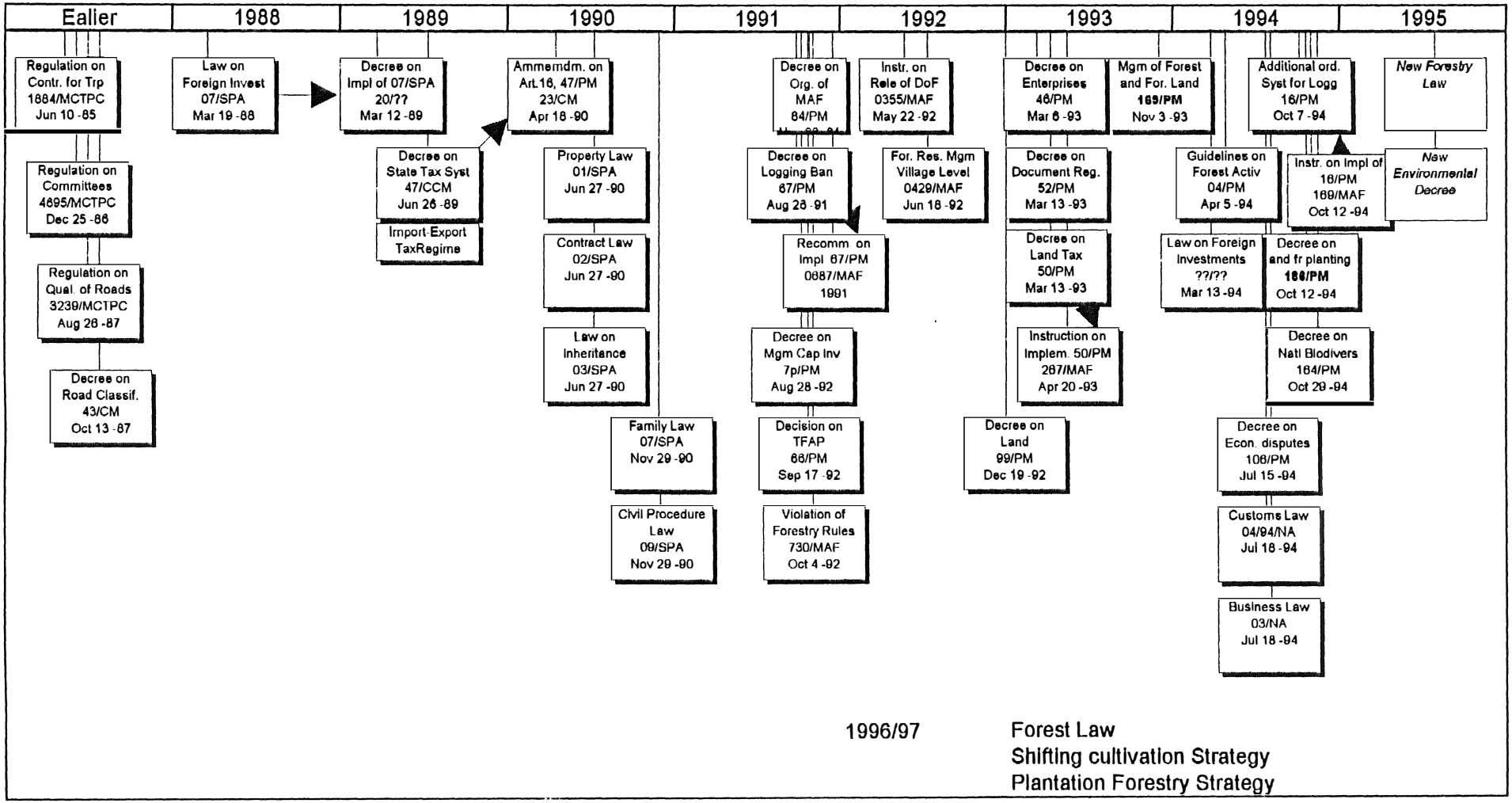



Fig 3.1: Development of legislation concerning forestry in Lao PDR

## 3.2 Village strategies

Policies and strategies are not only confined to the explicit, formalised format such as statements, decisions etc. but are also expressed in what for instance is actually being done. At household and village levels, there are strategies - to invest in paddy fields to ensure food security or to pursue a strategy of economic diversification, away from subsistence, to ensure not only the same objective but also to get access to the market e.g. as a consumer and producer. This could be more or less explicit in terms of being formalised but normally, these strategies are expressed in what the villages and villagers actually are doing.

This example also illustrates that there could be many different strategies to achieve the same objective. This will be further developed but at this stage, it is important to note that addressing shifting cultivation is very much an issue of using different strategies in order to obtain one objective, that of reducing shifting cultivation. The major strategy will be to have a flexible strategy, depending upon local circumstances, according to the tentative findings. Likewise, the shifting cultivators are applying different strategies in response to external - and also internal - pressure and influence.

What are the villages strategies for land use and how do the villagers respond to the government strategies? For instance, how do the villages respond to the land - forest allocation? (this terminology is used for the time being as it appears in the translation at the disposal of the researchers) In the research area, in December 1994, the government - through the District and the Shifting Cultivation Project ( SCP ) - actually started up the land - forest allocation work. That is, staff from the District and the SCP went to the villages and started the process from the government side by informing the villagers about the land - forest allocation.

Different villages respond to this initiative differently, very much dependent upon the particular circumstances in the locality. Also, within the same village, there could be several strategies contemplated at the same time with the villagers looking into the different options. There are individuals who have decided to pursue their own strategies, irrespective of the village stand. The different strategies can be viewed as options, being under consideration by the villages and the villagers. This is a dynamic situation. Below are indicated some different strategies as found and understood in the villages.

1. Avoidance

By avoidance, the problems might disappear. It can be a very active strategy with the village pursuing different activities to achieve this. Components of the avoidance are:

- taking advantage of “remoteness”
- seeking safety and security in continuing as before
- avoid integration with the market
- It might also involve looking backwards, at traditional solutions, at previous experiences (moving to other locations) and also in consulting the shamans.

This category is a perfectly rational strategy under some circumstances. It is difficult for the village to see any viable options and maybe there are no viable options (their understanding might be very correct!!) The village proposals for traditional solutions, e.g. to continue what they already are doing (e.g. shifting cultivation) is being questioned and perceived as being denied. The villages view themselves as being at a disadvantage vis á vis the market economy – it is something new, they do not feel comfortable and lack experiences of commercial transactions etc. Other options such as out-migration to lowlands or stabilisation (establishing permanent plots for sedentary farming) at present location are not perceived feasible, by and large because of previous experiences, for instance.

However, if they would perceive a set of solutions as feasible, they would very likely venture on this path. It is just that they - probably rightly so - are very conservative because poverty limits the risk taking capacity involved in new ventures. Other factors mentioned are lack of market, lack of technical ( agricultural ) solutions, lack of inputs, lack of communications and resources for investments.

Basically, poverty is an important part of this strategy. The villages have very little capacity to take any risks or to make any investments and they have to be very careful.

2. Depend upon the government

Another strategy is the dependency syndrome - wait for the government to provide the solutions. This is very similar to the "cargo culture" found in the Pacific during the 2nd World War. The government would bring in roads, medical care, provide agricultural technologies etc. This strategy has an historical background as dependency has been a rather dominant feature in the history of the area. It is very contradictionary as the villages by and large have had to fend for themselves whilst at the same time, the government under various circumstances have provided for instance food during part of the war. The political environment have also in a historical perspective nurtured the expectations of the farmers to eventually be supported by the government.

3. Continue as before but join the market as consumer

Continue as before but on a larger scale - invest in more paddy, perhaps better shifting cultivation or to compensate for loss of shifting cultivation land. At the same time, venture into the market economy but basically still use traditional methods. This is evidenced by e.g. firewood now being regularly sold to traders. Previously, it was collected only, not sold but used for subsistence. The objective is to be able join the market as a consumer, to buy consumer goods such as radio, television sets, bicycles etc. This category has not yet entered the market as a producer by using commercial inputs such as fertilisers, hybrid seeds etc.

In other countries in the region, commercially based shifting cultivation has been observed. Shifting cultivation is used as a cash crop with the paddy being the

subsistence crop. The farmers take part in the market economy as consumers but use traditional non-commercial techniques as producers.

4. Embrace new technologies and economic diversification

This category can be described as eager to try new crops, technologies - they actually are doing it - and to diversify their economy and take advantage of the market.

Virtually all villages have this strategy more or less on their agenda. For some, this is more difficult than for others, e.g. the poor villages far from the road as compared to developing, economically diversified villages with potential irrigation paddy and reasonably road access.

In a historical perspective, it appears ( the research is ongoing and this would be one working hypotheses ) as if the villages and individual villagers in terms of farming, of biological production, have displayed a significant willingness and interest in trying out new farming based ventures. Also presently, a number of novelties are being tried in some of the villages.

5. Single item strategy for the village

This could be a road, expanded paddy fields or a single new crop - coffee, mulberry, livestock. A road could be viewed as an introduction to a number of government services such as school, clinic, market etc.

In general, roads are a major priority among the villages. It is very likely not only beneficial but also a very important component for socio economic development. Also, experiences elsewhere show that the road is sometimes given too much importance and is expected to lead to major government services and investment to come to the villages in the area which is not necessarily the case.

6. Out-migration

Out-migration has not been mentioned as an alternative and does not appear high on the agenda for the villages. Previously, only under very difficult circumstances, the villages have relocated within the area. However, there is a significant amount of households which has moved out during the last two years. In one village, some 30 households moved out and 8 moved in.

## Gender specific strategies

In the Mekong Basin Provinces of Vientiane, Bolikamxai and Savannaketh, there appears to be gender specific strategies. This is also looked into in the Upper Nam Nan Water Catchment Area.

In Table 3.1 some data from the Mekong Basin Provinces are illustrated.

Table 3.1: Gender distribution for production and marketing in 10 villages of the Mekong Basin

| | | | Production | | | | Marketing | | |
|---|---|---|---|---|---|---|---|---|---|
| | Activity | Men | Women | Both | Women + both | Men | Women | Both | Women + both |
| 1. | Paddy | - | - | 10 | 10 | - | 9 | - | 9 |
| 2. | Shifting cultivation | - | 1 | 6 | 7 | - | 4 | - | 4 |
| 3. | Vegetable gardening | - | 5 | 5 | 10 | - | 10 | - | 10 |
| 4. | Animal husbandry | - | 3 | 7 | 10 | - | 10 | - | 10 |
| 5. | Fishery | 4 | 1 | 5 | 6 | - | 10 | - | 10 |
| 6. | Service/trade | - | 9 | 1 | 10 | - | 10 | - | 10 |
| 7. | Handicraft | - | 8 | 2 | 10 | - | 9 | - | 9 |
| 8. | Home industry | 4 | 1 | 3 | 4 | - | 8 | - | 8 |
| 9. | Forest produce | 2 | - | 8 | 8 | - | 9 | - | 9 |

What is striking here is the dominance of the women in terms of marketing and their engagement in service and trade. The situation in the research area of Thong Khang is more ambiguous and the data remains to be further looked into. There are also other aspects which are being looked into such as who is the actual manager of the household and the farm unit.

At the village and field level, the policies and strategic initiatives might be implemented to varying degrees. It is not necessarily so that for instance villagers are aware of government policies - they could very well be ignorant about this or perceive it in a different way or oppose it. Likewise, there could be a situation when the government does not have the required legal framework or the mechanisms to implement a strategy. This is for instance an issue in relation to the land - forest allocation - what is the legal status e.g. of land allocated individual villagers?

External factors

Decisive for the villagers options area also a number of external factors. In the Table 3.2 is indicated some major events which have more or less affected the villages. During the pioneering period, the forest cover was extensive according to the villagers and shifting cultivation was the "pioneering" type as forested forest land was

abundant. Whenever there was a need of new fields because yields declined, there were always virgin forest available. This eventually changed and this change appears to have occurred in the middle of this century when "rotating shifting cultivation" emerged.

The chart will be further elaborated as data is collected and analysed (see also section 7.1). At this stage, however, it might be hypothesised that the major externalities the villagers are exposed to is increased communication, carrying the market economy and the government policies and strategies. This generates a number of responses and adjustments and searches for options and new strategies.

Table 3.2: Important events in the Upper Nam Nan Water Catchment Area.

| | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1950 | | 1960 | | 1970 | | 1980 | | 1990 | | 2000 |
| 1. Government policies, strategies and legal framework | | | ? | | | "go back to village" | Cooperatives? | New Ec. Policy | For. Conf. Sc on the agenda | | |
| | | | | | | | | | TFAP | NFAP | |
| | | | | | | | | | | Constitution | |
| | | | | | | | | | SCP | | |
| | | | | | | | | | For. Prot/Conserv. | | |
| | | | | | | | | | | For. Law | |
| | | | | | | | | | A strategy for Sc | | |
| | | | | | | | | | | Tax incentives | |
| 2. Communication | | | War, dependency, migration | | | | | | | | |
| | | | Xayaboury rd | | Luang Prabang rd | | | | | Ban Tha Li rd | |
| | | | | | Traders | | | | | Traders | |
| 3. New technologies crops, seeds | pioneering sc paddy fields, maize, irrigation | | Rotating Sc | | | Cottin | | Irrigation | | Cotton, coffe teak, fish ponds | |
| 4. Demography | 153 hh | | | | 216 hh | | | | 457 hh | 422 | |
| Growth per anum | | | 3% | | | 6.50% | 2.50% | | -7% outmigration | 2.50% | |
| 5. Institutions | | | | | | | | | | | |
| 6. Others | | | | | | | Remittance from abroad | | | | |

### 3.3 Shifting cultivation strategies

Concepts of shifting cultivation

Shifting cultivation has a prominent position in most explanations of forest depletion and environmental destruction. It is a very general term, with different connotations for different stakeholders. Results of studies have indicated that in the late 1970s, there were some 250 million shifting cultivators in Southeast Asia. (Ohlsson, Bo, 1976. Forestry's Potential for Employment. FAO, Rome.)

The number of shifting cultivators in Lao PDR is estimated to som 300,000 households, partly or fully engaged. As the definition of a shifting cultivator is not very precise, this figure can be viewed as an indication of the magnitude. In the research area, comprising seven villages, 93 % of the households are carrying out shifting cultivation in 1997. According to information obtained from the farmers, the gross area presently used (the total area covered during one cycle) amounts to some 5 ha whilst sampling plot based studies indicate that the area is rather of the magnitude of 10 ha per household. (The discrepancy is partly explained by the occurrence of "maize fields" which are former shifting cultivation land or any upland land used for permanent or semi permanent crops) The cycle would be some 5 years. Applying these figures nationwide would result in some 1,500,000 to 3,000,000 ha being used for shifting cultivation or some 300,000 - 600,000 ha being used annually which amounts to some 1- 3 % of the total area of Lao PDR.

Shifting cultivation is usually described in terms of technologies and methods applied, cultivation cycles, slope gradients and crops produced. Ruthenberg, H, "Farming Systems in the Tropics" uses a farming system approach with shifting cultivation being one example of a farming system. Examples are classification of farming systems according to type of rotation and what kind of fallows (forest, bush, savannah, grass) or the intensity of rotation. The latter is often expressed in an index, R, which indicates the proportion of an area under cultivation in relation to the total area available for farming. If, for instance, 40% of the available arable land in one holding is cultivated, the R is 40%. When R constitutes shifting cultivation remains to be defined. When R is for example 10%, it is certainly reasonable to define this as shifting cultivation and when values of R assumes 33, a level of land utilisation has been achieved which hardly can be called shifting cultivation any more.

A number of other characteristics have been attributed to shifting cultivation, such as subsistence (see e.g. Jerndahl, R, "Survey on upland farmers in Lao Ngam District"). This is certainly not generally true. Rather, shifting cultivation can very well be commercial and is indeed undergoing a process of commercialisation. The shifting cultivation is very dynamic, which sometimes seem to escape observers. (Morrison, E., "A regional overview of national policy relating to shifting agriculture: Laos, Vietnam, Thailand" in Montane Mainland Southeast Asia in Transition, Chiang Mai University 1995) and "lies in a zone of transition between agriculture and forestry, and between subsistence, exploitative land "mining" and market-sustained continuous land management" (p 32).

Another important aspect is that "shifting cultivators" rather are "multiple land users" with shifting cultivation just one of many other activities, which are part of the household livelihood strategies. The collection of non-wood forest produce and cultivation of maize, cassava and other crops on a sedimentary basis are examples of other activities of significance. Finally, one major characteristic is the location of specific diversity, related to the conditions of the surrounding natural resource base.

The terminology varies. "Slash and burn" is used by one international organisation and is not very useful as slash and burn are just terms to describe the technology used.

"Swidden based rotational agriculture" has been suggested by P Parisak Pravongviengkham, Ministry of Agriculture and Forestry, Vientiane and this terminology has certain merits.

For the time being, the researchers will use the terminology "shifting cultivation". However, the terminology to be used and the understanding and analyse of this particular farming system is still under development.

In this context, a different analytical tool is suggested which might be more useful in order to understand the mechanisms involved in shifting cultivation. It may then indicate the particular circumstances in which the issue should and could be addressed.

The bona fide or traditional shifting cultivators are professional shifting cultivators with a culture, organisation and social life which is compatible with and supportive of shifting cultivation. They operate on a sustainable basis and have a defined and, by their own and mostly surrounding communities, recognised right to their territory. The "modern" sector, does not normally recognise these traditional rights. In Lao PDR, however, customary rights are recognised as indicated in for instance Decree 169/PM.

The bona fide shifting cultivators do not constitute an environmental problem, as they have over the years developed a sustainable relationship with the land. The production system does however normally not sustain production of trees and forests as the land, when it recovers from the shifting cultivation, normally yields bushes and young trees. This is however not necessarily the case as "shifting cultivation" communities can, and have managed trees. Hence bona fide shifting cultivation is not primarily an environmental problem, as long as the system is in balance.

Transitional shifting cultivation has been an expanding category in Sout East Asia, comprising land-less and small farmers who enter the forests often in the wake of forest harvesting operations. They constitute a real problem for the industry and for the environment for several reasons:

- They are not professional shifting cultivators or, they are professional in their original environment but have for some reason moved to another area with different environmental conditions, the sustainable use of which they lack knowledge about.

- They lack the traditional and/or national recognition of land rights which prevents them from long term investments for a sustainable production on the land engaged. This can also apply to the bona fide shifting cultivators if their territory is subject to immigration, forcing them to use shorter cycles or engage new land to which traditional land rights might not apply.

- They upset the often very delicate balance between people and land, achieved by the bona fide shifting cultivators. This can also force them to abandon their present practices.

This category of shifting cultivators are usually viewed as poverty based; it is a poverty problem. In the experience of the author, it is a somewhat glib explanation. Rather, it is suggested that an analysis goes beyond the "poverty" issue and looks at the dimensions related to access, including secure access to resources such as land and land management inputs. For instance, various policy based land denial systems (this includes situations where there are no policies to address this issue) cause professional farmers to carry out a short term, destructive and exploitative land management instead of doing what they are good at: carrying out sustainable, productive and environmentally sound agriculture, forestry/tree husbandry and livestock operations.

The transitional shifting cultivators comprise a wide range of people with different background and motives. The terminology used reflects this; opportunistic shifting cultivators, pioneers and encroachers. It is often associated with forestry operations, with the people entering the forest areas opened up by the forest operations.

Frequently, or at least during the initial stages of their career, the transitional shifting cultivators are carrying out logging for commercial purposes. In this category could also be included professional shifting cultivators which, for some reasons, move from one area to another area with a different ecology and other conditions and to which they have no history of cultural and other relations. This is for instance the case in Vietnam where ethnic minorities in Northern Vietnam move to upland areas in the Mid and Southern Vietnam highlands.

There is a third, rather new, major category of shifting cultivators which has been observed in Indonesia, India, Sri Lanka and Bangladesh, the Urban Based Entrepreneurial Shifting Cultivation (UBESC).

Entrepreneurs engage rural labour, mostly landless casual labourers to enter the forest and to cultivate commercial crops through shifting cultivation. In effect, the bio-energy of the forest is converted into commercial crops such as betel leaves or chilli. In this context, the land-less shifting cultivators are the instruments, the visible components of a system of using the forest land.

Another version of this is represented by the *bona fide* shifting cultivators who join the market as consumers. They use shifting cultivation with traditional techniques to finance the purchase of consumer goods. That is, they join the market as consumers but not as producers.

In general, shifting cultivation of all categories, traditional, bona fide, transitional and the UBESC are all quite well integrated in the market and not as the conventional wisdom tend to argue, mainly a subsistence based economy.

For the same output, shifting cultivation requires more land than irrigated paddy operations, but requires less person hours. In other words, shifting cultivation can and is in certain circumstances an attractive proposition and a viable land use option. By practising shifting cultivation, more food and money is produced than from irrigated paddy for the same amount of work.

To this should be added a gender perspective. In several instances which the author have come across, shifting cultivation has been supported by the men whilst the women have denounced it. An important part of an explanation to this is that it appears that the women in those societies have the major share of the labour input for shifting cultivation.

Shifting cultivation in Lao PDR

The shifting cultivation issue has been on the agenda in Lao PDR already since the 1970´s. The strategy then was to settle shifting cultivators in areas of permanent agriculture. Prior to 1976, some 7,000 families had been resettled whilst during the period of 1977 - 1980, some 11,000 families were settled. This strategy was eventually abandoned. The reasons are not known presently. It is not unlikely that a major reason was the costs involved and also the lack of sustainable success. People moved back to their original environment.

In 1986, at the Fourth Party Congress, a plan was taken which aimed at restrict "slash and burning agriculture" and to arrange for "fixed cultivation/occupation" for 277,000 families of shifting cultivators. This should be done through:

- integration of upland cultivation with reforestation (agroforestry)
- improvement of productivity of shifting cultivation
- transformation of shifting cultivation into permanent upland agriculture

The plan was never implemented and "it is doubtful whether it would have been possible to do so"[1] Various other initiatives occurred during the early 1990´s such and the need of reforestation and transformation of the shifting cultivation was very much on the agenda.

The TFAP/NFAP also had shifting cultivation as a major issue, both in terms of forest destruction and in terms of how to address shifting cultivation, using forestry. A plantation forestry program was suggested which partly was intended to reduce the amount of shifting cultivation. There were a number of other initiatives, indirectly or directly addressing the shifting cultivation issue. The Land - forest allocation is a prominent part of the shifting cultivation agenda.

[1] Pheng Souvathong, DoF, Shifting Cultivation in Lao PDR: An overview of land use and policy initiatives, International Institute for Environment and Development, IIED 1995, London

The Land - forest allocation process

The basis for the land - forest allocation are the Decree no 99/PM of 19/12/1992 and the Decree No 186/PM of 12/10/1994 on land and forest allocation. (replaced by the Forest Law of 1997) The implementation has been started on an experimental basis in Vientiane Municipality in a number of villages and in the Province of Luang Prabang amongst others.

The land - forest allocation contains a number of new concepts - individual/household responsibilities of different types of land such as forest land for instance - as well as a number of novelties for the administration. It includes organising teams to start up discussions with the villages, identifying different land types, drawings of village maps indicating the different land forest land types etc. Not the least was the initiative a new issue for the villagers.

On the basis of the experiences so far and in order to facilitate this process, the government issued "Instructions on the continuation on implementing land management and land - forest allocation", No 03/PM, June 25 1996. The objective of the implementation instructions are to "continue to make the policy on land management and land - forest allocation more deeply and extensively absorbed by government officials and people and in view to making the authorities of all levels and all Lao citizens clearly understand their obligations, benefits and responsibilities in protecting, managing, utilising and enriching land and forest in perpetuity" (unofficial translation, p.2 ) A second objective concerns the need for socio- economic development, environmental concerns and the transformation of a "nature - based economy into an commercial economy"

It is up to the Provinces, the municipality and the Special Zone to " organise the conclusion and evaluation on the implementation". It is understood that this implies that the different Provinces (and Districts) take into considerations the particular circumstances in their respective areas.

The document also, in Section 6, clarifies that "In view to ensuring the trust for investment in land development as well as the stability of livelihood of all Lao citizens, the State therefore recognises legal rights as follows: right of possession; right to use; usufruct rights; right to transfer; right of inheritance and right to receive compensation by the state. The required documentation to claim these rights are not discussed in the document.

The Ministry of Agriculture is further requested to continue to promote tree planting and forest protection linked "with the land - forest allocation policy". The exemption of tax for plantation forestry is specially mentioned.

In July 15 - 19 1996, the First Nation-wide Review Conference on Land Management and Land Forest Allocation was held to evaluate the work so far and to give directions for further work. It was noted then that up to that time, the land - forest allocation had been completed in 1,520 villages, comprising 72,000 families. In those places, according to the "Resolution on the First Nation-wide Review Conference on Land

Management and Land - Forest Allocation, July 19, 1996 " (unofficial translation), the process had by and large been successful:

"The problems related to land and forest have been remarkably and basically resolved, first and foremost the livelihood of the population has become stable, land conflict has been reduced, the agricultural commodity production has been increased, the consciousness of the population in forest and environment protection has also been increased enabling the prevention of detrimental illegal tree cutting and forest fire. At the same time it represents an appropriate method for restricting and gradually putting and end to shifting cultivation" (page 2).

At present, it is not the intentions to evaluate that statement in this Working paper. It is however done in the Resolution of the Conference.

In the Resolution, a number of weaknesses and shortcomings are discussed. Briefly, they are: the dissemination and implementation of Decree 99/PM has been delayed and "generally very retarded" and the state agencies and the population has not absorbed this matter; the management of land has not been even performed; the land forest allocation has covered only 10% of the total number of villages; the survey of the family registration and land titling has been tried in only 8 villages of Vientiane Municipality and in general, the performance of the local party organs and the state administration in this respect has not been "as high as it should be". (Page 3 )

However, the Resolution recognises that there was a lack of instruction and inspection (supervision?) at the central level which resulted in uncoordinated implementation or non implementation and finally, that there was a shortage of staff and budgetary support.

On this basis, the Conference puts forward a number of suggestions (" Primary objectives and work directions from now to the year 2000") This section of the Working Paper restricts itself presently to the land - forest allocation. The focus is to complete the land -forest allocation in Protected Areas, waters sources, catchment areas of hydropower dams and in areas affected by shifting cultivation. In areas where this has already been done, inspections are to be conducted to ensure that the outcome is positive and if so, land titling should be issued to the population. In areas where the forest - land - forest allocation has not been successful, rectification should be made or re-appropriation of the land by the state.

An outcome of the Conference was the need of convening meetings of extending the outcome. In August 2 1996, "Instruction on land - forest allocation for management and use" (No 0822/F) was issued. The Instruction initially indicate the relevant legislation to the issue at hand:

Decree No 99/PM of 19/112/92 concerning land;
Decree No 186/PM of 12/10/94 on Land - Forest Allocation for tree planting and protection;
Decree No169/PM of 03/11/93 on management and use of forest and forest land;

Provisional Regulation No 22/PCM of 21/03/89 on the management and use of agricultural land in Lao PDR;
Instruction on the continuation on implementing land management and land - forest allocation No 03/PM of 25/06/96;
Resolution of the Nation-wide Review Conference on Land Management and Land - Forest Allocation of 19/07/96
(some of the above legislation has been replaced by e.g. the Forest Law of 1997)

The Instruction emphasises the objectives and also indicates more specific targets. Among those are for instance:

- to preserve and expand existing forest area;
- to ensure that "all plots in the villages across the country clearly have the owners to manage and use for long term;
- to "increase self-reliance, creativeness and enthusiasm of pluro ethnic population to actively and seriously invest in production";
- to establish a uniform system for management of land and that each Province should work out the plan for reducing and gradually eliminate shifting cultivation together with a plan for producing food and commodity by taking the land - forest allocation as a point of departure and focusing on the preservation of the forest and environment.

Land - forest allocation to families, villages, collectives and divisions as specified in the Instructions relate to land use planning at village level. After identification of different land types, land would be allocated. Land not suitable for agriculture must be allocated to families for tree planting. Past land - forest allocation is to be reviewed and amended if found not satisfactory. In Section 6 of the Instruction, it is stated that the " land - forest allocation must be completed from village to village with the participation of local population and using simple method with the understanding and consent of the local population, nevertheless effective. A district might be selected for the experiment in one village to draw concrete lessons which will then be extended to other villages". (page 4 )

In the village, land is to be allocated in five different types:

1. Land for permanent production
2. Land type "bearing no permanent production" such as shifting cultivation land
3. Land left over, not suitable for agricultural production can be allocated to those interested, mainly for tree planting, including commercial enterprises.
4. Reserve land for future generations
5. Forest subdivided into three categories: Water source protecting forest; village forest reserve (sacred forest, cemetery, divine forest ) and utility forest. In case of the village having no forest, land should be set aside for the establishment of plantations

The Instruction also states that villages "Have access right to the allocation of different types of forest, including any adjacent forest which could be considered, depending upon the circumstances".

Based upon "actual practice in the past, the steps of implementation can be summed up into 8 steps as follows":

- preparations -
- consultation with the village
- actual data collection
- open discussions with the village to come to an agreement on land use plan of the village and the determination of boundary for land - forest allocation within the village
- actual field measurement
- extension
- monitoring
- evaluation

The Instruction also contains technical guidelines about slopes and land use. None of the above documents presented are have indications upon what sort of specific legal instruments such as land titles are to be used.

At the District level, the government intentions have been translated into specific action with the District visiting the villages to inform and carry out the land - forest allocation process. Below is given a brief description of this process as it has materialised in the Study Area and what are the "implementation regulations" as understood by the researchers.

The District views the land - forest allocation as not only a scheme to distribute land but also as an instrument to achieve other objectives. It intends to improve land management to improve production; to gradually decrease shifting cultivation; improved extension for increased production, develop trade and marketing and in general contribute to development of land use and management.

As a general rule, good soil should be used for agriculture and not so good or bad soils for forestry. It was also pointed out ( at this particular meeting ) that land upon which there was a forest regeneration older than five years should be left as forest land. If the regrowth was younger than 5 years, the land could be used for agriculture. The land available for the households is related to number of "labours" available in the household. The following guidelines are given:

| | |
|---|---|
| Upland agriculture | 1 ha per labour |
| Vegetable | 3 ha - " - |
| Forest plantation | 5 ha - " - |
| Grazing | 15 ha - " - |

Labour is defined as 15 years old and above with a fluctuating upper limit. With the land -forest allocation, there are certain conditions, one of which being that if the land is not used for 3 years, the usufruct rights to it can be withdrawn by the government.

For land use, Land Tax is being paid. This also applies to shifting cultivation land. There are some exceptions. One is that Land Tax is not paid for land used for

plantation forestry. The other is that there are tax incentives to promote a stabilisation of shifting cultivation. Land Tax paid is reduced if the land is being used subsequently rather than being shifted to another lot. The reduction varies and has been reported as a tax relief period of three years and as a gradual reduction in taxes for a number of years.

In one village in the research area, Tou Ho, land - forest allocation has been carried out and registered. The data are in Appendix B. The 59 households have all been registered and forest land has been allocated. For each household, four plots have been allocated, physically identified and demarcated. The total land amounts to 230.99 ha with an average of 3.92 ha per family. The total number of plots amount to 228 which is 8 less than theoretically possible.

Before forest land allocation, the choice of plots for shifting cultivation was individually based and there was no village based co-ordination, e.g. in terms of general directions that this year, the major thrust of the shifting cultivation is in this particular quadrant. In conjunction with the land forest allocation, the village decided to co-ordinate the use of the individual plots. The principle is that all household during a particular year use the plots in one general direction - east of the village e.g. The reasons are that this facilitates livestock management (the livestock generally grazes in the non used area) and possibilities for co-operation with regard to work on the shifting cultivation land. This is a village based strategy, worked out by the villagers.

In Ban Tha Li, another village in the research area, the opposite has taken place. In the past, Ban Tha Li co-ordinated the use of the shifting cultivation land with all households operating in the same area at the same time. Post land forest allocation, they now have decided to operate individually; each family can go to any of the four plots allocated. We cannot presently explain the circumstances behind.

The land forest allocation in Ban Tou Ho started in 1994 with the SCP/District visiting the village and informing about the legislation and the government intentions, the reasons why and how it should be implemented. The SCP/District carried the PMO decisions and also referred to the development the last 30 years. “Government wants to improve for the village and for the nation “. The village committee, VC, comprising the village leader, “national front”, Lao Womens Union, the tax collector, the “police/security” and the village elders basically agreed with some caveats such as the need of flexibility and change as they went along.- “ Give it a try with 4 plots.”

The Village Committee informed the villages in meeting in plena. In January 1995, maps were produced and used to distribute the land. Distribution was according to “rank” - presumably the highest rank had the first choice etc. Plots were chosen nearby each others for reasons previously stated. It was done “indoors”, in the village. The distribution of the land also included the definition and demarcation of Protection Forest, water catchment areas, Conservation Forest and Production Forest areas.

This activity took place early in 1995. Involved from the government was the SCP and the District. The village started to use the system 1995. The shifting cultivation

plots were actually measured by students from the Xieng Ngeun Forestry School. A list of all households was made were number of labour as well as plot 1,2,3 and 4 was indicated with area indicated with two decimals ( Appendix B ) Involved in the process was also Lao Womens Union, LWU. The plots for 1997 and 1998 of three farmers in Ban Tou Ho were visited. Table 3.3 is an extract from the list made in connection with the land-forest allocation.

Table 3.3: Extract from the list made by Tou Ho Village in connection with the allocation of forest land to the households. The extracted households incl. some of the plots were visited by the research team.

| Household | Plot No | Year cultivated | Area, ha | Plot visited | Comments |
|---|---|---|---|---|---|
| Mr Khie Ma | 1 | 96 | 0.90 | | |
| | 2 | 97 | 1.08 | x | |
| | 3 | 95 | 0.85 | | |
| | 4 | 98 | 1.30 | x | |
| Mr Pethsavanh | 1 | 95 | 1.50 | | |
| | 2 | 96 | 1.43 | | Used his brothers land which was visited |
| | 3 | 99 | 1.60 | | |
| | 4 | 98 | 1.54 | x | |
| Mr Pa Thou | 1 | 95 | 1.02 | | |
| | 2 | 96 | 1.08 | | |
| | 3 | 97 | 0.90 | x | |
| | 4 | 98 | 1.08 | x | |

As could be observed, the size of the plots were in the magnitude of the area indicated. They have all be surveyed by the students from the Forestry School located nearby. From ocular inspection, it could also be verified that the village tries to enable all villagers to cultivate in the same general area in any particular year.

Apart from the upland rice fields, "hay", the farmers also cultivated other upland plots. The fields were often referred to as "maize fields". Those belonging to the same villagers as above were also visited. The fields were used for maize, mulberry and a kind of pea ("mak duoi"). The maize fields are not included in the land – forest allocation and are thus outside the approximately 4 ha each household have been allocated in four plots. The fields are upland fields and the major difference is that they are permanently cultivated, albeit with the occasional fallow period.

Tax, some 1500 Kip/ha is paid for this category of land. Fields far away from the village pay less tax than nearby fields. In Ban Tou Ho, all households except some six have "maize fields". An estimation is that some 52 households in the village use some 2 ha each, with a total of some 110 ha. This would partly explain the discrepancy between the hectare-area for shifting cultivation given by the villagers and the actual area being cultivated as observed through sampling inventory and remote sensing.

Part of the land forest allocation is the land - forest exclusion. The process defines and identifies areas with restrictions concerning its use. These areas are water catchment areas, Protection Forest, Conservation Forest and Production Forest. Logging is banned but the Village Committee decide on logging and other use of that land. For the construction of public buildings such as schools and also for new, private houses, the Village Committee can and do give permits to log. In Ban Tou Ho, there were also at least three cases where households have been given permission to carry out shifting cultivation in Conservation Forest Area and other restricted areas. The reasons stated was that the households concerned had received plots of very bad quality and which could not sustain them. " What else can we do? "

The land - forest allocation basically defines the non village land vis á vis the village and is not only allocating land but also alienating land from the village. That is, different types of forest land is identified and mapped - Protection Forest, Conservation Forest, Catchment Forest. These forests are the responsibility of the Village Committee and use of them is restricted and managed by the Village Committee.

In the villages, we find sketch maps indicating the different forest categories within the village land. There are tax incentives to support permanent agriculture. The tax is reduced during the second and third year of cropping if the same piece of land is being used.

An example of villages response to government strategies and externalities

In this section is given an example of a land use development which has taken place in the Mekong Basin since the 1960´s. The chart below is an illustration of a hypotheses, based upon the villagers own description of the land use in their respective areas. It is also an illustration of village strategies for forest land use. This particular chart is based upon the stories as told by farmers/villagers in 10 villages in Bolikamxai, Vientiane and Savanaketh Provinces. There are ongoing efforts to verify this by identifying data on the different parameters as indicated in the chart.

According to the farmers, this is what happened:

During the 1950´s, the population was much less than now. Shifting cultivation was carried out only to a very limited extent. Agriculture mainly took place in the plains of the Mekong basin. The forest was virtually untouched although some shifting cultivation took place. This was however to a very limited extent. Beginning during the 1960´s, logging started in the forest. Roads were build and large areas were clear-felled. The local population were not really engaged in this as the logging operators often used their own crews. During the 1970´s and 1980´s, the logging continued. Shifting cultivation also increased as well as the number of people living in the area. The shifting cultivation expanded considerably and followed the wake of the logging operations on the roads prepared for the logging.

At the end of the 1980´s logging was very much reduced and has today virtually ceased in that Area. Shifting cultivation has also been reduced drastically because of

soil exhaustion, government policies and also because of the increased areas of paddy fields. According to the farmers, the proceeds and surplus from the shifting cultivation was used to invest in preparations of paddy fields.

Today, the shifting cultivation has declined considerable. (Data are available but not yet verified ) Some farmers are presently converting the former shifting cultivation land into plantation forestry. This seem to be a very fortunate combination: the shifting cultivation land has been exhausted, it is normally still fenced, and the farmers are looking for investment opportunities.

It appears then as if the forest land use has gone from natural forest, logged over forest, shifting cultivation, the surplus of which has been used to create paddy fields and eventually, the former shifting cultivation land now being used for plantation forestry as illustrated in the Figure 3.2. This also supports the opinion that the villagers in the Project area have not been living in a static environment but rather an environment which has undergone a traumatic and dramatic change over the last decades - from dense, natural forest to logged over areas with secondary forest and shifting cultivation.

Figure 3.2 is an approximation and, presently, at best represents a possible scenario. If it is correct and can be verified, it is a very positive development.

| Year | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| Logging | 1 | 1.5 | 2 | 3 | 4 | 6 | 4 | 0.5 | 0 |
| Shifting C. | 0 | 0.5 | 1 | 3 | 4 | 5 | 4 | 0.5 | 0 |
| Paddy | 0 | 0 | 0 | 0.5 | 0.5 | 1 | 1.5 | 2.5 | 4 |
| Plantation | 0 | 0 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 5 |

The above figures are indicative and based upon statements from farmers in the project area of Bolikamxai.

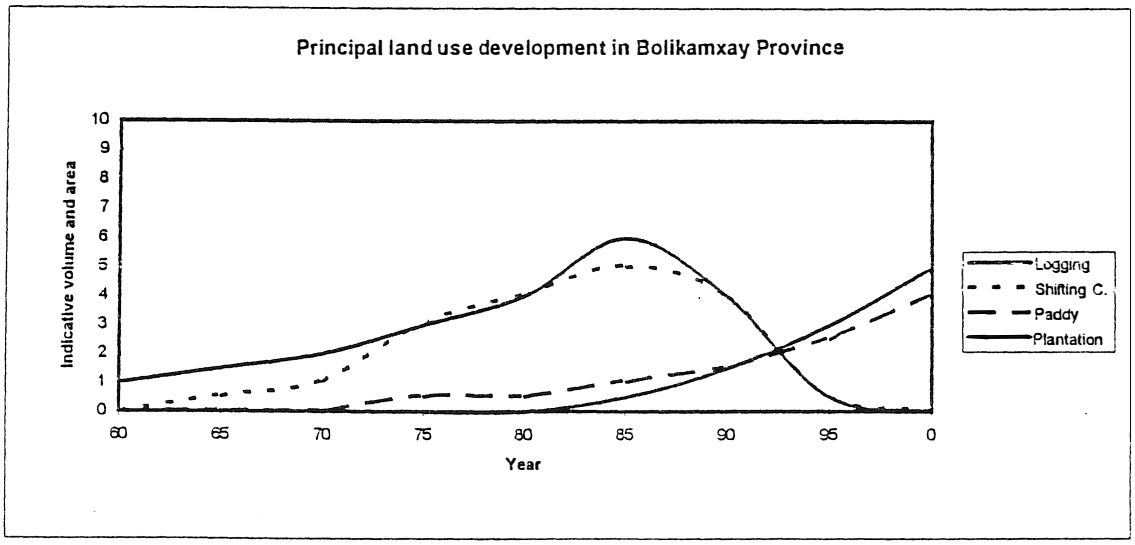



Figure 3.2: Illustration of forest land use development in Bolikhamxai 1960-97

### 3.4 Some conclusions and comments

The fieldwork and the analysis is not yet finalised. Some of the data and information are contradictory and do thus require to be rechecked and explanations sought. There are a number of issues which has come out of the work so far. One concerns the issue of whether villages and the villagers have livelihood strategies and if so, can they be defined and identified.

The work so far confirms that there are strategies at both village and villagers levels. Although this might appears obvious, it is an important consideration in any development of government strategies. The villages and the villagers manifest this in a number of different initiatives and undertakings, some of which are viewed by the villages and the villagers as not successful and some of which are.

Another issue is the ongoing transformation in the villages, related to the government strategies such as the land - forest allocation process. As indicated above about village strategies, there are different responses to this issue. This research does not aim at evaluating the land - forest allocation process per se but will nevertheless be in a position to follow it up as part of the research. Although in most cases, the villages now seem to have less land for shifting cultivation, in many instances the villages insist that they will manage with this. As some villages indicate that they will not manage with the land as the land - forest allocation process has allocated, this discrepancy remains to be clarified.

The land - forest allocation is very much seen as a trial by the villages. The expectations vary. New technology, new crops and markets will support the sustainable development versus more land for shifting cultivation are two extremes. There are a number of initiatives coming up in the villages - road construction, (from Ban Tou Ho to Ban Tha Li) livestock farm on a joint basis, expansion of irrigated paddy fields etc. - as well as other activities such as migration out and in. All in all, it appears that the land forest allocation activities has generated a very dynamic process where villages start to discuss and decide on land use planning and other future activities and also how to address the market economy.

# 4. THE HISTORICAL DEVELOPMENT OF THE STUDY AREA

## 4.1 Why Historical Research

The research project as a whole concerns forest land-use strategies. It's component of historical research has several objectives. One of those is to generate research data for the national and international community. Another objective is to provide a basis for the analysis of and the discussion on possible land-use strategies jointly with the people of the area.

A basic assumption of the study is that one can learn from the past when trying to understand the present situation and elaborating strategies for the future development. The approach is to trace and describe the historical development and analyse that information in combination with data on demographic, socio-economic, agricultural, environmental and political conditions in different years. In that way one could better understand how government policies and other factors have (directly or indirectly) influenced land-use, life and decisions of the people..

The purposes of historical research include:

- to gain knowledge of profile of the communities (origin, culture, and tradition of the people living in the area);
- to find out about settlement background of the communities along with the relationships among them;
- to acquire possible details of all significant changes and their causes, taking place over time, which have influenced life, livelihood and land-use of the people;
- to learn about the villagers' perception of their experiences in the past, of the current situation of their communities, and their priorities for the future.

## 4.2 Research Method

Similar to many other countries, the written historical record in the rural areas of Lao PDR is often very limited when it comes to the local situation and development. Under such conditions, the memories of the people living within the area will be the main source of historical information. Tracing, compiling and evaluating that information could only be done through good relations and confidence among researchers and the people of the area (villagers and local authorities).

The research work has included the following main steps:

- Discussing possible sources of historical data with concerned authorities at all levels;
- Conducting open-ended interviews with key informants in all villages (village headmen, elders, school teachers, and the local Lao Womens Union);

- Discussing the results of the data collection in the villages with district authorities
- Cross-checking and analysing interview data of each village with other data (historical record of other villages, results of photo interpretation, socio-economic study, official statistics etc.).
- Compiling a written document (minutes of the interviews translated into Lao language) describing the history of each village to be presented and discussed with villagers and local authorities (Annex C).
- Presenting the first findings at a meeting attended by representatives of all parties concerned, mainly the Department of Forestry, province, district, villages, and the Lao-Swedish Forestry Programme);
- Returning to all villages and correcting any misunderstood part of the village histories together with the villagers (Photo 4.1);
- Finalising the first findings

Photo 4.1: Discussion of land use history with representatives of one of the villages (Ban Thong Khang) around the water sources of the Nam Nan. The slope in the background was the first location of the Village some 50 years ago.

## 4.3 Profile of the Communities

The seven communities of Upper Nam Nan Water Catchment Area are composed of several ethnic groups divided into three ethnic categories. The first one is the Hmong ethnic group of the *Lao Soung* category, who often lives at the highest elevation, in comparison with the two other categories. The second one is the Khamu group of the *Lao Thoeng* category, usually preferring the lower elevation to settle. The third one, which is the biggest group of the country's population, usually living in low-land areas, is Lao or *Lao Loum*.

All together, there are about 2,500 people living in those communities, of which respective names are: *Ban Tou Ho, Ban Pha Haen, Ban Huay Oun, Ban Thong Khang, Ban Pha Tonglom, Ban Pha Kuang, and Ban Tha Li. "Ban"* is a Laotian term, meaning "village". The location of all communities, including those previous locations related to their settlement backgrounds, are shown in Figure 4.1

Tou Ho and Pha Haen are *Lao Soung* communities with the population originating from the Hmong sub-group called "White Hmong" or *"Hmong Khao"*. Huay Oun is a *Lao Thoeng* community. Thong Khang and Pha Tonglom are both communities of mixed ethnic groups, with *Lao Thoeng* as the major category and *Lao Loum* as the minor one. Pha Kuang and Tha Li, are *Lao Loum* communities. Generally, both the Hmong and the Khamu, living in this area, are animist, but many of Khamu ethnic in Pha Tonglom Village are Christian. Traditionally, the Lao are Buddhist.

Only three out of the seven villages can be reached by gravel roads, namely Thong Khang, Pha Tonglom, and Tha Li (see figure 2 in chapter 2). The four other villages can be reached only by foot. Neither of the villages has access to electricity. Such a poor infrastructure means that access to the market and to all the possible information is limited.

## 4.4 Settlement history

The colonial period (-1953):

*Six of the seven current villages settled in the UpperNam Nan Water Catchment Area before 1953. During this time the population increased at a fast rate from a few households at the turn of the century to over 130 households. There were no roads, not even Nan District Town had road access. All contacts with the outer world were maintained by walking. The forest was reportedly dense and tigers and other wildlife were common. Agriculture was almost entirely based on "shifting cultivation" although a few paddy fields were established in Tha Li Village in the first decades of the century.*

Those earliest settlers of the Area came from various districts of Luang Prabang Province. The oldest of the seven communities are the two *Lao Loum* villages, Tha Li and Pha Kuang. According to the key informants in both villages, their older generations told them that these two small communities had already existed since the end of the 1800s. However, they could describe very few pieces of the history of those days.

In the 1880s, the first settlers of Tha Li Village arrived in a group of six families from Pakseng Village, Nam Xueang District in the Northern part of Luang Phrabang Province in search for better agriculture land. They settled in the forest at their first location named "Wang Hok" (Site No. 1, Fig 4.1) and started practicing shifting cultivation on the slopes nearby.

Two years later, the group moved to the second location named "Tat Li" (Site No. 2) in order to stay closer to "Tha Li", their new agricultural area. Finally, in the 1890s, the group moved to Tha Li, where it was joined by four other households arriving from Pakseng. Since then, Tha Li has become a solid community. After some time the Tha Li villagers also started paddy field cultivation and built an indigenous irrigation system. However, the paddy cultivation was abandoned in the 1920s when all the buffaloes died of a disease.

The existence of Pha Kuang Village at the time is not well described but was confirmed by a marriage between a man from Thali and a woman from Pha Kuang around 1910.

In 1926 a Lao Theung farmer moved in and settled at Huay Hao some 2 km North of Tha Li . He was later followed by some others and became their leader. The village comprised between 10 and 15 households in 1945 when the leader suddenly died. They could not find a new leader and the Huay Hao community dispersed.

By the end of 1929, Tha Li accommodated 32 households and the village of Pha Kuang, had about 10-15 households. The distance between the two villages was about 6 km through rough terrain. It was described that the forest was dense and it was a habitat of various species of wild animals.

In 1936, the Tha Li farmers were impressed by paddy cultivation in Na Fai village (outside the Area, a few kilometers further South) and made some experiments by themselves to take up the practice again. However, the result was not promising. The yield became less than that from upland cultivation , therefore the experiment was interrupted in the following year. The paddy cultivation was resumed for the second time around 1950.

However, most of the villagers based their living entirely on shifting cultivation. In the beginning, the practice was of the pioneer type and not rotational as today. When the practice was changed to a rotational system, it cannot be verified. Nonetheless, in the 1950s, the Tha Li villagers practiced rotational "shifting cultivation". Mostly, at that time, the villagers conducted their cultivation in a compound area each year, co-operating with one another, both for social and for security reasons.

Prior to the 1950s (possibly already in the 1930s), a big group of 47 Khamu-households had settled at the first location of Thong Khang Village, which is currently referred to as "Thong Khang One" (Site No. 15).

By that time, many people of Hmong ethnic, including the members of Pha Haen and Tou Ho communities, were living at a place named "Tat Hoy", just North of the Water Catchment Area (Site No. 8).

The account of Huay Oun village history began in 1951. By then, three households of Khamu ethnic lived at the first location of that village.

Political disputes (1954 -1963):

*This period was characterised by political disputes among the population in the country and also in the Upper Nam Nan Water Catchment Area. Infra structure was still poor but there was some agriculture development through permanent rice cultivation in some villages.*

In late1950s, political instability of the country was underway. It caused splitting up among the population of the country. Those people living at Tat Hoy were not any exception. Seven households of Tou Ho community left Tat Hoy, in 1957, for settling at Toup Ho, just outside the Water Catchment Area. Later, in 1961, the Pha Haen community split up into two groups. The group of 11 households, with neutral opinion, left Tat Hoy for living at Kieu Lai, their agricultural location (Site No. 5).

In the meantime, some serious diseases, namely malaria and dysentery broke out in Huay Oun community. Lots of its population fell ill and died continually along the following two years. The cause of the diseases were then unknown for the community. Based on their animism belief, the villagers assumed that the disaster was caused by supernatural power and that they must run away from it.

Therefore, in 1963, the whole community, 20 households, deserted the village location and set up a new living compound at their agricultural area called "Huay Liang" (Site No. 10). Nonetheless, the situation did not become better, but the opposite way round. Desperately in search of spiritual guardians for their survival, coupled with serious suggestions of their witch-doctor, the population of Huay Oun fled Huay Liang and returned to the previous location in 1965.

In 1961, there was a fire in the village of Pha Nip, a few kilometers outside the Water Catchment Area. The entire village was destroyed and its inhabitants moved to other places. Some of them came to settle at the site of the previous Huay Hao Village. Soon after, several families who had lived there before returned to their old village site.

Although the history of the Pha Kuang Community dates back to the early 1900s, the details of its historical record could not be accounted originally before the year of 1963, when 32 households of *Lao Loum* ethnic were living at the place, which currently called *"Pha Kuang Kao"* - meaning "Old Pha Kuang" (Site No. 6). They lived there throughout the 1960s, in spite of various difficulties including poor water supply.

Civil war (1964 - 1973):

*During the war, many people left their villages either by their own choice or being urged by the Government at that time. Especially those living in the northern and eastern part of the valley had to move. The remaining villagers had to supply both themselves and those seeking shelter in the jungle. However, this was also the period when the Area started to become more accessible with construction of the road from Sayabouri through the Nan District town on to Luang Prabang and a truck road to Thong Khang village. The last of the seven villages still existing today also came to settle in the Area. By the new road and the temporary army base at Thong Khang the logging in the area became significant.*

In 1964, civil war between the Royalist and the Pathet Lao parties could not be avoided. Mass migration of people living in the war zones took place during the peak period of the war, 1965-1969.

The Tou Ho community, 30 households by then, fled Toup Ho in 1964 and sought shelter at "Huay Chia", far outside the Nam.Nan Water Catchment Area.

The people of Pha Haen community had lived at Kiew Lai for four years since 1961. In 1965, they moved to a new location near a small stream called "Huay Kang" in search of better water resources for their agriculture.

In 1966, the war was intensified. Most of the population of Tou Ho community fled again, and only seven households remained at Huay Chia. Meanwhile, the Huay Oun community scattered to seek shelter at different places. Among others, a group of six households took refuge at a place named "Khon Sok" (Site No.11.)

While those of Tou Ho and Huay Oun communities had to flee their villages, the people living in Thong Khang could remain. But, in 1967, a mass of people in Thong Khang died of unknown disease. Like those in Huay Oun, the villagers of Thong Khang believed that the disaster was caused by a curse of supernatural power. Therefore, they deserted the village and set up a new living compound, "Thong Khang Two", with 86 households (Site No 12).

In 1967, a Royalist army base was posted in the vicinity of "Thong Khang Two".

An intensive fighting between the war-parties broke out in 1968. Both firing on the ground and bombing from the planes occurred around "Thong Khang Two". Eventually, the community split up into two groups and moved from their village in 1969. One group of 34 households took refuge in the jungle. The other group, 52 households, moved to Khon Sok, where a group of Huay Oun Community had lived since 1966.

Also in 1969, a big group of refugees from Xieng Khuang Provines (about 100 households) were placed at the site of "Thong Khang Two". They were supported by the army base and did not carry out any agriculture by themselves.

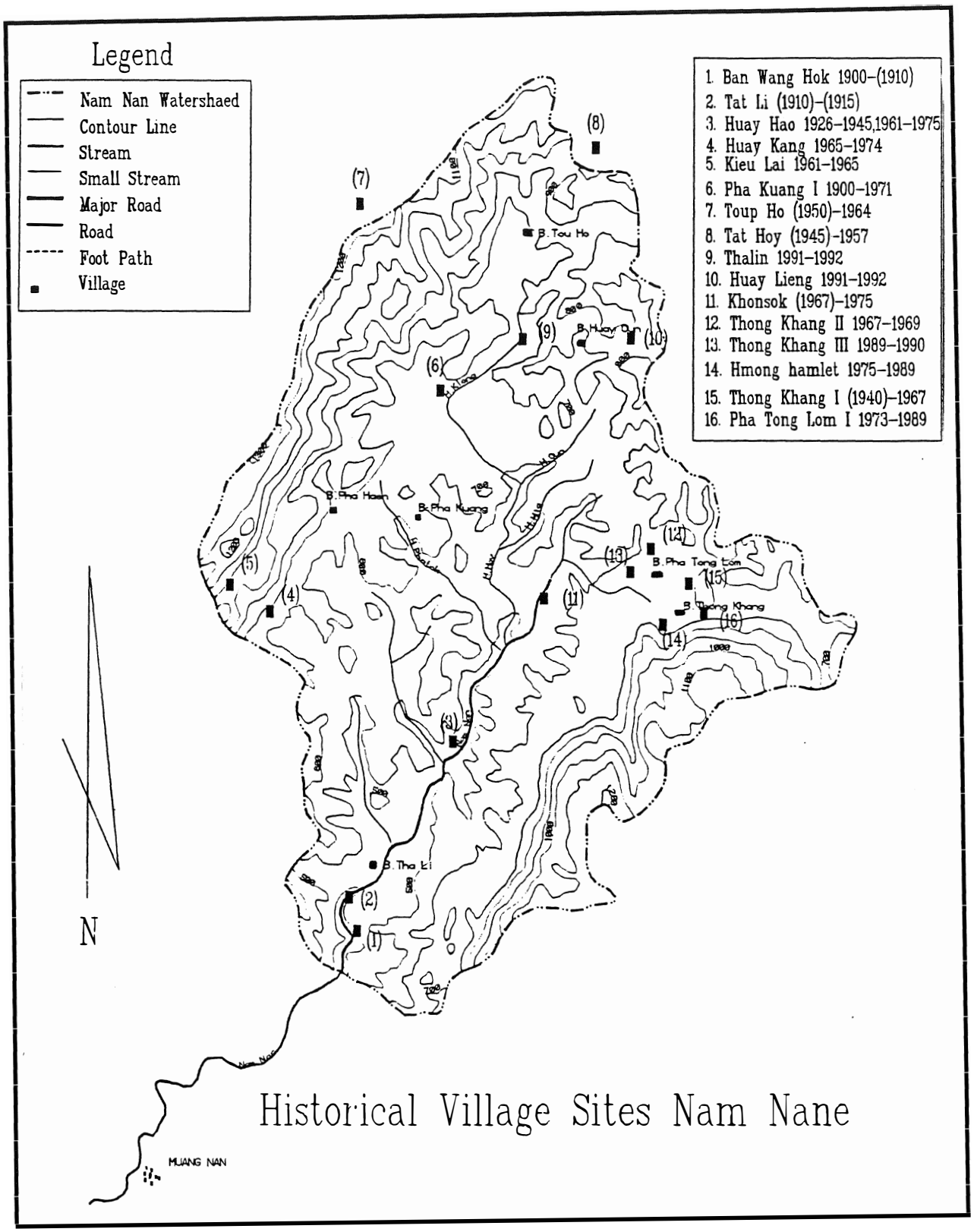



Figure 4.1: Current and historical village sites in the Upper Nam Nan Water Catchment Area

In the middle of the war, in 1969, a road connection from Sayabouri to Luang Prabang town passing through Muang Nan district town was constructed. Suddenly, the infrastructure of the Upper Nam Nan Water Catchment Area had improved quite significantly. Four years later, a gravel road was built leading from the main road to the army base at Thong Khang.

In 1971, the army base near "Thong Khang Two" was strengthened by the US support. Though the existence of the army made the villagers living around the army compound feel safer than they did in the preceding period, confrontations between the soldiers of the war-parties occurred in the distant areas away from the army compound.

In the middle of one night in 1971, a gunfight between the soldiers of the two parties broke out around Pha Kuang Village and accidental shots hit some villagers and caused fire to a house. An immediate out-migration of the whole village, 35 households, then took place. They sought refuge in the district center of Muang Nan, where they were separately placed at different families.

At all events during the peak period of the civil war, Tha Li Community could manage to remain, while all the neighbouring villages had to migrate around because of both outside factors, such as the war, and the inside factors, such as serious diseases. In fact, Tha Li was disturbed by the pressure from the war-parties as well. Anyhow, a neutral policy, led by the it's village committee, was the main factor that kept the people of Tha Li to live normally and to have more opportunity than those of the other communities to plan and develop their living during the period of the war. For instance, in 1970, while those in other communities were still moving around, the villagers of Tha Li started peanut cultivation based on information about a good price of the products at the time.

When the negotiation between the fighting parties was put into the process in 1972, a group of the US-supported army was to be recruited at the previously mentioned army base in Thong Khang area. The army group was accompanied by 30 households of Khamu settlers from Pha Tonglom, a war zone in Xieng Ngeun District. For security reasons, the Khamu group was allowed to stay in the army compound and obtain food supply from the army, until the better circumstances occurred. At this rate, not only the people of Pha Tonglom community obtained food supply from the US-supported army, but also those of Huay Oun and Thong Khang who were living in Khon Sok Village. The reason was that the people could not safely go to their agricultural areas.

In the same year, the people of Pha Kuang who stayed as refugees in Si Boun Hueang Village, Muang Nan, were provided with a location close to the District center called "Phone Tan" (nowadays the location of the district hospital) in order to build up their new village. However, the villagers found that the agricultural space did not meet their needs. Some households were, therefore, forced to carry out their productions at other places.

Finally, the peace agreement was signed in 1973, leading to the end of the civil war.

The post-war period (1974 - 1988):

*As a result of the new roads and the Government's recommendations urging people to return to their home villages, the population of the Area raised sharply in the years after the war. During seven years the recorded population increased from 300 to 450 households. The increase of the population pressure forced the people to intensify their cultivation, with reduced rotation cycles in "shifting cultivation" and also decreased forest cover as a result.*

As a consequence of closing to the end of the war, various migrations started again.

Directly after the peace agreement was signed in 1973, the Pha Tonglom community left the army compound and settled at the first location of Thong Khang Village (No. 15), and also took over the old fallows left by Thong Khang community. Seeds of rice for sowing, 20 kg. per labour, were provided for them by the army. They also started to establish paddy fields around their village.

In 1974, when the war had been settled, the Government encouraged all refugees to return to their original villages. An incentive was announced, saying that those who returned to their original villages would obtain the supports for their needs, such as, food and medical supply along with clothings.

The seven households of Tou Ho Community, who had remained at Huay Chia since 1966, returned to Tat Hoy.

In 1973, the Pha Kuang community split up and left Phone Tan for other locations. Six households moved to Huay Some outside the Upper Nam Nan Water Catchment Area. There, they reunited with three other households. Together, they returned to Pha Kuang in 1974 and rebuilt their permanent village, at the current site of Pha Kuang community.

Apart from encouraging the refugees to return to their original villages, the Government also urged those who were living in scattered small hamlets to move into any of the solid villages, according to their own preference. The population of small hamlets within the Area, gradually complied with the Government's suggestions.

In 1975, Pha Kuang Community welcomed a group of about 10-15 households with Khamu origin, from Huay Hao hamlet (Site No. 3). During the same period, 27 households of Hmong ethnic from another district of Luang Prabang migrated to Thong Khang Village, but had their own administration.

Also, in this year, the Tou Ho group at Tat Hoy, by then 11 households, moved to Huay Long Village, outside the Area, with expectation of being able to carry out paddy field cultivation. Since the outcome of the paddy field was not satisfactory, the group, being grown to 15 households, moved to Huay Oun in 1976 and settled down separately from the Khamu group who had lived there before the war and now returned.

A severe drought during 1976-77 caused difficult conditions and starvation in the late 1970s to people all over the country. As a consequence, the villagers of Thong Khang were forced to feed themselves with roots, leaves and anything edible.

Shortly after the end of the war, a guerrilla group--locally called *"Chao Fa"*--was organised. It's members were Hmong ethnic and became most active in 1977, causing very much trouble both to the Government and to the population of remote villages. This year, the group kidnapped the headman of Pha Kuang Village. He was later released in exchange with all kinds of weapon from his village-members, and no violence occurred. In the meantime, the Pha Haen group, living at Huay Kang, was transferred by the district authorities to Na Fai Village, adjacent to the district centre, for security reasons. One month later, the group was allowed to return to Huay Kang. On its home return, the group built up the village of Pha Haen at a new location, with the population of 52 households. They still live there.

The Tou Ho community of 15 households, left Huay Oun in 1978 and moved northwards to a new location, and built up the current Tou Ho Village. At the time, the *Chao Fa* organisation had given up, and 45 households of this organisation were sent by the Government to settle in Tou Ho Village. Soon after the establishment of the village, the Tou Ho community was provided with a simple pipe-water system by the United Nations Organisation, but the problem of water deficiency remained.

Because of the fast increase of the population, new roads and in-migration after the war the shifting cultivation increased rapidly. In addition, logging in the Thong Khang Area was quite rapid in the 1970s.

Very few details of the 1980s were obtained from the villagers. On the other hand, one can observe from population data that the population increase during the period slowed down considerably, partly because of out-migration.

<u>The present decade (1989 -):</u>

*Several changes and increased government influence and attention to the Area characterise the most recent 10 years. The policy efforts by the Government and the Forest Department aiming at stabilising land use, finding alternative crops and protecting forest areas and water sources have been significant. The establishment of the Thong Khang Research Station has meant investments in roads and agriculture and exposed the villagers to new ideas. The program to allocate forest land to farmers for cultivation is likely to change people's life. By an out migration in the years around 1990 the population is less than it was 10 years ago.*

Following the First National Forestry Congress in 1989 the Government strengthened it's attention on forestry policy issues and stabilisation of land use in the uplands. In that year they also instructed living in "the uplands" to move to the lowlands and they also started setting aside forest reserves and protected areas.

In 1989, the Lao and the Swedish Governments agreed to set up a "Shifting Cultivation Project (SCP)" to be co-funded by Sida in the Area with a project station next to the village of Thong Khang. Initially, it was a mixed rural development and

trial project. Later, the rural development responsibility has been transferred to the Nan District and the research component emphasised.

In the year of 1989, the people of Thong Khang, Pha Tonglom, and Huay Oun faced problems with their living again.

Thong Khang and Pha Tonglom had to move to new locations because the area in which they had been located was declared a reservation area by the Government. Thong Khang Community moved to Ban Kang (or "Thong Khang Three", site 13), but its Hmong hamlet moved completely out of the Nam Nan Water Catchment Area.

Pha Tonglom Community found its new location in the nearby, where it has remained until now.

Huay Oun Community was urged by the Government to move to the low land in order to carry out permanent agriculture. At this stage, the population split into two groups because of an internal conflict between the village headman and the informal leader of the village. The first group followed the village headman, conforming to the Government suggestion and moving to the low-land location. The other group followed the informal leader, moving to a slightly higher altitude (Site No 10).

One year later, a serious disease broke out in Thong Khang Community and caused a mass of death, which stressed the people's belief in super-natural power. Therefore, the Government had to approve the people's request of returning to their old place, and the Community has been there since then. However, seven households decided to remain at Ban Kang. Nowadays, the Ban Kang hamlet belongs to Pha Tonglom.

In 1991, a feasibility study on constructing a permanent irrigation system at Tha Li Village was completed by the SCP. A fund for the construction was granted by the SCP in 1992.

Serious diseases broke out in Pha Haen in 1991 and a lot of people died. Frightened by the disaster, half of Pha Haen's population fled the village in 1992. Most of those, who left the village, migrated to Tou Ho.

The year of 1992 also became an important year for Huay Oun Community. This year, its split population, had been brought to a re-union by an ad-hoc committee. Since then the people of Huay Oun have lived together as a solid village.

In the early 1990s the Department of Forestry initiated a land allocation program by systematically defining what forest land should be set aside as forest conservation areas, protection forest along streams and other sensitive areas or be used for forest production. Also the villagers were very interested to maintain forest for their livelihood, but there were also a conflict of interests because it meant that the area the villagers could use for upland cultivation was reduced.

In 1993 the next step of land allocation was initiated with the program to allocate specific forest land to villagers for their agricultural production. At first land was to be allotted to the communities and after that distributed to individual farmers.

1994 was a very important year for Tha Li Village. A truck road from the main road through the village and northwards to it's the paddy area was completed with the support of SCP.

All the seven communities of Upper Nam Nan Water Catchment Area had their agricultural land allotted in 1995. They have used their plots since then, but no legal document have been issued yet.

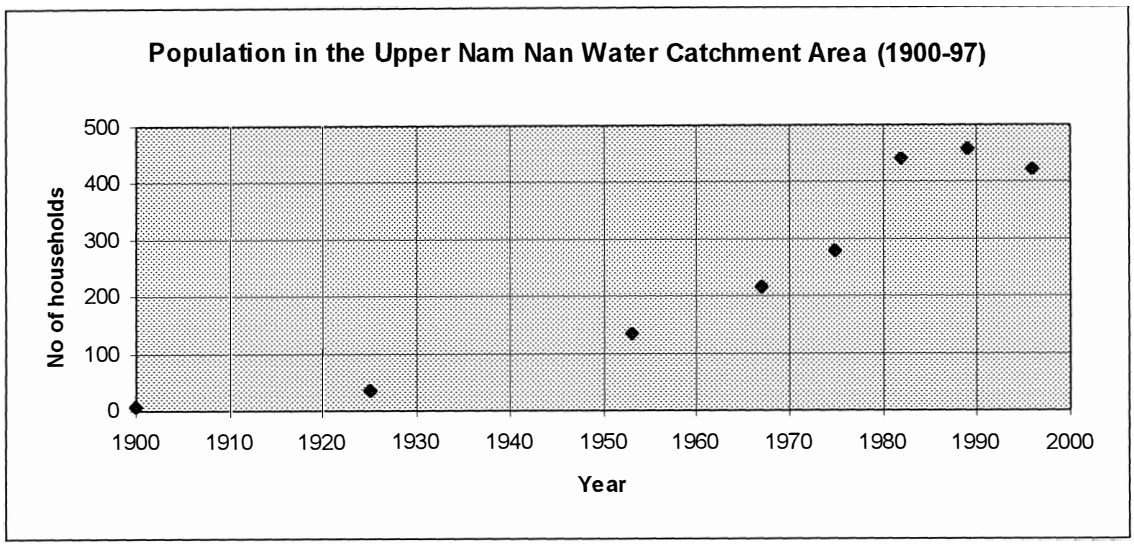
Government activity coupled with external influence from SCP, improved infra-structure and access to markets may have all contributed to the changes, which the people in the Area are now experiencing and initiating.

In 1998, the five villages of Tou Ho, Huay Oun, Pha Haen, Pha Kuang and Tha Li are working together on a new road project of their own initiative. The road will connect their villages according to an agreement among themselves. They have also jointly submitted a request to the government for additional support. Consequently, people in all the villages are trying new crops with the purpose of selling the products in the market and other villages are involved in animal farm projects.

Besides the road construction, the Tha Li villagers, especially, work on an extensive irrigation scheme that would enable them to reduce significantly their shifting cultivation.

## 4.5 Demographic changes 1900 - 1997

Since the beginning of the century nearly 100 years ago the population in the study area has increased from a handful households in one or possibly two village to more than 420 households (about 2600 people) in seven villages (Figure 4.4 and annex D1).




As usual, the cause of the population change can be subdivided into birth, mortality and migration. In our data we have basically no birth and mortality figures, only the net change and some information on migration and reasons for the migration.

We can speculate regarding the factors which often tend to affect the birth rate and mortality, such as medical service and primary health care, people's knowledge of basic hygiene, use of contraceptives, outbreaks of major diseases etc. Considering the remoteness of the area, we have little reason to assume any major changes in death and birth rate have occurred before the 1970s (when infra structure started to improve) and possibly not so much after that either. However, when discussing the seemingly high population increase during the civil war period in Tha Li with the villagers, they confirmed that few people migrated in the village those years but a lot of children were born. "Our movements were restricted, life was boring and we had little to do except producing children".

Migration sometimes causes very sudden changes in the population. For that reason a simple analysis of the main reasons for migration as expressed and remembered by the villagers (Table 4.1 and Annex D2).

The analysis indicates that about 40 % of the migration has been undertaken on the main initiative of the villagers and 60 % are caused by external factors, mainly the government. The war has directly or indirectly caused about 40 % of the migration.

Some important reasons, such as the effect of new roads and the opening up of the area, are hidden under other headlines as the completion of the new roads coincided with the end of the war.

Table 4.1: Major causes why villagers of the study area have migrated (1900-1997).

| Primary reason for moving | Number of household occasions |
|---|---|
| *Local factors (mainly farmers initiative):* | |
| Disease and superstition | 244 (17.8%) |
| Agricultural conditions | 183 (13.4%) |
| Join relatives | 68 (5.0%) |
| Village site, water conditions | 35 (2.6%) |
| Achieve better infra structure | 8 (0.6%) |
| *External factors (government initiative):* | |
| War and insecurity | 331 (24.2%) |
| Government policy | 269 (19.6%) |
| End of war declared by government and incentives for people to return home | 188 (13.7%) |
| Political reasons | 49 (3.6%) |
| *Other reasons or not specified:* | 44 (3.2%) |
| TOTAL | 1370 |

Concerning the net change of population some main phases could be identified.

The period before 1960 with little government or other external impact except the gradual migration of a number of ethnic groups into the area. In relative terms the population increased fast during the first half of the century.

The increase in the 1960s and 1970s was irregular. Because of the war and civil unrest the number of permanently settled people increased rather slowly in the late 1960s and many people were forced to settle in other places or sometimes to hide in the forest.

In the 1970s when the war was over and a road was built, people were encouraged to return to their old villages and the settled population in the area increased rapidly.

Since the increase of population has slowed down considerably, because of out-migration. During some years there has even been a decrease in the area as a whole, although the population has increased significantly in some part of the area. The highest population was recorded in 1989 with more than 450 hh. Currently, in 1997, the population is 423 hh which is less than it was in 1982.

# 5. CURRENT SOCIO ECONOMIC SITUATION AND TRENDS

## 5.1 Methodology and approach

The methods used are very varied. Apart from using natural science - aerial photo, satellite imagery and analyses thereof - methodologies based upon social science are used. In discussions with the village - the village leader - a prepared questionnaire is used and eventually filled up. In discussions with elders, women, individual households, during field visits to agricultural spots etc., no such devices are normally used. Checklists might occur in order to support memory. Another approach is to talk, walk and touch. That is, actually visit the sites being discussed to visually confirm whatever is being discussed. In some instances PRA methods have been used, such as drawing maps, discussing village calendar for agriculture work etc.

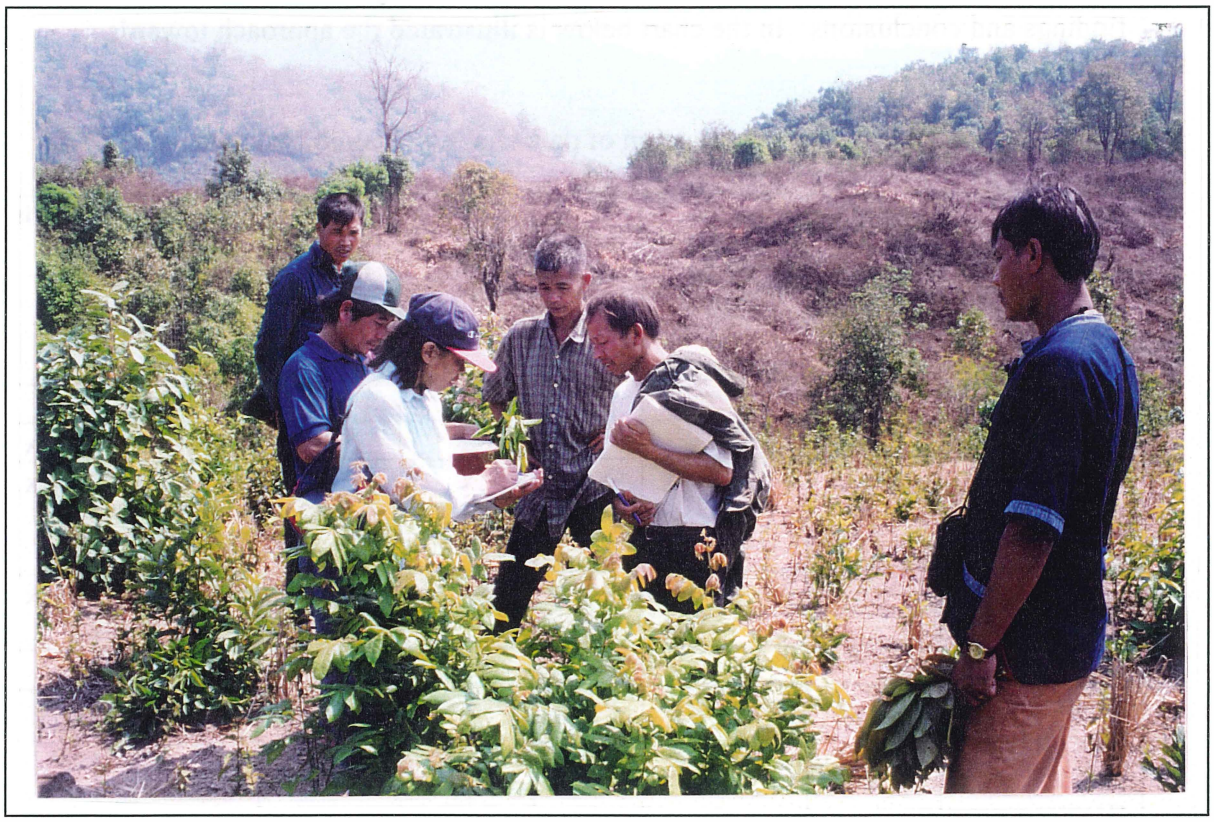


Figure 5.1: Villager showing one of his allotted plots to the research team and explaining about the land allocation procedure from his perspective.

There are a number of problematic areas in social science methodology. Both validity and reliability are critical issues. One important part of the research method and approach is to prompt the villages and villagers to set the agenda and define the issues at hand as they see it. This requires very open ended approaches. It is handled by the approach of operating in open ended issues rather than using pre set questions in combination with check lists and questionnaires and by returning to the villages several times to confirm and verify data as well as to raise new issues which has come out of the analysis. When discussing issues related to their profession - farmers - the objective of the approach is to arrive at a level of a "professional dialogue".

Data and information supporting the conclusions and hypotheses are quantitative and qualitative. Sometimes they are obtained by direct observation and recording - number of blacksmiths or rice mills in a village - and can be verified by observation.

Sometimes the data cannot be verified by direct observation, such as statements about forest land use during a specific period. The approach then is to verify this from other sources which could be other informants, conclusions from observation of the area concerned or by aerial photos of the relevant period. Other information such as yield figures, obtained from the farmers can be verified by the local extension or tax staff.

There are other research work which can be used to at least verify magnitudes and ranges of data. In this particular research co-operation project, revisits to the concerned villages are being used to verify data and information as well as to discuss findings and conclusions. In the chart below is illustrated the approach towards verification.

Table 5.1: Approach to verification of data and information obtained

| **Examples of data / Information, items,** | **Source of verifier** | **aerial photos, satellite imageries** | **Visits to the object** | **Other villagers** | **The Province, District and the village** | **Indepen-dent observa-tions** | **Revisits** | **Others, such as other research , reports etc.** |
|---|---|---|---|---|---|---|---|---|
| Village data | | | | | | | | |
| Land use | | x | x | x | x | x | x | |
| Extent of "outside" land use | | | x | x | x | | x | |
| paddy field, 2 crops | | x | x | x | x | x | x | |
| yields | | | | | x | x | | x |
| Historical data on land use | | x | | x | x | | | x |
| Economic activities i the village | | | x | x | | | x | |
| Land allocated | | | x | | x | | x | |

## 5.2 Situation and trends

This section is not yet finalised. In the Appendix B, some preliminary data is given in draft form. Briefly, the research area contains 421 households with a population of 2,373 persons.

Some 93 % of the households are engaged in shifting cultivation with an average 1.04 ha being used annually by the households. The shifting cultivation area used per capita is 0.186 ha per annum (1997) These figures, based upon village information, do not tally with field based surveys.

The total amount of paddy fields presently amounts to 60.12 ha, most of which is located in two villages. Only 11 % of the households have paddy fields. This figure is to increase as one village is presently investing in a considerable expansion of existing paddy fields.

Some 14 % of the households are viewed as well off with some 21 % of the household being viewed as "marginal". The remaining 64 % are viewed as average household in terms of socio economic standard.

In terms of economic diversification, the villages have very different strategies. Some villages are very actively and engaged in an evolving market economy whilst others have a different outlook. It seems that material conditions such as soil quality and distance to road are very important factors to explain this.

There is a substantial amount of data remaining to analyse.

In Appendix B is included one of the instruments used to record and compile the data. It is mainly used in conjunction with the village leadership.

# 6. LAND USE AND FOREST COVER IN THE AREA DURING 1950 – 1997

## 6.1 Methods

A basic hypothesis of the project is that the actual historical development and the current land use and socio-economic situation provide an important base for strategic considerations. For the estimation of the land use and forest cover some different methods and sources have been considered.

- Official available planning data based on reports from the village headmen to the District government.
- Previous inventories undertaken in the area (if any).
- New inventories based on subjective or objective methods (for example field sampling inventories or interpretation of aerial photos).

Interviews on province and district level in Luang Phrabang and previous experience (from Lao PDR and Vietnam) indicate that official data are not very specific and sometimes incomplete or too old when it comes to forest land subject to non-permanent or non-authorised land use. In the case of Upper Nam Nan Water Catchment Area the most specific data have been compiled by the Shifting Cultivation Stabilisation Research Project, i.e a socio-economic study initiated in 1996.

However, most previously available land use data are either entirely derived from interviews or village reporting without any verification of the accuracy (subjective) or from forest vegetation and land use mapping of the area. That mapping was based on forest vegetation criteria and provides insufficient information on current land use as it was carried out without consulting the land users (farmers). Another type of map has also been produced in relation to the land allocation efforts. To some extent those maps reflect government intentions rather than actual land use. They are also quite rough and too imprecise for identifying or check specific field areas.

In this study two methods (A and B ) have been tested and applied complementary to each other. Both methods are based on point sampling (describing the situation as accurately as possible on a representatively selected portion of the area). Initially, a systematic grid of sampling points where allocated all over the area. In total 75 points where laid out on the aerial photos of 1996 (Figure 6.1).

Method A: Each sample point was jointly visited in the field by the researchers and representatives of the concerned village. The village representative was asked to describe the current and past land use on the sample point. In case of shifting cultivation (swidden based upland agriculture), the previous years of cultivation, cultivated crop and year when the original forest was cut was recorded. Concerning forest, the use of the forest by the village (i.e. hunting) was recorded. The villager was also asked to describe the future intended land use.

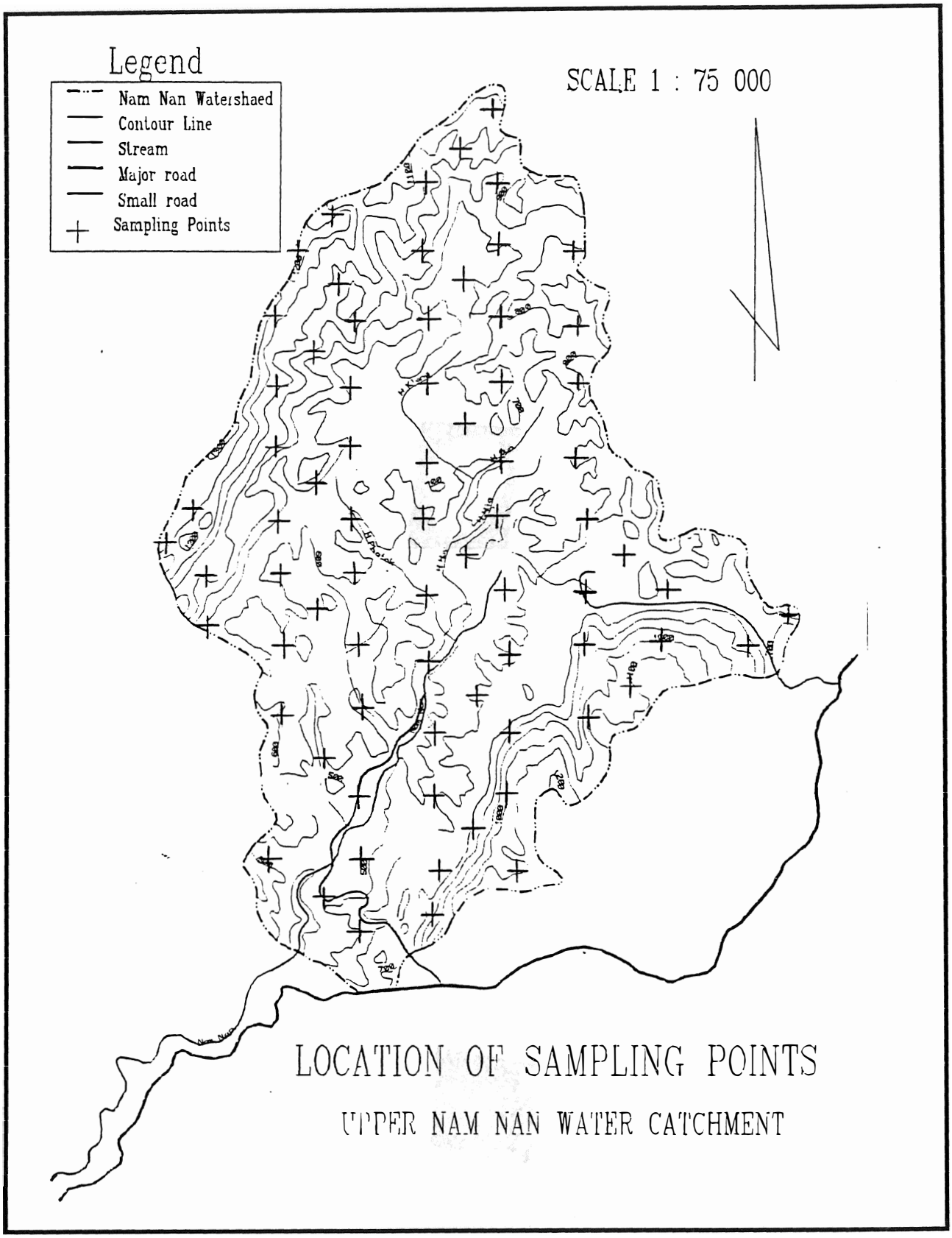



Figure 6.1: Location of the sampling points

Mehod B: Identification of each sampling point on aerial photos (1953, 1982 and 1996) and satellite photos (1967 and 1989). The photo interpretation was done visually by optical instruments in the office by NOFIP specialists, some of who had previously joined the villagers to the sampling points while implementing Method A.

Concerning the two methods applied, Method A is expected to provide more detailed and explanatory data but with a certain degree of mis-memory and subjectivity. It is anticipated that Method B is more accurate and objective when it comes to time and forest cover but can not give sufficient details on land use. By matching the two approaches an evaluation of methods is made possible.

A more technically sophisticated technique of using remote sensing by correcting and super-imposing the different photos and analyse the land use changes over time in a Geographic Information System (GIS) is also being developed and tested (Method C). The work is still ongoing and no inventory results based on Method C are presented in this report.

A basic problem is that the photos of various years used in the study (as well as in most other studies of this kind) are all in different scale and geometrical constitution. While satellite photos are relatively scale homogenous, the scale of the aerial photos varies within the photo. The operation needed to make photos geometrically correct is called rectification. A topographic map is, in theory, geometrically correct. However, the paper copy of a topographic map has usually been stored and treated in such a way that distortions have occurred.

Method C developed in the study is based on the following main steps

- Scanning of maps and photos. By this step they will all be available in digital form and could be analysed in a computer.
- Identifying and matching distinct checkpoints on the topographic maps and satellite photos with the topographic map grid and subsequent rectification of the scanned photos.
- Digitising contour-lines (some of them) and streams of the topographic map. By this step these details are separated as so called vector data (lines) and could be easily modified in the computer.
- Enhancing the degree of details of the stream system by use of the satellite photo. This is done to improve the conditions for matching aerial photos afterwards.
- Matching and rectifying the aerial photos with the topographic map grid.
- Identifying and digitising data to be analysed (i.e. agriculture fields, cover of old forest and villages) on the different photos covering the area.
- Change analysis.

The process is partly illustrated in figure 6.2.

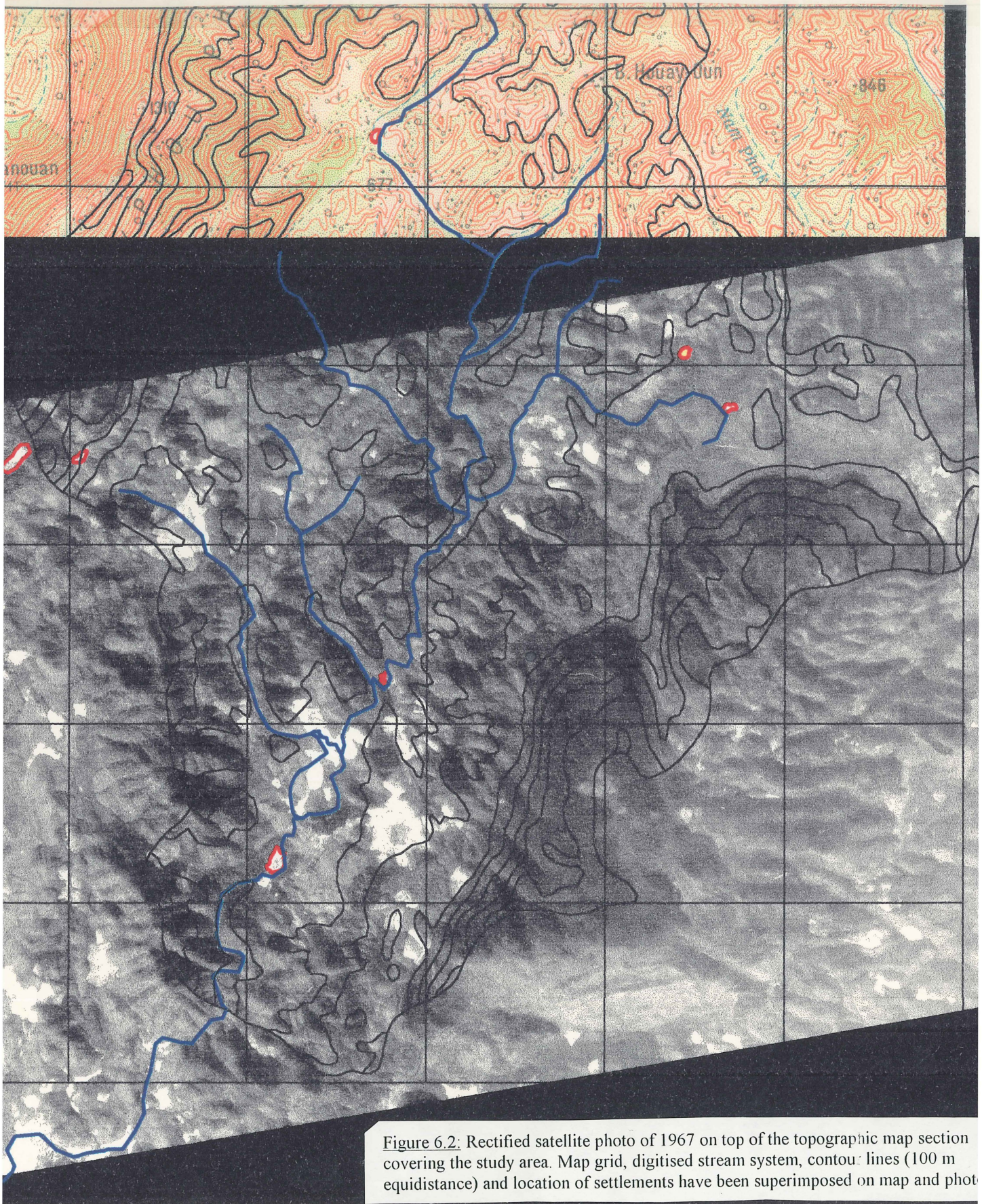



Figure 6.2: Rectified satellite photo of 1967 on top of the topographic map section covering the study area. Map grid, digitised stream system, contour lines (100 m equidistance) and location of settlements have been superimposed on map and photo

Concerning the remote sensing data, five sets of images covering a period of 43 years have been used (Table 6.1).

Table 6.1: Aerial photos, maps and satellite images used in the study

| Acquisition | Origin | Approximate scale at visual interpretation | Type | Quality |
|---|---|---|---|---|
| 1953 | French | 1:40 000 | b/w air photos | Good |
| 1967 | United States (Corona) | 1:50 000 | b/w satellite images | Fair |
| 1982 | USSR | 1:30 000 | b/w air photos | Fair |
| 1985 | Lao-USSR | 1:100 000 | Topographic map | Good |
| 1990 | Swedish-French (SPOT) | 1:50 000 | SPOT XS satellite image map | Good |
| 1996 | Swedish-Finnish | 1:15 000 | b/w air photos | Very good |

The French air photos were procured from Institute Geographic Nationale, France. The photography was made one year before France decided to leave Indochina as colonial power and the photos are not known to have been used very much. The photo quality is quite satisfactory for the study. Different structures of forest and new swiddens could easily be identified and sampling points be transferred and located.

The American satellite photos (USGS) were produced for military purposes during the 1960s and have recently been declassified. They have a better resolution (about 5 m) than any satellite photos of today produced for civil purposes. Because two cameras had been mounted on the satellite in different angle it was also possible to obtain stereo vision during photo interpretation. As a complement to the photos of 1967 a photo from 1965 was obtained and used as reference during interpretation. In this way new fallow areas could be more easily separated from old ones.

The Soviet made air photos have been used and stored for many years in Lao PDR. They have been extensively used in forest inventory, for resource mapping and other purposes. They were also the land use base for the topographic map of 1985. The secondary copies of the photos available are now somewhat blur and pale.

The SPOT satellite image map was originally procured by the Lao Swedish Forestry Programme (for the NFI Project). It was used in combination with the topographic map enlarged into the same scale. No stereo vision. To locate the sampling points (originally laid out on 1996 air photos) the points were transferred from air photos onto the topographic maps and superimposed on the satellite image maps. Precise identification of plot location was not possible and interpretation of forest vegetation on the photo points less precise.

The aerial photos obtained by the Lao-Swedish Forestry Programme in 1996 have the distinct advantage of being so new that direct field verification was made possible.

## 6.2 Current land use and forest cover

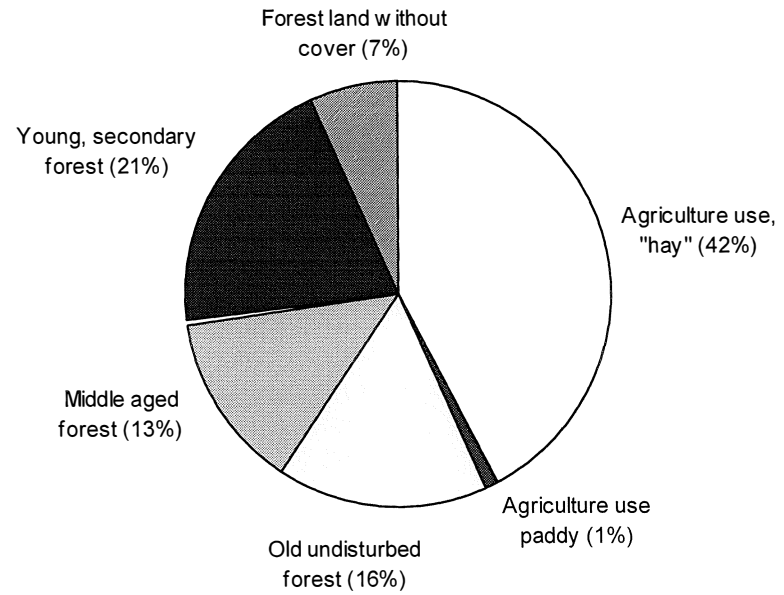
The sampling inventory reveals that about 50% of the study area is covered with forest (Figure 6.3).

Totally, some 57 % of the total area is currently considered as reserves, protection forest or regeneration forest land by the villagers. Out of that 7 % represents forest land without forest cover. Most of the latter has been used for shifting cultivation in the past but is now abandoned, either because of natural causes (i.e. heavy Imperata growth making cultivation difficult) or because an agreement has been made among district and villagers to set it aside for forest protection.

If "forest" is defined by the vegetation standards used by the Department of Forestry (minimum 20% crown cover) around 50% of the area (38 samples) could be classified as "Current Forest". Out of that, 16 % of the area is old, relatively undisturbed forest, 13 % is closed medium aged secondary forest and 21% is more or less closed young secondary forest or disturbed forest of older age. Most of the old and medium aged forest is located in steep and rocky terrain or along the streams.

Of the non-forest covered area 1% was permanent paddy fields, 42% used for "shifting cultivation" and (as mentioned above) 7% represented forest land without forest cover.

**Figure 6.3: Current and expected land use in the Area**



## 6.3 Land use in the past (1950-1997)

The data on land use history is based on two main sources – the interviews with villagers on the sample plots and interpretation of the old photos.

In general, the areas covering steep slopes on high altitudes is relatively untouched forest while most areas on lower altitudes have been cultivated. The area under forest cover has decreased from about 60% in 1952 to between 40 - 50% in the 1990s. The lowest rate of forest cover (42%) was recorded for 1989. After that some forest regrowth has occurred. As a comparison, the average forest cover in the entire province was estimated at 25% in 1989 (NRS, 1991).

The area under agriculture cannot be estimated as exactly as the forest cover based on photo interpretation, because of different and continuously changing fallow length among the fields and other technical reasons. Especially for old data (1950s, 1960s and 1970s where complementary interview data are very uncertain) this is a problem. Assuming that most non-forest areas are used for agriculture (which is not certain, besides, areas of young forest could also be part of the shifting cultivation cycle) the figures of Table 6.2 are derived.

According to those estimates the agriculture area increased from about 40% in 1952 to 58% in 1989. The increase was particularly rapid during the 1970s and early 1980s when population also increased fast. During the 1990s the increase has been halted, and the agriculture area in 1996 was less than in 1989.

Table 6.2 Area under cultivation and forest cover (%), Upper Nam Nan Water Catchment Area

| Year | "Shifting cultivation" | Paddy | Forest | Total |
|---|---|---|---|---|
| 1952 | 40 % | 0 % | 60 % | 100 % |
| 1967 | *Interpretation not yet completed* | | | |
| 1982 | 52 % | 1 % | 47 % | 100 % |
| 1989 | 57 % | 1 % | 42 % | 100 % |
| 1996 | 51 % | 1 % | 48 % | 100 % |

Over the years, about 56 % of the total area of 9170 ha (Figure 6.4) has been under shifting cultivation on at least one occasion since 1960 (1960-1996). In addition 1% of the area is used for permanent agriculture. Some of that area is not in use any longer. About 54% of the total area has been cultivated since 1980 and 49% has been cultivated since 1990 (1990-1996).

It means that some 9 % cultivated in the past have been abandoned. The main reasons are that yield was poor, too heavy weed problems (mainly Imperata) and sometimes that they were occupied by somebody who was unable to cultivate for the time being.

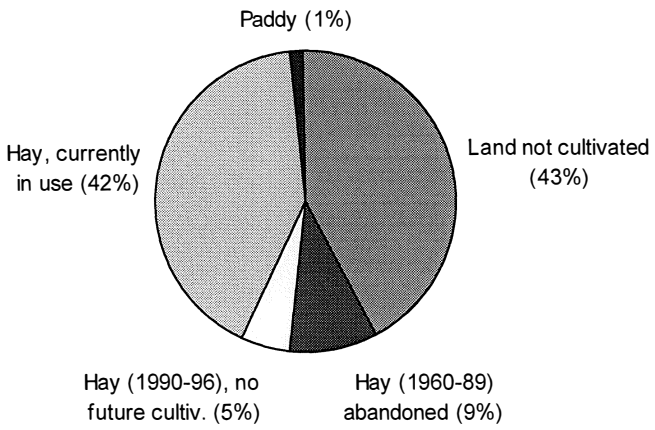
In addition, some 5% of recently cultivated land have been identified by the villagers and district jointly during the land allocation process as forest land to be set aside for protection.

Although some former upland fields obviously have been abandoned, other and larger areas have been taken into cultivation and there is no doubt that the land under cultivation has increased since 1960. However, most of that increase occurred during the 1960s and 1970s.

Only 1 - 2 % of previous forest has been opened up as shifting cultivation fields ("hay") after 1980. All other areas of "hay" were opened up before that.

During the 1990s there is a tendency that some previously cultivated fields are given up and sometimes set aside as reserved or "protected forest". The main reason for this, as explained by the villagers, is the intensified efforts by the government in propagating for forest protection and implementation of the new land allocation program. Another reason is probably a decreased population pressure as compared to the peak in the late 1980s.

**Figure 6.4: Past and present cultivation in the Upper Nam Nan Water Catchment Area**



## 6.4 Future land use

In addition to current and historical land use, the villagers were asked in the sampling inventory about the intended future land use on each plot. For natural reasons such information cannot be very definitive. In some cases there had been agreements made between district and villagers to set aside areas for protection. Exactly how positive the villagers had been to make such an agreement is difficult to say for an outsider.

In one village the farmers admitted that if food was not enough and there was no other help available, they had to use forest land and could not stick to the "agreement". In another village there was an expectation by the village that they would not need certain areas for agriculture when paddy cultivation expanded.

Despite uncertainties, the enquiry provides an informative picture of the villagers expectations in this respect. To sum-up, they expect that sampling plots representing 42% of the area would be used for shifting cultivation also in the (near) future. As a comparison, the Shifting Cultivation Research Project states that about 22 % of the total area of the seven villages is allocated for agriculture. Even if the studied water catchment area and the total extent of the seven villages do not coincide entirely, the difference can not be explained only by that.

Actually, the allocated 22% refers to rice plots ("hay") only. Upon enquiry it turned out that many households have one or some plots used for cultivation of maize (particularly) and also vegetables, medicinal plants etc.

Another reason for the discrepancy could be that the allotted plots have not (except in one of the villages) been measured in the field The area figure is based on the assumption that each household is able to cultivate about one hectare per year.

In addition, one must keep in mind that we are making comparisons with a sampling inventory in which there is always a statistical error. The standard error in the estimate of the agriculture area is in the range 200 – 250 ha.

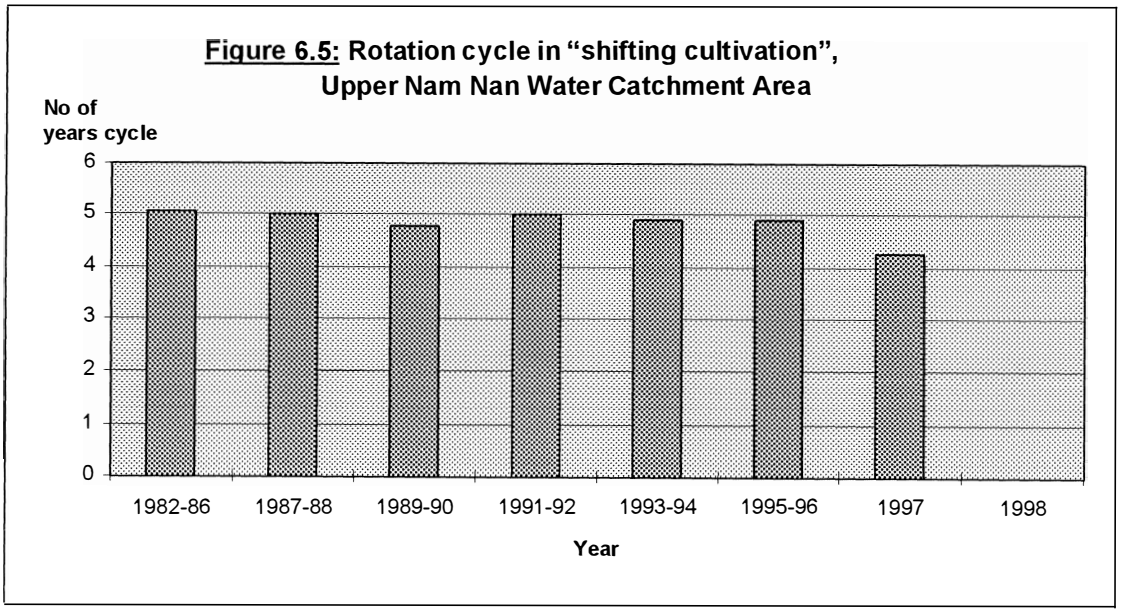
## 6.5 Trends in shifting cultivation

The strong emphasis by the Lao government to stabilise "shifting cultivation" and the current strategic efforts, in particular the implementation of a forest land allocation program draws the attention to recent trends in "shifting cultivation". In particular the crop yields and rotation cycles are of interest as indicators of sustainability and future potentials.

Before looking into the result, it must be stressed that the land allocation is a new activity. Only studies that describe changes over the last two - three years could be expected to reflect any impact of the land allocation on cropping cycles. Studying trends (or tendencies) over such a short period is hazardous as the effect of weather and other conditions a certain year could be strong. Anyway by putting different pieces of objective and subjective information together some sort of analysis might be done. The sampling inventory based on interviews with concerned villagers would possibly be a feasible base for such an analysis.

The result of the sample plot interviews, where farmers were asked to mention what years a certain plot had been cultivated, indicate that the average "rotation cycle (*) has been relatively stable during 1982-1997 (Figure 6.5).

Based on those results, there are not any signs that the rotation cycle for upland rice has gone down in the last 15 years except in 1995-97. During 1982-94 it was continuously around 5 years (Annex D). However, for fields cleared to be cultivated in 1997 a reduction to about 4.2 - 4.4 years is indicated. This tendency matches the circumstances that (for the area as a whole) the population has not increased in the last 15 years and that the effects of the land allocation reform should come visible by now.




*The average rotation cycle means the average number of years from one occasion when a field is cultivated to the next one. If a field is cultivated year 1 and year 7 the cultivation cycle is 6 years and the fallow length is 5 years.*

However, when the above findings were presented to representatives of all the villages in a seminar, several villagers raised their voice and doubted the result. They felt that the decrease had been more significant than that. At this stage, we can only draw the general conclusions that the findings of the Study do not match those villagers opinion. Possibly, something is wrong with the data obtained, possibly it is a matter of how things are defined. The issue will be further looked into during 1998.

### 6.6 Land use history told through aerial photos

This section aims at exemplifying how photos could serve to verify, illustrate or further explain history obtained through interviews or records.

In Figure 6.6 a-d the main part of Tha Li village area is displayed on three photos (1953, 1967 and 1996) and also on the topographic map section covering the same area. Although photo copying has reduced the amount of details that can be detected on the photos, some important information could still be extracted.

Plain aerial photos are normally never geometrically correct (as is a topographic map) but the distortion could be reduced considerably through "rectification". The photos in fig 6.6 have all been rectified and are also displayed in the same map scale. The topographic map grid and some contour lines have been superimposed on the photos to make it easier to localise identical spots on the different photos.

On the old photo from 1953 (fig 6.6 b) the first four (4) paddy fields established in the village already in the beginning of the century are visible in white (see also fig 6.7). The other light coloured area further North on the air photo represents swiddens cultivated the year before photography (1952). Dark areas with fine texture represent brush and fallow while areas with a coarser structure represents old forest of deciduous or evergreen type (different colour). Following the contour lines one can see that the fine textured areas (old fallow) are usually confined to the valleys while most hills are still covered with old forest.

The track leading through the village site is the old walking path along the Nan stream southwards towards the Nan District town and northwards towards the agriculture fields. At that time there were about 40 households in the village.

A fairly large block of recently cultivated swiddens are visible North of the paddy fields in the northernmost part of the photo. The village elders explained that during that time shifting cultivation was usually carried out jointly by the village in one or a few concentrated blocks. The reasons were partly protection (against wild animals) and partly social (they preferred company and also used to help each other in different works much more than they used to do later, after the war. Some swiddens in the Northernmost part of the photo belong to another village.

On the satellite photo of 1967 (Fig 6.6 c) one can see that the area used for shifting cultivation annually (or at least that year) is bigger than in 1953 but still concentrated to the region rather close to the village although in another direction that year (that year was during the peak of the war and conditions were unsafe). The settlement of


Fig 6.6a: Extract of the topographic map covering the core part of the Tha Li area:

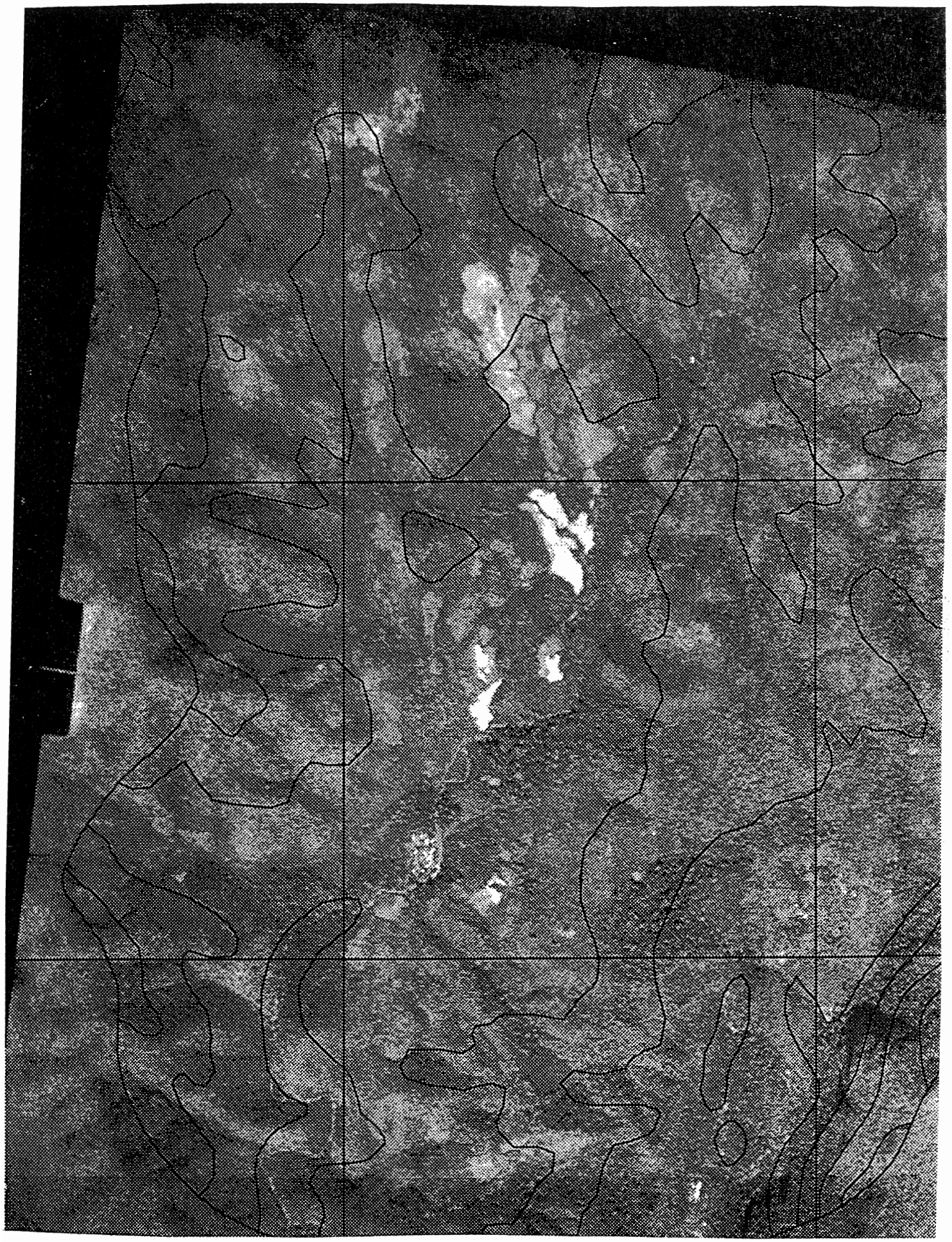


Fig 6.6 b: Rectified aerial photo dated 1953 covering the core part of the Tha Li area. The village site is visible in the centre of the Southern part of the photo.

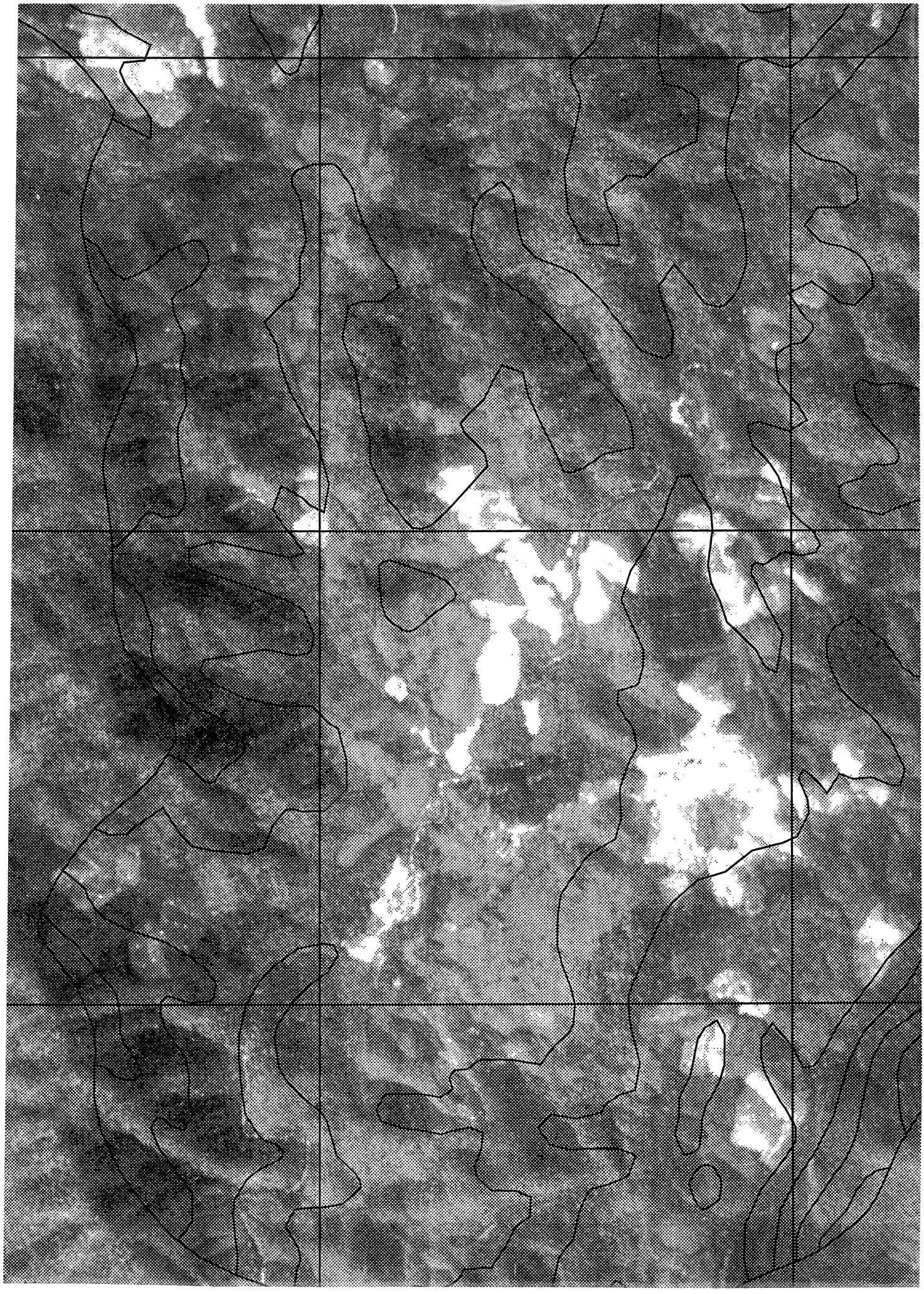


Fig 6.6 c: Rectified satellite photo dated 1967 covering the core part of the Tha Li area. The village site is visible in the centre of the Southern part of the photo.

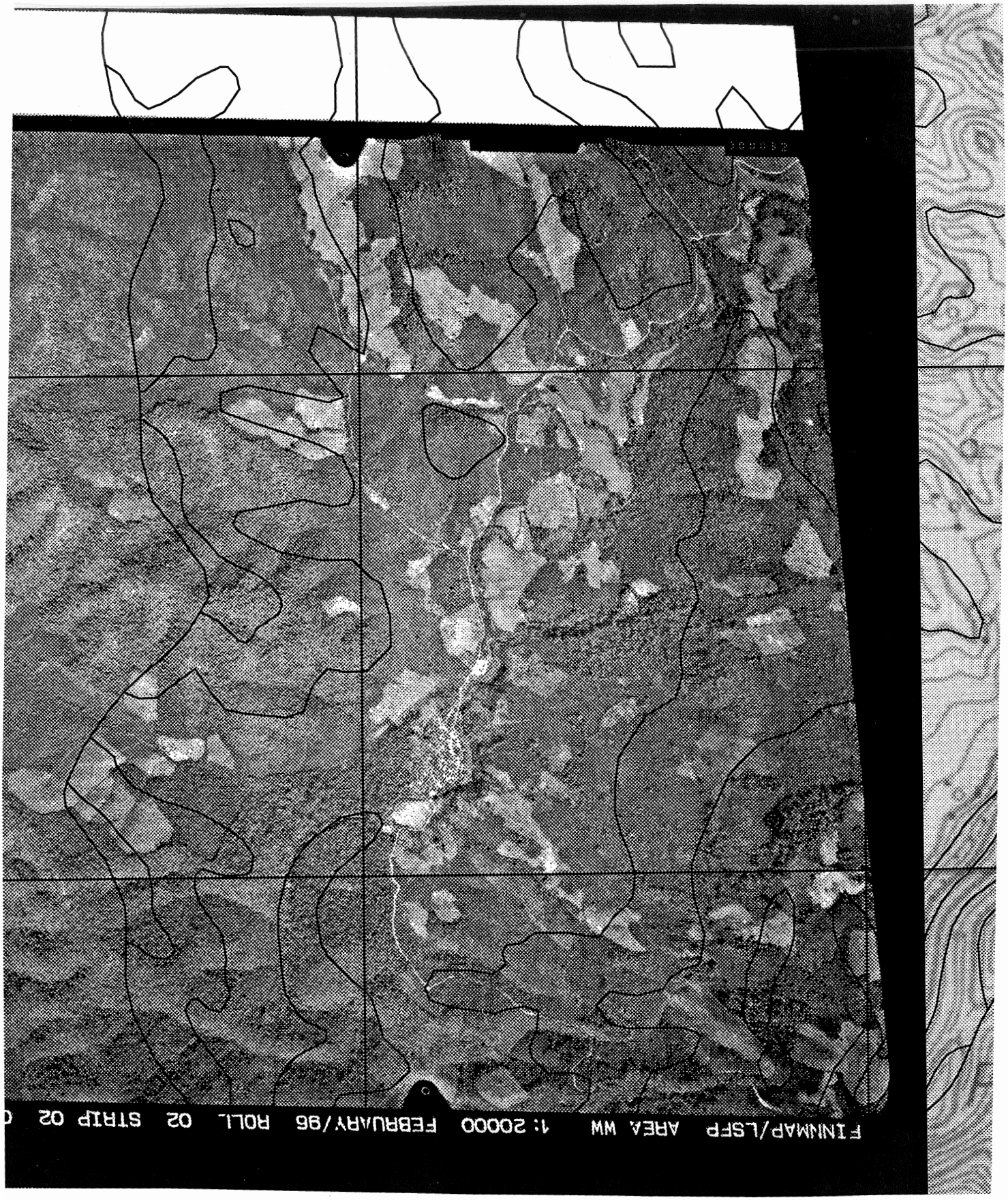



Fig 6.6 d: Rectified aerial photo dated 1996 covering the core part of the Tha Li area. The village site is visible in the centre of the Southern part of the photo

Huay Hao is also visible North East of the paddy area. The total population in those two villages was about 60-70 households at that time.

On the new photo of 1996 (Fig 6.6 d), the paddy area has increased significantly in addition to those fields already established in 1953.

Shifting cultivation is scattered in all directions. If adjacent photos could have been displayed one could realise that the shifting cultivation areas of different villages border each other.

The village site is distinctly larger on the new photo as the number of households has increased to 123 households. The new road recently built is clearly visible on the photo.

The area of old forest has decreased since 1953 but not so much as one might have expected. On the hills, especially in the Southern and western part of the photo there is forest which has probably never been cultivated (rocky or steep terrain).

Fig 6.7: The area of paddy fields about 1 km NNE of Tha Li village. Photo taken from the road North of the fields. The upland field immediately in front of the camera is cultivated last year (1997) and would have been detected by light colour on any photo taken that year.

# 7. A MODEL FOR ANALYSING LAND USE CHANGES

## 7.1 Some factors influencing forest land use

Deforestation is normally the inverse of forest land use. A conclusion drawn from the study area is that almost all forest land not covered by original forest is used for agriculture. In the Upper Nam Nan, most agriculture is carried out by the people living within the area and the products are used by the same people (subsistence agriculture). There is also an apparent correlation between the number of people of the area and their agriculture land (Figure 7.1 and 7.2).

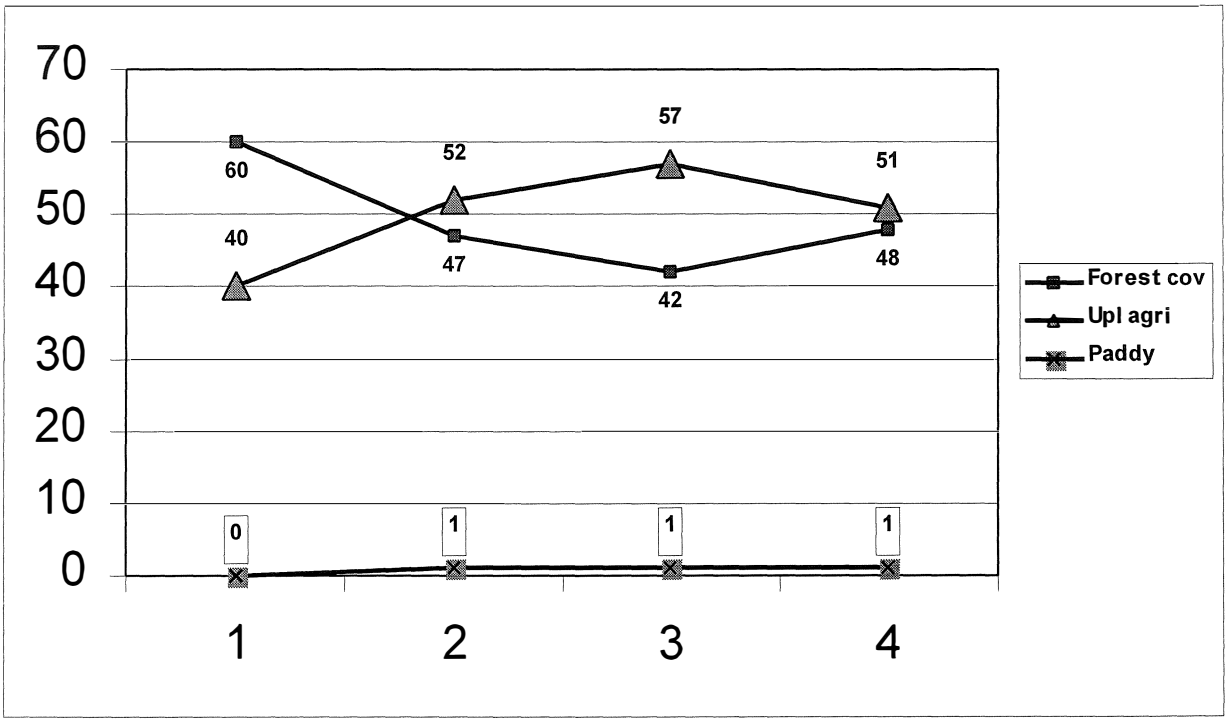



Fig 7.1: Variation in forest and non-forest area (upland agriculture and paddy) in the Study Area during 1953 - 1997 (percent land cover of total area in 1953, 1982, 1989 and 1996 respectively).

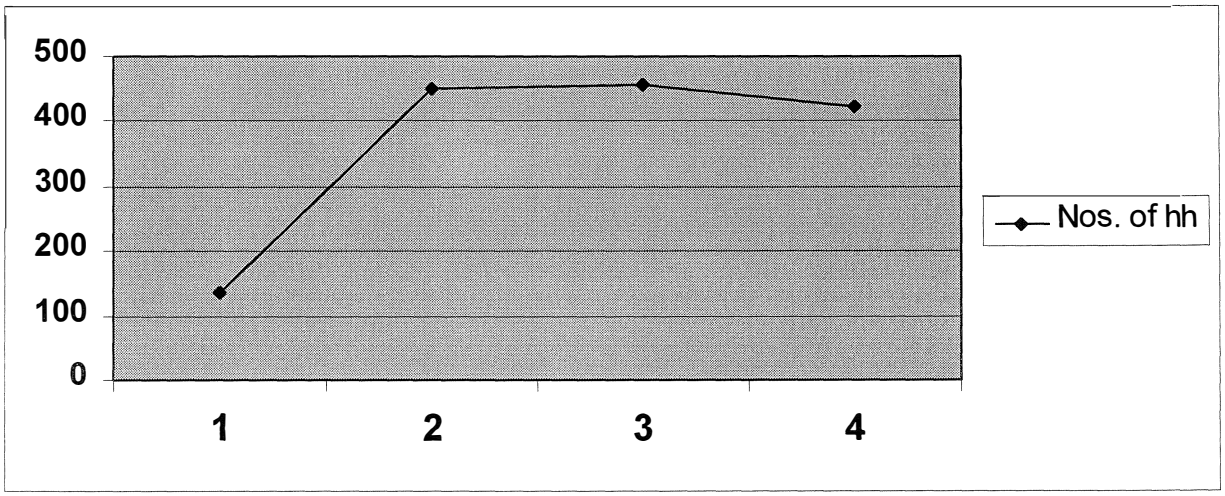



Fig 7.2: Change of population (number of households) during 1953 – 1997.

However, the correlation is not linear. The population has increased faster (with a higher rate) than the total non-forest area.

There could be different reasons for this. One obvious reason could be shortage of land for a growing population. People are forced to make the best out of the situation and intensify their land use.

Another aspect is that when people start diversifying their agriculture and selling their products the market demand and the economic growth will influence the size and direction of agriculture activity.

Another significant factor is changes in agriculture yield. How much crops could be produced within a defined area ? Negative changes occur when the soil is being over utilised and degrades. Positive changes are expected with new technology, seed improvement, fertilisation and irrigation.

There are also other factors such as import and export of goods and services.

In a subsistence economy with limited external contacts and relations the above factors could possibly explain a great deal of the changes taking place. When such a system "opens up" with more and more contacts with the outside markets the complexity of the system increases and becomes more difficult to describe.

## 7.2 The Area Production Model (APM)

The APM is a computer model aimed to be used as a tool in strategic planning. It was developed by Prof. Nils-Erik Nilsson (1984) within the framework of an FAO project. It enables simulation (in a generalised way) of future changes of land use which are likely to occur under different assumptions of population increase, growth of GDP and changes in agricultural productivity (which might come out as a result of investments in irrigation, improvement of seeds and new technology or because of environmental degradation). The simulations always cover a defined geographic area.

The APM also includes mechanisms for outlining future development of forest plantations and natural forests under assumption of optional management and logging practices and production and demand for biomass energy. Those parts of the APM were not tested in the pilot study described in this paper.

By comparing the result of simulation alternatives (scenarios) with different assumptions on i.e. population growth (so called sensitivity analysis) various planning options (possible strategies) are considered and evaluated.

The APM is based upon some main principles and assumptions:

- Food security is essential in people's life and for explaining land use trends.

- People's need for subsistence food (i.e. rice) is basically independent of their living standard (expressed as GDP). If the population doubles, the need for subsistence food will also double.

- People require more marketable food (coffee, sugar etc.) if they have more money. If GDP per capita increases 3 times and the population increases 2 times, the demand for marketable food is assumed to increase 6 times.

- Unless particularly specified, it is assumed that food will have to be produced domestically within the area of study (i.e. a district). If the agricultural productivity (yield per ha) is unchanged, a 50% increase in the total demand for food will require a corresponding increase in agricultural area. However, if also the yield per ha increases, the demand for agricultural land area will be reduced.

- If the required agricultural area increases that land will have to be deducted from some other land use class. In the APM, the land use class from where additional agriculture land has to be taken will need to be specified.

An advantage of the APM is that it is not a "black box" but uses simple input variables. A Windows based version is now available making it fairly easy and fast to handle the model and make repeated simulations during i.e. a discussion. To reflect "new" planning situations, where conditions can not be described in every detail, it is not always necessary to make additional programming. Instead, the transparency of the APM enables use of the model as a "tool", and possible generalisations can be done separately during analysis.

## 7.3 Land use development in the study area 1952-1997 seen through the APM

To develop realistic scenarios using a model such as APM it is important to understand how the model works and how the most significant parameters (population, agriculture yield, land use, economic growth) tend to change over time in the real world.

By studying the known development in a defined geographical area over a historical period and trying to describe the development in the model such an analysis is possible. In this case study the APM has been applied on historical data from the Upper Nam Nan Water Catchment Area for the period 1952-1997. Demographic changes and land use distribution during that period have consequently been used as input data.

To understand the simulation result a few conditions should be clarified:

Particularly in this case where we try to describe a history and the output tables are "fixed" (we try to adapt the input in such a way that the tables describe the real situation) it is the input data required to achieve those output tables that are of main interest).

Also in a planning case when scenarios on future development are simulated, it is the input data and the assumptions behind the input data which are important as they represent the path to achieve a certain scenario (in other words, they indicate strategies)

For population, the annual growth factors, specified for every 5-year period have been set in such a way that the simulated population changes in accordance with the result of the village interviews. The interviews gave household numbers only, but also indicated that household size has not changed significantly in the previous generation. Therefore, the number of persons has been calculated with the assumption that the average household size during the whole period has been the same as today (6.1 persons).

Concerning land use, it is assumed that all land without forest is used for agriculture (the sampling inventory indicates that such land has usually been swidden in the previous 5-10 years).

In the simulation, the annual yield in shifting cultivation refers to the average yield per year regardless of whether it was cultivated or lay fallow that year. The yield per hectare in 1953 was set in such a way that the total production of subsistence crops (rice) in the area could supply every person at that time with 1 kg/day. The annual change of yield per hectare (to be specified for every 5-year period) was set in such way that the total production every year could still supply every person with 1 kg of rice per day.

The GDP/capita, supposed to reflect people's amount of capital, which influences the production of market crops and cash crops but is not assumed to influence the consumption of subsistence crops. However, there is no method to estimate the GDP per capita in the area or it's change (especially not 45 years ago). Anyway, the

absolute figure is less important than the change and the current GDP/per capita has tentatively been set at 100 USD/capita. It is also assumed that the average level has increased over time, especially for those people who have got access to the road.

The total forest area of 1953 could be estimated from the air photos but not the distribution on different forest use categories. In the simulation, it was ad hoc distributed on two categories – ”natural forest on farm forest land” (some sort of village forest) and ”inaccessible natural forest”. Some of the latter forest category is not as inaccessible today as it was in 1953, but there is no mechanism to reflect that in the model. The forest, which has recovered in recent years because of slightly decreased population pressure, is categorised as ”protection forest”.

Input data on tree volumes, auto production of wood, agriculture residues and energy demand or supply are approximations or guesses. The simulated changes of the volume of forest trees or energy balances should only be seen as an example of what could be of interest to know and what variables are important.

Some results of the simulation result are enclosed in annex E.

## 7.4 The APM as a tool for analysis of land use strategies

A few comments on the simulation result:

The actual population change in the area corresponds to an average increase of about 3%. That was also the case during 1952-72. However, during 10 years after the war the annual increase was about 6 %. In the following 10 years it was about zero (as an average). The reasons and implications of those quite strong fluctuations are of interest when discussing future optional strategies.

Over the period of 45 years the area used for shifting cultivation by the average household has decreased from 23 ha to about 10-12 ha. It reflects the fact that agriculture has become more intensive. It is also reflected in the increase of "production per hectare" in shifting cultivation (subsistence crops) from 100 kg/year to about 250 kg/year.

As long as we consider all land used for shifting cultivation as agriculture land (and not only the plots cultivated a specific year), the yield per hectare has increased over time. This increase has been demand driven - during times when population increased fast, the yield per hectare also increased rapidly. However, we know that farmers need more land to produce the same amount of rice as they did before. Land degradation is not displayed clearly in the simulation result but has to be a result of indirect (but obvious) conclusions.

We might suspect that the trend with shortened cultivation cycles is not sustainable. On the other hand it is probably the only way to supply a growing population with enough food in the short perspective. In a strategic perspective one might accept land degradation in a short perspective if it is regarded as a temporary solution if it generates incomes and some of those are invested in land improvement.

By applying the APM on historical data one can focus on important issues, find out what levels of different variables are realistic, initiate the capturing of missing but crucial data and identify what activities are not well described by the Model. In many areas we find that cattle grazing is, or could become, an important economic activity for the villagers, but it is not reflected in the Model and we must find some way to go around this problem.

When analysing the APM as a planning tool, we might apply it on existing government plans and analyse in what direction we are heading by following those plans.

Another application would be to study and possibly define farmers strategies on village level and analyse if they differ from or could "improve" government strategies.

## 8. TENTATIVE FINDINGS AND HYPOTHESES

The authors would like to put forward a number of "preliminary conclusions". To emphasise that many of those conclusions really are preliminary and will be studied further in the project, they are named "hypotheses" (some of the items in the list are not exactly hypotheses but rather findings in the study).

(01) A precondition in strategy development (strategic planning) is to have a basic understanding of the current situation, what changes take place and why. A basic hypothesis of the project is that one can learn from the history in order to obtain such understanding.

(02) The results of the study indicate that demographic factors, new agricultural techniques, environmental, political, infra-structural, cultural and socio-economic factors as well as government policies and strategies have all significantly influenced forest land use in the study area over the last 50 years. When working with land use strategy development the effect on all those factors needs proper consideration.

(03) It is evident that the government has strategies and a forest policy that affect the life of the people in the area. However, it is also apparent that the villages have their own strategies to meet various external and internal requirements. Finally, the individual households have their strategies to cope with the current and future expected demands.

(04) The household or village strategy of moving to another place is often influenced by external factors, but is also frequently initiated by the villagers. About 40 % of all migration in the study area has been done on the initiative of the local people, while 60 % was caused by external factors (mainly war and government initiatives).

(05) The government strategy to allocate forest land to individual households and entities and to restrict them from using other areas has a strong impact on the life of the villagers. Most villagers understand the reasons behind the strategy, they also try to change their life to cope with the new situation but worry for it's consequences on their own livelihood.

(06) The land forest allocation is also an exclusion where the government asserts its rights with regard to specific categories of forest land such as Conservation Forest, Protection Forest and Water Catchment Forest. Use of this land is restricted according to legislation. The Village Committees are responsible for the management and is also exercising that responsibility.

(07) The land - forest allocation activities have prompted a very dynamic process with village based land use planning, emergence of a variety of strategies for further development and possibly also a strengthened land use planning and management at village level.

(08) Villages pursue their own strategies. During the civil war all villages practiced their own strategies to cope with a very difficult situation. One village managed

to stay out of the fighting and remain stable on the same spot as it has done for a period of 100 years by now. Other villages moved numerous times, were protected by the government or took shelter in the forest.

(09) Currently the village communities and the individual villagers work with survival and success strategies in the new market economy (improved access to market through new roads, identify and produce market crops that give a good price etc.). Some villages are more active than others in this respect.

(10) The village land management system for shifting cultivation land has generated an equitable distribution of land. This seems also to be the case in a village where recently developed irrigated land is being distributed in an equitable way.

(11) In most villages, there is a mixture of production for subsistence and for the market with upland rice being primarily for subsistence unless a surplus is being produced.

(12) There is a strong correlation between population density and the area used for agriculture/forest cover. However, when population density increased over a certain limit, the area used for agriculture per household has decreased significantly. The decrease resulted in a more intensive swidden based rotational agriculture ("shifting cultivation") with shorter rotation cycles. As a result, the yield per hectare cultivated a certain year has declined but the average annual yield per hectare on the whole area used by the household has increased.

(13) The cover of forest (young forest) in the area has increased during the 1990s. The increase is probably mainly an effect of a decreased number of people living in the area compared to a peak in 1989. It is too early to say to what extent the government efforts in forest protection and land allocation has had effect on the forest cover.

(14) There is a significant gap between the area allotted and the total area actually used for agriculture so far during the 1990s (the former is only about half of latter). A number of reasons could partly explain the gap (i.e. plots used for other agriculture than rice-production such as "maize plots" are not included in the allotment and the effect of the land allocation is not yet fully reflected in the data). Some villages also have areas outside the study area, but that would actually expand the "gap". Anyhow, except in one village, the allotted plots have not been measured in the field. The actually used area per household could therefore be different from the officially estimated allotted area.

(15) Regardless if the actually used area is bigger than the estimated allotted area or not, the most interesting aspect is the change (so far and in the coming years).

(16) One output of this type of research is identification of information and research needs. As an example it seems to be a relevant research task to monitor and analyse the water flow in relation to forest cover and paddy expansion in the area. There are several reasons for that - The study area is a "water catchment area" adjacent to a research station. The Government's emphasis on forest protection in the last ten years has been significant. Enough water of good quality

is crucial for the survival and development all villages in the area. One of the villages is involved in an irrigation scheme expected to provide most villagers with paddy land to produce enough rice for subsistence. However, reduced water flow in the main stream of the area over the last 30 years is also reported in several of the villages.

(17) Objective sampling inventories tend to provide precise estimates of pre-determined variables but often fail to explain reasons behind data, unless a great amount of complementary information is available. Descriptive surveys, on the other hand, could provide information that explains reasons but are poor at quantifying data for generalised use outside a study area. Development of methods combining the two approaches are of importance in strategic planning and multi-disciplinary research.

(18) For obtaining land use data in small areas an approach with systematic allocation of field samples where the land users (villagers) provide the information on present, past and future land use has been tested and found feasible.

(19) Local historical information could often only be obtained through systematic interviews with the people living in the area. By cross-checking information of different persons and combine it with certain other data (i.e. old photographs and records) a historical display over the period of the last 50 - 100 years has been obtained.

# Annex A

## Notes from the Seminar at Thong Khang Research Station on August 19, 1997

# People's Options on Forest Land Use

**Seminar on forest land use and land use strategies in the Upper Nam Nan Water Catchment Area, Nan District, Luang Phrabang Province**

*The seminar is organised in relation to an ongoing research project funded by Sida/SAREC and conducted by the Swedish University of Agricultural Sciences (SLU) in co-operation with the Department of Forestry, Lao PDR and the concerned villages.*

Date: August 19, 1997 at 8.30 a.m – 4.00 p.m.

Place: Thong Khang Research Station

Program:

1. People's Options on Forest Land Use – project background and work done so far (Mr Houmchitsawath / Mats Sandewall)

2. The history of the villages in the Upper Nam Nan Water Catchment Area (Kajsa Sandewall / Mr Wandee). Short comments from the villagers and the audience.

3. Demographic and land use changes over 50 years, including trends in shifting cultivation and forest cover (Mats Sandewall/Dr Phet)

4. Socio-economic trends in relation to historical events and government strategies (Bo Ohlsson/Dr Phet)

5. Discussion (Mr Houmchitsawath)

LUNCH (12. 00 – 13. 00)

6. Socio-economic conditions – changes in people's life (Bo Ohlsson / Dr Phet)

7. The land allocation reform – what has happened and what are the prospects (Mats Sandewall /District/Province/SCP)

8. Methodological aspects on the research (Mats / Bo / Kajsa / Mr Sombat)

9. People's Options on Forest Land Use - discussion (Mr Houmchitsawath)

**Notes from the Thong Khang Seminar:**

Participants:

- Three (3) representatives of each of the seven (7) villages in the Upper Nam Nan Water Catchment Area (Huay Oun, Pha Haen, Pha Kuang, Pha Tonglom, Thali, Thong Khang, Tou Ho). It was 1) the Village Headman, 2) a representative of the Village Elders Association and 3) a representative of the Lao Women's Union.
- The Acting Head of the Nan District
- The Head of the Nan District Agriculture and Forestry Service (DAFO)
- The Head of the Forestry Section of Luang Prabang Province
- The Head of Thong Khang Research Station
- Researchers of Thong Khang Research Station
- The Advisor of the Shifting Cultivation Sub-program, LSFP
- The Province Forestry and Agriculture Adviser in Luang Prabang (LSFP)
- The Research Team

Issues highlighted and comments made:

The researchers presented the result following the agenda (previous page) and the content of the working paper (not yet completed at the time of the Seminar).

The Province and District representatives presented government policies and strategies with regard to forest land use. The interpretation of current legislation was explained. For instance, forest less than five years old is to be viewed as agricultural land and can be used as such. Plantation forestry is exempt form tax payment. To support sedenterisation, the tax is being reduced if the same (upland) land is used the subsequent year.

The province and district representatives also emphasised that the villagers must not wait for the government to start projects etc. Rather, the role of the government is to provide a framework within which the villagers can develop their economy and their socio economic standard.

The representatives of the villagers made a number of comments. They expressed satisfaction and interest in the report but also disagreed with some of the observations. For example, some of the villages had the opinion that the shifting cultivation cycle in the last fifteen years had decreased significantly (and not been moor or less even as

observed by the researchers). It was agreed that this matter had to be studied further in detail.

Another comment made by the villagers was that they could see no serious constraints in producing different alternative crops. The main problems was considered to be the market and the communications.

The historical part was received with attentativeness by the villagers. This was the first time ever that the villagers history had beenThe translation into Lao language of each of the seven village histories was studied thoroughly. The content was to be commented in detail during the following weeks. During that time it was observed that the villagers usually agreed on their own history but also paid great attention and sometimes disagreed with details of other villages.

# Annex B

1. **Preliminary socio economic data**
2. **1995 land allocation in Tou Ho village**
3. **Socio-economic check list**

Village Data, Thong Khang, Lao PDR

| | No of hh | Pop. | Males | % males | Females | % female | Labour | % labou | F. hoh, HH | Eth. grp 1 | % Eth.grp | Eth grp 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Village | | | | | | | | | | | | |
| Houey Oun | 34 | 168 | 101 | 60.12 | 67 | 39.88 | 100 | 59.52 | 4 | Kamou | 100 | 0 |
| Tha Li | 128 | 770 | 385 | 50.00 | 385 | 50.00 | 298 | 38.70 | 5 | Lao Lhum | 95 | 5 |
| Phae Haen | 27 | 122 | 57 | 46.72 | 65 | 53.28 | 61 | 50.00 | 2 | Lao Songh | 78 | 22 |
| Thong Khang | 68 | 430 | 208 | 48.37 | 222 | 51.63 | 153 | 35.58 | 5 | Khamu | 87 | 13 |
| Pha Kwang | 42 | 213 | 110 | 51.64 | 103 | 48.36 | 113 | 53.05 | 3 | Lao Lhum | 100 | 0 |
| Pha Tonglom | 67 | 367 | 187 | 50.95 | 180 | 49.05 | 147 | 40.05 | 5 | Khamu | 78 | 22 |
| Tou Ho | 55 | 303 | 146 | 48.18 | 157 | 51.82 | 126 | 41.58 | 5 | Lao Songh | 96 | 4 |
| Total | 421 | 2373 | 1194 | 50.32 | 1179 | 49.68 | 998 | 42.06 | 29 | | | |
| Average | 60 | 339 | 171 | | 168.43 | | 143 | | 4 | | | |

**Socio economic stratification**

| | Well off | % well off | female hhs | Ditto, % | Av. hh | % av hh | female hhs | % of hh | Marg. hh | % Marg hh | F Marg. hh | % mrghh |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Houey Oun | 0 | 0.00 | 0 | | 27 | 79.41 | 2 | | 5 | 14.71 | 2 | |
| Tha Li | 7 | 5.47 | 1 | | 86 | 67.19 | 0 | | 35 | 27.34 | 0 | |
| Phae Haen | 12 | 44.44 | 0 | | 7 | 25.93 | 1 | | 8 | 29.63 | 1 | |
| Thong Khang | 10 | 14.71 | 1 | | 47 | 69.12 | 0 | | 11 | 16.18 | 2 | |
| Pha Kwang | 9 | 21.43 | 0 | | 27 | 64.29 | 1 | | 6 | 14.29 | 2 | |
| Pha Tonglom | 14 | 20.90 | 1 | | 34 | 50.75 | 0 | | 19 | 28.36 | 7 | |
| Tou Ho | 7 | 12.73 | 0 | | 43 | 78.18 | 3 | | 5 | 9.09 | 2 | |
| Total | 59 | 14.01 | 3 | | 271 | 64.37 | 7 | | 89 | 21.14 | 16 | |

Land

| | | | | | Sources of income - farming activities 1997 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Village | Paddy, Ha | No of | % of | | Total Yie | Yield p | Yield per | kg seeds | Kg seeds | No of HH | % HH for | Ton sold | Ha used |
| | Total area | hh | hh | ha/hh | tons/year | ha, ma | ha, min | totally | per 1 ha | market | market | | for com. |
| Houey Oun | 0.00 | 0 | 0.00 | | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tha Li | 33.40 | 48 | 55.56 | | 45.00 | 2.50 | 1.50 | 1,340 | 4 | | 50 | 14.85 | na |
| Phae Haen | 0.40 | 1 | 0.67 | | 0.50 | 0.50 | 0.30 | na | na | 0 | 0 | 0 | 0 |
| Thong Khang | 6.50 | 9 | 10.81 | | 4.50 | 1.20 | 0.40 | 120 | 40 | 0 | 0 | 0 | 0 |
| Pha Kwang | 1.97 | 3 | 3.28 | | 1.29 | 0.96 | 0.24 | 960 | na | 0 | 0 | 0 | 0 |
| Pha Tonglom | 17.85 | 17 | 29.69 | | 44.21 | 3.60 | 1.20 | 800 | 40 | 3 | | 3.5 | 1.5 |
| Tou Ho | 0.00 | 0 | 0.00 | | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 60.12 | 78 | 100.0 | | 95.5 | | | 3220 | | 3 | | 18.35 | 1.5 |
| Average | 8.59 | 11.14 | | | | 1.75 | 0.73 | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | Area SC, | Area/ | No of | Area | SC % of | tot. | max/ha, t. | min/ha, t. | Tot seed, kg | Kg seed | Hh for | Am. sold | Ha for |
| | Ha | cap. | hh | per hh | tot hh | yield | | | per village | per ha | market | unh./ton | mark. prod |
| Village | | | | | | | | | | | | | |
| Houey Oun | 53.0 | 0.3 | 32 | 1.66 | 94.1 | 55 | 2.60 | 0.70 | 2,638 | 50 | ? | 28/* | mixed |
| Tha Li | 112.0 | 0.1 | 121 | 0.93 | 94.5 | 145 | 3.00 | 0.70 | 56,100 | 50 | barter | 72.5 | |
| Phae Haen | 25.0 | 0.2 | 26 | 0.96 | 96.3 | 52 | 1.50 | 0.30 | 1,005 | 40 | 3 | 2 | 8 |
| Thong Khang | 66.0 | 0.2 | 58 | 1.14 | 85.3 | 9.2 | 1.33 | 0.10 | 3,320 | 50 | barter | | |
| Pha Kwang | 44.0 | 0.2 | 38 | 1.16 | 90.5 | 60 | 2.20 | 0.38 | 2,040 | 60 | 9 | na | na |
| Pha Tonglom | 46.0 | 0.1 | 63 | 1.00 | 94.0 | 55.2 | 1.70 | 0.35 | 2,784 | 60 | barter | na | na |
| Tou Ho | 45.0 | 0.1 | 55 | 0.82 | 100.0 | 65.5 | 2.70 | 0.50 | 2,228 | 50 | na | 32.75 | na |
| Total | 391.0 | | 393 | | | 442 | 2.15 | 0.43 | 70,115 | 51.43 | | | |
| Average/Ban | | 0.186 | 56 | 1.04 | 93.3 | | | | | | | | |
| | | | | | | | | | | | | | |
| | SC=shifting cultivation | | | | | | | | | | | | |

| | Villages | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Activity | Houey Oun | | Tha Li | | Pha Haen | | Thong Khang | | Pha Kwang | | Pha Tonglom | | Tou Ho | |
| | %, T | %, C | %, T | %, C | %, T | %, C | %, T | %, C | %, T | %, C | %, T | %, C | %, T | %, C |
| **Farming** | | | | | | | | | | | | | | |
| Vegetable garden | 0 | 0 | 11 | 0 | 13 | 0 | 31 | 0 | 12 | 2 | 21 | 18 | 75 | 0 |
| Orchards | 0 | 0 | 0 | 0 | 19 | 19 | 19 | 19 | 10 | 5 | 6 | 6 | 44 | 0 |
| Animals | 44 | 12 | 53 | 4 | 16 | 2 | 10 | 0 | 45 | 10 | 39 | 7 | 47 | 11 |
| Ruminants | 25 | 25 | 0 | 0 | 11 | 11 | 10 | 7 | 0 | 0 | 0 | 0 | 26 | 15 |
| Buffaloes | 29 | 9 | 40 | 4 | 2 | 1 | 7 | 2 | 19 | 7 | 31 | 8 | 9 | 6 |
| Pigs | 41 | 9 | 66 | 66 | 21 | 21 | 100 | 100 | 86 | 57 | 57 | 57 | 100 | 100 |
| Fish | 0 | 0 | 9 | 1 | 8 | 2 | 10 | 10 | 41 | 10 | 12 | 12 | 36 | 0 |
| Poultry | 77 | 77 | 100 | 100 | 22 | 19 | 100 | 100 | 98 | 7 | 100 | 0 | 100 | 100 |
| | | | | | | | | | | | | | | |
| **Non - farming** | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Service/trade | | 0 | | 2 | | 0 | | 10 | | 7 | | 3 | | 2 |
| Handicraft | | 35 | | 2 | | 2 | | 87 | | 7 | | 0 | | 9 |
| Home industry | | 9 | | 4 | | 2 | | 9 | | 14 | | 11 | | 17 |
| | | | | | | | | | | | | | | |
| Timber/pooles | 9 | 0 | 9 | 9 | 22 | 0 | 35 | 11 | 98 | 33 | 6 | 0 | 36 | 0 |
| Firewood | 94 | 0 | 100 | 5 | 22 | 0 | 100 | 6 | 98 | 0 | 100 | 0 | 100 | 0 |
| NWP | 94 | 94 | 11 | 1 | 22 | 22 | 87 | 87 | 93 | 93 | 100 | 100 | 96 | 96 |
| | | | | | | | | | | | | | | |
| | T=Total | | | | | | | | | | | | | |
| | C=Commercial | | | | | | | | | | | | | |

## The 1995 Land Allocation in Tou Ho Village, Nan District in Luang Prabane

| Household no | Plot No | Area, ha | Subtotal, Ha | No of labour |
|---|---|---|---|---|
| 1 | 1 | 1.00 | | |
| | 2 | 0.00 | | |
| | 3 | 1.08 | | |
| | 4 | 1.00 | | |
| | | | 3.08 | 2 |
| 2 | 1 | 0.90 | | |
| | 2 | 1.08 | | |
| | 3 | 0.85 | | |
| | 4 | 1.30 | | |
| | | | 4.13 | 2 |
| 3 | 1 | 0.36 | | |
| | 2 | 1.30 | | |
| | 3 | 0.85 | | |
| | 4 | 1.30 | | |
| | | | 3.81 | 2 |
| 4 | 1 | 1.20 | | |
| | 2 | 0.26 | | |
| | 3 | 1.04 | | |
| | 4 | 0.80 | | |
| | | | 3.30 | 3 |
| 5 | 1 | 0.70 | | |
| | 2 | 1.10 | | |
| | 3 | 1.00 | | |
| | 4 | 1.04 | | |
| | | | 3.84 | 5 |
| 6 | 1 | 0.71 | | |
| | 2 | 1.68 | | |
| | 3 | 1.30 | | |
| | 4 | 1.80 | | |
| | | | 5.49 | 3 |
| 7 | 1 | 1.35 | | |
| | 2 | 0.80 | | |
| | 3 | 1.00 | | |
| | 4 | 1.00 | | |
| | | | 4.15 | 2 |
| 8 | 1 | 0.72 | | |
| | 2 | 0.52 | | |
| | 3 | 1.10 | | |
| | 4 | 1.08 | | |
| | | | 3.42 | 2 |
| 9 | 1 | 0.99 | | |
| | 2 | 1.25 | | |
| | 3 | 1.04 | | |
| | 4 | 1.00 | | |
| | | | 4.28 | 2 |
| 10 | 1 | 1.17 | | |
| | 2 | 1.50 | | |
| | 3 | 1.20 | | |
| | 4 | 1.00 | | |
| | | | 4.87 | 2 |

| | | | | |
|---|---|---|---|---|
| 11 | 1 | 0.72 | | |
| | 2 | 1.08 | | |
| | 3 | 1.08 | | |
| | 4 | 1.20 | | |
| | | | 4.08 | 1 |
| 12 | 1 | 1.03 | | |
| | 2 | 0.80 | | |
| | 3 | 1.08 | | |
| | 4 | 0.69 | | |
| | | | 3.60 | 1 |
| 13 | 1 | 0.36 | | |
| | 2 | 0.42 | | |
| | 3 | 0.42 | | |
| | 4 | 0.00 | | |
| | | | 1.20 | 2 |
| 14 | 1 | 1.50 | | |
| | 2 | 1.43 | | |
| | 3 | 1.60 | | |
| | 4 | 1.54 | | |
| | | | 6.07 | 3 |
| 15 | 1 | 0.86 | | |
| | 2 | 1.05 | | |
| | 3 | 1.00 | | |
| | 4 | 0.90 | | |
| | | | 3.81 | 2 |
| 16 | 1 | 0.85 | | |
| | 2 | 1.72 | | |
| | 3 | 1.26 | | |
| | 4 | 0.63 | | |
| | | | 4.46 | 2 |
| 17 | 1 | 1.85 | | |
| | 2 | 1.50 | | |
| | 3 | 1.20 | | |
| | 4 | 1.50 | | |
| | | | 6.05 | 5 |
| 18 | 1 | 0.63 | | |
| | 2 | 1.00 | | |
| | 3 | 0.80 | | |
| | 4 | 0.33 | | |
| | | | 2.76 | 2 |
| 19 | 1 | 0.54 | | |
| | 2 | 0.40 | | |
| | 3 | 1.00 | | |
| | 4 | 0.84 | | |
| | | | 2.78 | 2 |
| 20 | 1 | 0.86 | | |
| | 2 | 0.90 | | |
| | 3 | 0.00 | | |
| | 4 | 1.02 | | |
| | | | 2.78 | 2 |
| 21 | 1 | 1.00 | | |
| | 2 | 0.85 | | |
| | 3 | 1.80 | | |
| | 4 | 0.90 | | |
| | | | 4.55 | 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 22 | 1 | 0.90 | | | | | |
| | 2 | 1.00 | | | | | |
| | 3 | 0.00 | | | | | |
| | 4 | 1.00 | | | | | |
| | | | 2.90 | 2 | | | |
| 23 | 1 | 0.80 | | | | | |
| | 2 | 1.00 | | | | | |
| | 3 | 0.80 | | | | | |
| | 4 | 1.00 | | | | | |
| | | | 3.60 | 1 | | | |
| 24 | 1 | 0.92 | | | | | |
| | 2 | 0.70 | | | | | |
| | 3 | 0.91 | | | | | |
| | 4 | 0.80 | | | | | |
| | | | 3.33 | 2 | | | |
| 25 | 1 | 1.20 | | | | | |
| | 2 | 1.68 | | | | | |
| | 3 | 1.20 | | | | | |
| | 4 | 1.17 | | | | | |
| | | | 5.25 | 4 | | | |
| 26 | 1 | 0.90 | | | | | |
| | 2 | 1.20 | | | | | |
| | 3 | 1.20 | | | | | |
| | 4 | 0.80 | | | | | |
| | | | 4.10 | 2 | | | |
| 27 | 1 | 0.72 | | | | | |
| | 2 | 0.78 | | | | | |
| | 3 | 0.90 | | | | | |
| | 4 | 0.80 | | | | | |
| | | | 3.20 | 1 | | | |
| 28 | 1 | 0.60 | | | | | |
| | 2 | 0.60 | | | | | |
| | 3 | 0.85 | | | | | |
| | 4 | 0.70 | | | | | |
| | | | 2.75 | 2 | | | |
| 29 | 1 | 1.00 | | | | | |
| | 2 | 1.05 | | | | | |
| | 3 | 1.05 | | | | | |
| | 4 | 0.56 | | | | | |
| | | | 3.66 | 3 | | | |
| 30 | 1 | 1.08 | | | | | |
| | 2 | 0.00 | | | | | |
| | 3 | 0.60 | | | | | |
| | 4 | 1.00 | | | | | |
| | | | 2.68 | 2 | | | |
| 31 | 1 | 1.00 | | | | | |
| | 2 | 0.00 | | | | | |
| | 3 | 1.62 | | | | | |
| | 4 | 1.20 | | | | | |
| | | | 3.82 | 4 | | | |
| 32 | 1 | 1.08 | | | | | |
| | 2 | 1.20 | | | | | |
| | 3 | 1.72 | | | | | |
| | 4 | 1.54 | | | | | |
| | | | 5.54 | 3 | | | |

| | | | | |
|---|---|---|---|---|
| 33 | 1 | 1.20 | | |
| | 2 | 1.08 | | |
| | 3 | 1.12 | | |
| | 4 | 1.00 | | |
| | | | 4.40 | 2 |
| 34 | 1 | 0.95 | | |
| | 2 | 0.90 | | |
| | 3 | 1.20 | | |
| | 4 | 1.05 | | |
| | | | 4.10 | 2 |
| 35 | 1 | 0.67 | | |
| | 2 | 1.00 | | |
| | 3 | 1.20 | | |
| | 4 | 1.12 | | |
| | | | 3.99 | 2 |
| 36 | 1 | 1.13 | | |
| | 2 | 1.20 | | |
| | 3 | 1.20 | | |
| | 4 | 1.10 | | |
| | | | 4.63 | 2 |
| 37 | 1 | 1.05 | | |
| | 2 | 1.05 | | |
| | 3 | 0.84 | | |
| | 4 | 1.43 | | |
| | | | 4.37 | 2 |
| 38 | 1 | 0.36 | | |
| | 2 | 0.35 | | |
| | 3 | 0.00 | | |
| | 4 | 0.48 | | |
| | | | 1.19 | 1 |
| 39 | 1 | 1.00 | | |
| | 2 | 1.10 | | |
| | 3 | 1.10 | | |
| | 4 | 1.50 | | |
| | | | 4.70 | 3 |
| 40 | 1 | 0.63 | | |
| | 2 | 0.65 | | |
| | 3 | 1.00 | | |
| | 4 | 1.20 | | |
| | | | 3.48 | 2 |
| 41 | 1 | 1.00 | | |
| | 2 | 1.20 | | |
| | 3 | 0.99 | | |
| | 4 | 1.21 | | |
| | | | 4.40 | 2 |
| 42 | 1 | 1.35 | | |
| | 2 | 1.00 | | |
| | 3 | 1.40 | | |
| | 4 | 1.20 | | |
| | | | 4.95 | 4 |
| 43 | 1 | 1.17 | | |
| | 2 | 1.00 | | |
| | 3 | 1.20 | | |
| | 4 | 1.47 | | |
| | | | 4.84 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 44 | 1 | 1.02 | | | | | | |
| | 2 | 1.08 | | | | | | |
| | 3 | 0.90 | | | | | | |
| | 4 | 1.08 | | | | | | |
| | | | 4.08 | 2 | | | | |
| 45 | 1 | 0.36 | | | | | | |
| | 2 | 1.00 | | | | | | |
| | 3 | 1.00 | | | | | | |
| | 4 | 0.60 | | | | | | |
| | | | 2.96 | 2 | | | | |
| 46 | 1 | 1.20 | | | | | | |
| | 2 | 1.12 | | | | | | |
| | 3 | 1.30 | | | | | | |
| | 4 | 1.10 | | | | | | |
| | | | 4.72 | 2 | | | | |
| 47 | 1 | 1.00 | | | | | | |
| | 2 | 0.98 | | | | | | |
| | 3 | 0.80 | | | | | | |
| | 4 | 0.70 | | | | | | |
| | | | 3.48 | 2 | | | | |
| 48 | 1 | 0.29 | | | | | | |
| | 2 | 0.79 | | | | | | |
| | 3 | 1.05 | | | | | | |
| | 4 | 1.00 | | | | | | |
| | | | 3.13 | 2 | | | | |
| 49 | 1 | 0.70 | | | | | | |
| | 2 | 1.20 | | | | | | |
| | 3 | 1.20 | | | | | | |
| | 4 | 1.20 | | | | | | |
| | | | 4.30 | 0 | | | | |
| 50 | 1 | 1.08 | | | | | | |
| | 2 | 0.80 | | | | | | |
| | 3 | 1.65 | | | | | | |
| | 4 | 0.80 | | | | | | |
| | | | 4.33 | 3 | | | | |
| 51 | 1 | 0.90 | | | | | | |
| | 2 | 0.60 | | | | | | |
| | 3 | 0.96 | | | | | | |
| | 4 | 0.80 | | | | | | |
| | | | 3.26 | 3 | | | | |
| 52 | 1 | 1.50 | | | | | | |
| | 2 | 1.02 | | | | | | |
| | 3 | 1.17 | | | | | | |
| | 4 | 1.00 | | | | | | |
| | | | 4.69 | 2 | | | | |
| 53 | 1 | 0.88 | | | | | | |
| | 2 | 0.80 | | | | | | |
| | 3 | 0.80 | | | | | | |
| | 4 | 0.59 | | | | | | |
| | | | 3.07 | 3 | | | | |
| 54 | 1 | 2.55 | | | | | | |
| | 2 | 1.50 | | | | | | |
| | 3 | 1.40 | | | | | | |
| | 4 | 1.40 | | | | | | |
| | | | 6.85 | 2 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 55 | 1 | 1.75 | | | | | |
| | 2 | 0.80 | | | | | |
| | 3 | 1.04 | | | | | |
| | 4 | 0.80 | | | | | |
| | | | 4.39 | 2 | | | |
| 56 | 1 | 0.75 | | | | | |
| | 2 | 1.00 | | | | | |
| | 3 | 0.78 | | | | | |
| | 4 | 1.20 | | | | | |
| | | | 3.73 | 2 | | | |
| 57 | 1 | 1.08 | | | | | |
| | 2 | 0.99 | | | | | |
| | 3 | 0.80 | | | | | |
| | 4 | 0.91 | | | | | |
| | | | 3.78 | 2 | | | |
| 58 | 1 | 0.36 | | | | | |
| | 2 | 0.48 | | | | | |
| | 3 | 0.48 | | | | | |
| | 4 | 0.00 | | | | | |
| | | | 1.32 | 3 | | | |
| 59 | 1 | 1.35 | | | | | |
| | 2 | 1.20 | | | | | |
| | 3 | 1.00 | | | | | |
| | 4 | 0.96 | | | | | |
| | | | 4.51 | 1 | | | |
| | | | | | | | |
| Total area, Ha | | 230.99 | 230.99 | | | | |
| Av.area/HH (ha) | | | 3.92 | | | | |
| Av. area/HH/a | | 0.98 | | | | | |
| Total no of plots | | 228.00 | | | | | |
| Total no of labour | | | | 131 | | | |
| Ha/labour/a | | 0.44 | | | | | |

3.3.2 SOCIOECONOMIC CHECKLIST FOR THE STP

Lao PDR and Vietnam

**I. Country**

1 Province:.....
2 District:.....
3 Commune
4 Village
5 Date in village:.....
6 Date reported:.....
7 Revisit:.....

**II. Participants**

| 1. STAFF | 2. ITINERARY | 3. Villagers/Gender |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**II. Village Data**

1 **Demography**

| | | |
|---|---|---|
| 1.1 | # households | |
| 1.2 | # population | |
| 1.3 | # males | |
| 1.4 | % males | |
| 1.5 | # females | |
| 1.6 | % female | |
| 1.7 | # labor | |
| 1.8 | % labor | |
| 1.9 | Nr. females heads of households | |
| 1.10 | % | |

2 **Ethnicity**

| | | |
|---|---|---|
| 2.1 | Main ethnic group: | |
| 2.2 | # households: | |
| 2.3 | %: | |
| 2.4 | Ethnic subgroup | |
| 2.5 | 2nd ethnic group | |
| 2.6 | #households: | |
| 2.7 | % | |
| 2.8 | Ethnic subgroup | |
| 2.9 | 3rd ethnic subgroup | |
| 2.11 | # households: | |
| 2.12 | % | |

3 **Household Status**

| | | |
|---|---|---|
| 3.1 | # well off households | |
| 3.2 | % | |
| 3.3 | # female headed households | |
| 3.4 | % | |

3.5 # Average households
3.6 %
3.7 # female headed households
3.8 %

3.9 # marginal households
3.10 %
3.11 # female headed households
3.12 %

**III. Sources of Income**

**A Farming Activities**

**1 What is the total area of paddy field (ha)**

1.1 How many households have and cultivate paddy fields ?
1.2 Percentage of households:
1.3 What is the total yield paddy, unhusked? (tons/yr):
1.4 What is the yield (rice) per ha ? Maximum (t/ha):
1.5 Average (t/ha):
1.6 Minimum (t/ha):

1.7 How much rice does a household produce ? Maximum (t/yr):
1.8 Average (t/yr):
1.9 Minimum (t/yr):

1.11 Amount of seeds used totally for the village
1.12 Amount of seeds used for 1 ha
1.13 Yield unhusked rice per kg seeds
1.14 How many hh produce for the market
1.15 % of HH
1.16 Estimate amount sold, kg husked rice
1.17 Estimate no of Ha used for market production

**2 What is the total area used for shifting culivation (ha) in 1996:**

2.1 How many households practise shifting cultivation ?
2.2 Percentage of households:
2.3 What is the total yield ? (tons unhusked rice):
2.4 What is the yield per ha ? Maximum (t/ha):
2.5 Average (t/ha):
2.6 Minimum (t/ha):
2.7 How much rice does a household produce ? Maximum (t/yr):
2.8 Average (t/yr):
2.9 Minimum (t/yr):
2.10 Responsible 1) women 2) men
2.11 Main labor 1) women 2) men

2.12 Amount of seeds used totally for the village
2.13 Amount of seeds used for 1 ha
2.14 Yield unhusked rice per kg seeds
2.15 How many hh produce for the market
2.16 % of HH
2.17 Estimate amount sold, kg husked rice
2.18 Estimate no of Ha used for market production

**3 How many households cultivate vegetable garden ?**

3.1 Percentage of households:

How many HH produce for the market

% of total HH

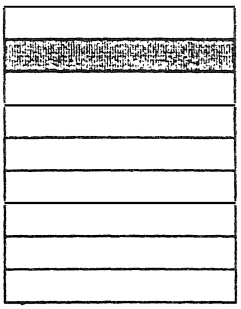
3.3 If selling, how much does a household earn ? Maximum (LAK/yr):

3.3 Average (LAK/yr):

3.4 Minimum (LAK/yr):

3.5 Responsible 1) women 2) men

3.6 Main labor 1) women 2) men



**4 How many households raise animals ?**

**4.1** Large animals, except buffaloes

4.2 %

4.3 How many HH for the market

4.4 % of HH

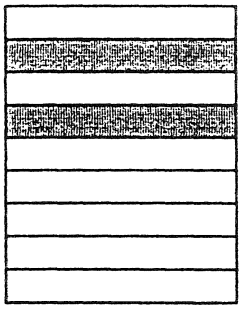
4.5 If for market, how much does a HH earn ? Maximum (LAK/yr):

4.6 Average (LAK/yr):

4.7 Minimum (LAK/yr):

4.8 Responsible 1) women 2) men

4.9 Main labor 1) women 2) men



4.11 **Small animals/ruminants, No of HH**

4.12 %

4.13 How many HH for the market

4.14 % of HH

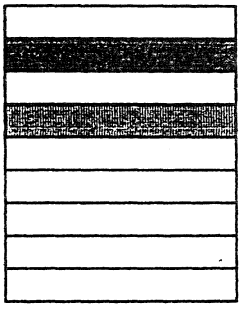
4.15 If for market, how much does a HH earn? Maximum(LAK/yr):

Average (LAK/yr):

Minimum (LAK/yr):

4.16 Responsible 1) women 2) men

4.17 Main labor 1) women 2) men



4.18 **Buffaloes, No of HH**

4.19 %

4.21 How many HH for the market

4.22 % of HH

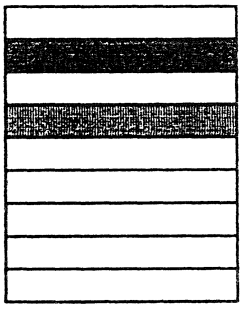
4.23 If for market, how much does a HH earn? Maximum (LAK/yr):

4.24 Average, (LAK/yr):

4.25 Minimum, (LAK/yr):

4.26 Responsible 1) women 2) men

4.27 Main labor 1) women 2) men



4.28 **Pigs, No of HH**

%

How many HH for the market

% of HH

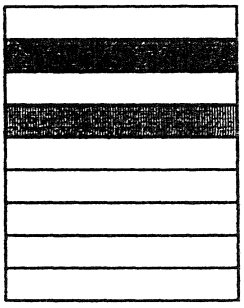
If for market, how much does a HH earn? Maximum (LAK/yr):

Average, (LAK/yr):

Minimum, (LAK/yr):

Responsible 1) women 2) men

Main labor 1) women 2) men



5 **How many HH raise and/or catch fish**

5.1 %

5.2 How many HH for the market

5.3 % of HH

5.4 How much does each household earn ? Maximum (LAK/yr):

5.5 Average (LAK/yr):

5.6 Minimum (LAK/yr):

5.7 Responsible 1) women 2) men

5.8 Main labor 1) women 2) men

5.9 **How many HH raise poultry/ducks**

5.11 %

5.12 How many HH for the market

5.13 % of HH

5.14 How much does each household earn ? Maximum (LAK/yr):

5.15 Average (LAK/yr):

5.16 Minimum (LAK/yr):

5.17 Responsible 1) women 2) men

5.18 Main labor 1) women 2) men

**B Non-Farming Activities**

**6 How many households generate income from service/ trade ?**

6.1 Percentage of households:

6.2 How much does each household earn ? Maximum (LAK/yr):

6.3 Average (LAK/yr):

6.4 Minimum (LAK/yr):

6.5 Responsible 1) women 2) men

6.6 Main labor 1) women 2) men

**7 How many households generate income from handicraft ?**

7.1 Percentage of households:

7.2 How much does each household earn ? Maximum (LAK/yr):

7.3 Average (LAK/yr):

7.4 Minimum VNDK/yr):

7.5 Responsible 1) women 2) men

7.6 Main labor 1) women 2) men

**8 How many households generate income from home industry ?**

8.1 Percentage of households:

8.2 How much does each household earn ? Maximum VNDK/yr):

8.3 Average (LAK/yr):

8.4 Minimum (LAK/yr):

8.5 Responsible 1) women 2) men

8.6 Main labor 1) women 2) men

**9 How many hh generate income from employment/sell their labour ?**

9.1 Percentage of households:

9.2 How much does each household earn ? Maximum VNDK/yr):

9.3 Average (LAK/yr):

9.4 Minimum (LAK/yr):

9.5 Responsible 1) women 2) men

9.6 Main labor 1) women 2) men

| | | | |
|---|---|---|---|
| Y | Occurence of migratory labour, how many totally | | |
| | | Women | |
| | | Men | |
| | Outside the District | Women | |
| | | Men | |
| | Inside the District | Women | |
| | | Men | |

**10 How many households collect/generate income from forest products ?**

| | Timber/pooles | Firewood | Non wood produce |
|---|---|---|---|
| 10.1 | | | |
| 10.2 Total no of HH | | | |
| 10.3 % of total | | | |
| 10.4 No of HH for market | | | |
| 10.5 Max income/Kip/yr | | | |
| 10.6 Average income/Kip/yr | | | |
| 10.7 Minimum income/Kip/yr | | | |
| 10.8 No of HH for subsistence | | | |

11 Hunting
type of animals, extent of
change over time etc.

**III Gender - 1) women 2) men**

| | | |
|---|---|---|
| 1 Paddy | Production: | |
| | Marketing: | |
| 2. Shifting cultivation | Production: | |
| | Marketing: | |
| 3. Vegetable garden | Production: | |
| | Marketing: | |
| 4. Animal husbandry | Production: | |
| | Marketing: | |
| 5. Fisheries | Production: | |
| | Marketing: | |
| 6. Service and trade | Production: | |
| | Marketing: | |
| 7. Handicraft | Production: | |
| | Marketing: | |
| 8. Home industry | Production: | |
| | Marketing: | |
| 9. Forest produce | Production: | |
| | Marketing: | |
| 10. Employment | Women | |
| | Men | |

**IV. Land Availabiliy**

1 **What is the total area of paddy fields ? ( ha):**

1.1 How much does a household possess ? Maximum (ha):

1.2 Average(ha):

1.3 Minimum (ha):

1.4 How many households have already paid land tax ?

Percentage of households:

1.5 How many households have female names in land tenure?

1.6 What is the percentage of female names ?

2 **What is the total area of individual forest land used for shifting cultivation, Ha**

2.1 How many households have individual shifting culltivation land ?

2.2 Percentage of households:

2.3 How much does a household possess ? Maximum (ha):

2.4 Average(ha):

2.5 Minimum (ha):

2.6 How many households have already paid land tax ?

2.7 Percentage of households:

2.8 How many households have female names in land tenure?

2.9 What is the percentage of female names ?

2.8 What is the land used for ? (1) shifting cultivation a:

(2) grazing (3) fruit tree plantation (4) idle b:

**Total area of individual lands (ha):**

3 **What is the total area of non paddy land allocated to the village ?** (ha):

3.1 Forest categories according to the villagers Area, ha

3.2 _____

3.3 _____

3.4 _____

3.5 _____

3.6 _____

3.7 _____

3.8 _____

3.9 _____

TOTAL

**3.11 Government catgories, Lao PDR**

3.12 Special Forest

3.14 Conservation

3.15 Production Forest

3.16 _____

3.17 _____

3.18 _____

3.19 _____

3.21 _____

3.22 _____

3.23 _____

TOTAL

**Total Area of forest land allocated to the village (ha):**

**Grand total area of the land use of the village (ha):**

## VI. Credit Needs and Previous Experinces - commercial credits

1 How many households have ever accessed credits ?

1.1 Percentage of households:

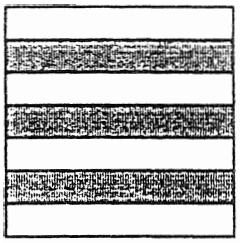
How many women ?

% of women :

1.2 How much each household has borrowed ? Max. (LAK/yr):

1.3 Average (LAK/yr):

1.4 Minimum (LAK/yr):

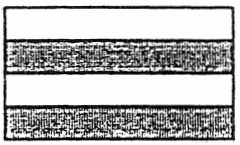


1.5 How many households failed to repay ?

1.6 Percentage of households:

How many women ?

% of women :



## VI Species

Species found in the forest — Use thereoff

Species found in the village - fruit, herbs, bushes etc — Use thereoff

## VII Village and forest land history

**Shifting cultivation**

Traditional system:

| | |
|---|---|
| Gross area | |
| Area engaged annually, gross | |
| max/hh | |
| min/hh | |
| Years of fallowing | |

Technology changes, eg introduction of the plow for shifting cultivation
New Crops etc

Land Allocation
Done, ongoing?
Describe
Land tenure
documentation, the Red Book etc
Land distribution, equality,
princples applied
Village Management Com.
Outcome

How is the village to address this

PLANS
incl. village priorities

VIII Land conflicts - past, present

**Annex C**

# Brief history of the seven villages of the Upper Nam Nan Water Catchment Area

# HUAY OUN

## *Historical Background*

Huay Oun Village is a village of Khamu ethnic group with traditional animism. The village has no access to any kind of infrastructure. It is located about 6 km. away from the nearest road side.

History about Huay Oun Village began in 1951 with three households existing at the first location of the village, about 100 m. away from the current location. Numbers of inhabitant gradually increased by newcomers.

The villagers lived on swidden upland agriculture, with rice cultivation as their main occupation. Maize, the minor upland crop, was cultivated for use as animal fodder and as substitution for rice deficiency. Other crop species were chilli and very few varieties of vegetable. The agricultural area was located near a small stream, named "Huay Liang", about 200 m. away from the boundary of their living area. Cattle, buffaloes, goats, pigs, and poultry, were raised within the living area.

At the beginning of 1960s, the villagers became worried about their living, because many people fell ill and successively died, one after another. The main diseases were malaria and diarrhoea. But, at the time, the incidence of such falling ill was solely regarded by the villagers as a fate or a *"bad luck"* caused by the angry local spirits.

Years went by and the *"bad luck"* continued, even if all spiritual processes against it had been performed by the villagers. Eventually, in 1963, the whole village of totally 20 households, filled with fear and despair, agreed in consensus to leave their *bad-luck-stricken* living area for another location. However, they chose Huay Liang, where they had their agriculture land, to be the new living area.

Unfortunately, after living at Huay Liang for almost three years, the villagers realised that they had not yet been away from the *" bad luck"* they had tried to flee. The people of Huay Oun Village still fell ill and successively died all along the period they had been living at Huay Liang. At this rate, the witch-doctor predicted that all the habitants would soon die of their falling ill if Huay Oun Village was still located at Huay Liang. His prediction was so influential that the whole village moved again in 1965.

In spite of their earlier superstition, the villagers returned to the previous location of the village. Nonetheless, only 18 out of 20 households resettled at the old location. The other two households moved together farther away northwards, to Huay Sieu Village by the bank of Nam Khong, the country's most important river.

When the civil war was intensified in 1966, the Royalist urged the villagers to leave their village while the Pathet Lao insisted that all the villagers remain in the village. Being confused by such different and opposite demands from the two fighting parties, the people of Huay Oun Village scattered and sought shelter in different places as follows:

- a group of six households moved to a place called "Khon Sok", located close to a US-supported army base, about 3-4. km. west of the current site of Thong Khang Village;

- one household moved to Huay Long, outside Nam Nan watershed area;

- the rest moved to other places.

At Khon Sok, the Huay Oun group met another refugee-group of six house-holds from Thong Khang Village. The twelve households then settled down together, forming a small hamlet called "Ban Khon Sok", which means Khon Sok Village. For security reasons, the villagers could not manage their subsistence on their own agricultural products. They were, therefore, provided with food supply by the US Government through the army base, once a week.

Finally, an agreement between the two fighting parties was signed in 1973. As a consequence, the Government of Lao PDR declared in 1974 that all the displaced villagers be recommended to return to their respective original villages. The people of Huay Oun Village, alike those of other villages, gradually moved from the refuges back to their original village. The group of six households who took refuge at Khon Sok returned to Huay Oun in 1976, with one additional household of a married couple stemming from Houay Oun and Thong Khang villages respectively. As soon as the people returned to their own village, they resumed practising swidden upland agriculture.

In order to follow the national policy on rural development, resulted from the First National Forestry Congress in 1989, stating that people living in upland areas be suggested to move to lowland areas, the authority of Nan District instructed the village headman to urge his people to move to lowland area and carry out permanent agriculture, such as paddy field. By that time, 40 households were living in Huay Oun Village, and internal conflicts between the village headman and an informal leader of the village were going on. The conflicts split the villagers into two groups. The first group with 28 households followed the village headman, moving down to a lowland, named "Huay Thalin", about 2 km eastern away from the current site of the village. The second group, comprising 12 households, accompanied the informal leader and moved southwards to an upper slope, about 200 m. away from the current site of the village.

In 1992, a new village headman was selected by the villagers. The selected village headman was some one else, neither the former headman nor the conflict-involving informal leader. Just after the selection of the new headman, an ad hoc committee arrived at the area of Huay Oun to help reunite the two groups of the villagers. The committee consisted of four members: one representative from the District Administration Office, one from the District Forestry and Agricultural Office, one from the SCP, and the head of Thong Khang Sub-District.

The reunion of the villagers was then organised. The two groups moved from their locations towards each other and reunited with each other at a spot between their respective deserted locations, and resettled together. Since this new location was a paddy field area which belonged to a family in Huay Oun Village, it was supposed to be paid for by the inhabitants. An agreement was set up, saying that each household will pay 20 kg of rice for the cost of the land. Fortunately, the owner of the land migrated soon afterwards to Pha Tonglom Village, making way to the land become free-of-charge. At this stage, 32 households remained living in Huay Oun Village.

The current headman was selected in 1995. He is only 22 years old with a four-year-schooling education. In spite of his young age and lack of experience, he was selected headman, regarding general opinion of the villagers, thanks to his honesty. The villagers felt exhausted because of all difficulties caused by the war and being affected by internal conflicts among experienced leaders. Therefore, they preferred a young and not much experienced headman to an older and very much experienced one.

In 1997, the village was inhibited by 34 households. So far, the villagers have been living on their traditional upland agriculture, mainly growing rice, with the same technical system that has been practised for more than 40 years.

## Time Line – Huay Oun

| *Years* | *Events* |
|---|---|
| 1951 | Three (3) households living at the first location. |
| 1963 | The village consisted of 20 households. Because of the break-out of deadly diseases, the whole village moved to the second location. |
| 1965 | Eighteen (18) households returned to the first location, the other 2 households left the village. |
| 1966 | Civil war intensified. The villagers fled Huay Oun and scattered. |
| 1974 | The war was settled. The people gradually returned to the village by suggestion of the government. |
| 1989 | The village's totally 40 households split up into two groups because of internal conflicts. |
| 1992 | The villagers were reunited by an ad hoc committee. |
| 1997 | There were 34 households living in Huay Oun Villlage |

# PHA HAEN

## *Historical Background*

Pha Haen, as well as Tou Ho, is a village of the White Hmong ethnic group. The only means to reach this village is to go on foot. As well as the Khamu, the Hmong is anemism.

The settlement history of this village was told by a group of the village's elders. Their account started from the beginning of 1960s, when many ethnic groups of totally about 120 households lived together at Tat Hoy. Each group had its own administration and practised swidden upland agriculture separately from one another.

The group of those who later settled down in Pha Haen Village -- to be called *"the Pha Han group"* -- carried out their agricultural activities at a place called "Kieu Lai", about 15 km. away from Tat Hoy. Though it was a rather long distance to commute every day, the group felt that they had their own place.

When political instability of the country occurred in 1961, some members of *the Pha Haen group* supported the opposition of the then government, while the rest of the group tried to maintain their neutrality. In order to stay away from the conflicts within the group, 11 households who had neutral perspective, with a leader named *Saen Luang Lao Pao*, migrated from Tat Hoy to Kieu Lai,, their agriculture area, and stayed there for four years.

Over time, both the number of population and the agriculture land at Kieu Lai had expanded. In the fourth year of settlement, the group members had increased to 35 households. Since Kieu Lai is a high-elevation area in a valley with poor water resources, the growth of its community created more and more problems with the lack of water. The community, thus, moved to a new location in 1965. The area was close to a small stream called "Huay Kang", and the new village was named "Huay Kang Village" after the stream.

Even if the war intensified, *the Pha Haen group* could lead their normal life on swidden upland cultivation at Huay Kang for nine years, throughout the period of the war. They also grew opium as medical substance for household consumption.

The war ended in 1974. Few years later, in 1977, political movements of a guerrilla organisation, called *"Chao Fa Group"*, became very active, causing fear and worries among people in remote villages. For security reasons, the population of Huay Kang Village were transferred by the government to an urban area of the District of Muang Nan. They were separately placed at various families in Na Fai Village, adjacent to the district centre. However, being a refugee-group living at the others' home, the villagers from Huay Kang felt uncomfortable, especially they suffered lacking of food.

Because of not having possibility to produce their own food, they had to commute to Huay Kang in order to fetch the remain of agricultural products to supply their living at Na Fai. It had been mentioned by the authority of Louang Prabang Province that food supply from the government be provided for the group of Huay Kang during their stay in Na Fai Village. But, the group said they had never received food supply from any organisation.

After living at Na Fai for about one month and foreseeing more difficulties in the future, the group submitted a request to the government for permission of returning home. After having their request approved by the government, the group of Huay Kang moved back to their upland area, but resettled at a new location called "Pha Haen", about 1.5 km. north-eastern away from Huay Kang. They have been living there until now.

When Pha Haen Village was settled in 1977, there were 52 households living in it By that time, area around the village was dense forest, covering with various species of tree and bamboo. Many kinds of wild animal were found, such as boars, monkeys, gibbons, deer, tigers even bears and boas.

In 1992, half of the total households migrated from the village. The reason was that lots of people died of unknown diseases, and the villagers believed that it was the supernatural power that caused such a disaster.

Among all those moving away:

- sixteen households moved to Tou Ho;
- five households moved to Nong Toke – farther away beyond Tou Ho;
- four households moved to Phou Louang;
- ong household moved to Xaya Bouri.

After the mass migration, only 26 households remained in the village. Numbers of household did not increase until the beginning of 1997. By then, two households of new settlers came to Pha Haen. The first of them came from Haat Maat, and the second one came from Tou Ho.

At present, 28 households are living at Pha Haen. There is no local school in the village. Those children at primary school level have their schooling at the primary school of Pha Kuang Village, the next-door neighbour, down the slope of Pha Haen about 6 km. away.

.

## Time Line – Pha Haen

| *Years* | *Events* |
|---|---|
| At the beginning of 1960s | The *Pha Haen* group lived at Tat Hoy, together with many other groups of different ethnic origin. |
| 1961 | Political instability had occurred. The *Pha Haen* group split into two groups because of non-agreement of political opinions. The group of 11 households with neutral opinion left Tat Hoy and moved to Kieu Lai. |
| 1965 | The *Pha Haen* group at Kieu Lai emigrated to Huay Kang. All together were 35 households. |
| 1974 | The war ended. |
| 1977 | A political guerrilla group, called *"Chao Fa",* was organised, causing troubles both for the villagers living in remote areas and for the government The *Pha Haen* group was transferred by the government to Na Fai Village, close to the district centre of Muang Nan. After one month the goup returned to their upland area, and built up their permanent village named ***Pha Haen.*** |
| 1992 | Some deadly diseases broke out and 26 out of totally 52 households fled the village. |
| 1997 | Twenty eight (28) households lived in the village. |

## PHA KUANG

### *Historical Background*

Pha Kuang is the closest neighbouring village of Pha Haen. All of its inhabitants nowadays are Lao, and are called *"Lao Loum"* by local people, while the Khamu ethnics are called *"Lao Theung"* and the Hmong ethnics are called *"Lao Soung"*. There is no other means but going on foot of reaching Pha Kuang.

Before settling down at the current site of Pha Kuang, people of this village, as well as those of the other villages within Nam Nan Watershed, have moved around for various reasons. Although the village's elders insisted that Pha Kuang had the origin of its settlement history dated back to the end of 1800s, none of them could trace the history back to that origin. According to their memories, the account started from 1963.

At the time, 32 households of the *Lao Loum* people lived at the place which is now called "Old Pha Kuang". It is located few kilometres north of current Pha Kuang Village. The villagers lived very hard-life on their upland agriculture. The area was very dry, and the villagers could get water from a stream nearby the village only during the period of July - November. Besides, they faced a serious problem of heavy malaria disease. In spite of such a hard life, the villagers stayed there, even during the peak period of the civil war. They led their lives at Old Pha Kuang, throughout the 1960s

In the middle of one night in 1971, a gun-fighting between the military force of the war-parties broke out in the village compound, causing five dead and one wounded among the villagers, while many more dead and wounded among those fighting soldiers It resulted in an immediate out-migration of the whole village, 35 households by then. The villagers took refuge in the district centre of Muang Nan. They were separately placed, by the district authority, at different families in Si Boun Hueang Village.

After three months of their being refugees in Muang Nan, the group was provided with a location named "Phone Tan" for their resettlement. While living at Phone Tan, which is currently accommodating the district hospital, the group kept calling their village by the name "Pha Kuang".

On their arrival at Phone Tan in 1972, the Pha Kuang villagers started clearing the forest for building their housing compound and cultivating agriculture crops. However, they found that the agriculture land around Phone Tan did not meet their needs. Some of them were forced to carried out the agricultural activities at other locations.

In 1973, after living at Phone Tan about one year, all 35 households split up and left Phone Tan for various destinations -- depending on where the areas of their agriculture land were located. Those places among their destinations were; Huay Some, Na Nuan, Tha Li,, Nam Phak, and other places.

A group of six households moved to Huay Some. They were joined by three more households in 1974. The members of the hamlet at Huay Some became nine households.

Since the war had been settled, the government encouraged those who had left their villages, during the trouble period of the war, to return to their original villages. An incentive was announced, saying that those who returned to the original villages will obtain the supports for their needs, such as, food and medical supply along with clothings.

The nine households at Huay Some moved back towards the Old Pha Kuang, but settled down at a new location in the adjacent of the old one. The current Pha Kuang village has been existed since then.

In 1975, Pha Kuang received a group of about 10-15 households with Khamu origin. They moved from Huay Hao, a small hamlet, located in the South of Pha Kuang, to Pha Kuang in order to comply with the government's policy of gathering the scattered small hamlets into solid villages.

The primary school of the village was initiated, with the schooling levels of grade 1 and grade 2, in 1976. Since the majority of the villagers were Lao, who traditionally are Buddhist, the village monastery was also initiated in this year. The only monk of the monastery performed his tasks in the village for about two years. Then he quitted the monkhood and returned to Na Nuan, his native village. Since then, the monastery has existed without monk. Whenever the villagers want to perform their religious rites they will have to invite Buddhist monks of any monastery or temple from other places.

Population of Pha Kuang Villageincreased to 30 households in 1977. This year, the villagers experienced another horror, caused by the activities of the *Chao Fa* group. The incident occurred during a trip of the village headman. He was on his way back to the village after a monthly meeting in Muang Nan, when he was kidnapped by the *Chao Fa* group. He was used as their hostage to force the villagers of Pha Kuang to submit all the weapons in the village to them. No violence occurred, anyhow.

In 1992, with technical support of the SCP, a group of villagers started fish-pond activities. At present, there are nine fish ponds in the village. So far, the fish products have been only for household-consumption.

During the last 10 years, 1987-1996, seven households moved out of the village and five households moved into the village. However, some of them were the same households, who moved out, but returned afterwards.

The details of exact years of the in-migrations and out-migrations of the Pha Han villagers have not been available. Only the following details were provided.

For the out-migrations:

- one household moved to take care of their elderly relatives in Pha Nip Village;
- one household moved to Thong Khang Village in search of access to infrastructure;
- two households moved to Pha Liep Village in order to cultivate paddy fields;
- two households moved to Pak Khon Village, their originally native village;
- one household moved to YangVillage for personal reasons.

Concerning the in-migrations:

- two households, who moved to Pha Liep, returned to Pha Kuang because of not having success in their paddy rice cultivation;
- one household, the natives of Pha Liep, followed the two returning households of Pha Kuang;
- one household from Na Nuan came to Pha Kuang to join their relatives;
- one household from Pak Pho, also came to join their relatives.

In 1997, Pha Kuang was inhabited by 40 households.

**Time Line – Pha Kuang**

| *Years* | *Events* |
|---|---|
| 1963 | Thirty two (32) households of *Lao Loum* had already existed in the village of Old Pha Kuang. |
| 1971 | The whole village, 35 households, fled the village because of the fighting between the soldiers of the war parties. The villagers were placed, by the authority of Muang Nan District, at different families in Si Boun Heuang Village. |
| 1972 | The people of Pha Kuang were provided with a new village location at Phone Tan. |
| 1973 | All 35 households deserted the village at Phone Tan, but split up and moved to various destinations. Six households moved to Huay Some, and the rest moved to other places. |
| 1974 | The war was settled. The government encouraged all refugees to return to their original villages. The group of Pha Kuang, living at Huay Some, returned to the original area and built the Pha Kuang village. |
| 1975 | A group of 10-15 households with Khamu origin migrated from Huay Hao to Pha Kuang, complying with the government' s policy of gathering the scattered small hamlets into solid villages. The Khamu group entirely adapted themselves to *Lao Loum* tradition. |
| 1976 | The monastery of the village was established and a primary schooling system was initiated. |
| 1977 | The village headman was kidnapped by the political guerrilla group called *"Chao Fa"*. The group kept him as its hostage and exchanged him with all the weapons existing in the village. |
| 1992 | Fish-pond activities were initiated with technical support by the SCP. |
| 1994 | Land allocation was under way. |
| 1997 | The village accommodated 40 households. |

# PHA TONGLOM

## *Historical Background*

Pha Tonglom is a village of mixed ethnic groups, Khamu ethnic or *"Lao Thoeng"* and Lao ethnic or *"Lao Loum"*. Khamu group is the majority one. The village can be reached by a gravelled road, connected with the main road leading from Luang Prabang Xaya Bouri , About 1-2 km. south of the village, it is the compound of SCP-Research Station.

The first settlers of Pha Tonglom Village were a group of 30 households of Khamu ethnic, coming from Long Nam Sa, a sub-district of Ka Si District in Vientiane Province in 1969. The first stop of the settlers was at Pha Ngam of Xiengern District in Luang Prabang. The group stayed there, and called their village by the name "Pha Tonglom",. until the end of 1971. They cultivate upland rice, maize, and opium, and also raised animals.

At the time, Pha Tonglom Village, was located within a zone of intensive war. In search of a safe shelter, the whole village accompanied a US-supported army group on its way to the army base in Thong Khang, a sub-district of Muang Nan, in 1972. The army let the villagers stay in its compound for one year. Since it was very difficult for the villagers to find a suitable location for their agriculture cultivation, due to both the war and their being new-comers of the place, they had to live on the support from the army.

When the war drew to an end, in 1973, the Pha Tonglom community left the army camp and rebuilt their new village at the deserted old location of Thong Khang Village. The new village was named "Pha Tonglom Village" as it had earlier been. Total inhabitants were divided into 45 households They also practised swidden upland agriculture on the old fallows left by the Thong Khang villagers. Seeds of rice for sowing, 20 kg per labour, were provided by the army.

Few months after the settlement. A mass of people in the village fell ill and died. In spite of that what they called "a bad luck", the population of Pha Tonglom did not leave their village, unlike those in other villages.

By 1988, the authority of Muang Nan declared that the locations of the two villages, Pha Tonglom and Thong Khang, be considered a part of reserved areas within Nam Nan watershed, and suggested that the two villages move to new locations. The community of Pha Tonglom thus moved, in 1989, to resettle at a new location, about 2 km. north of its first location.

The new village, with the population of 65 households, maintained its old name "Pha Tonglom Village". Nonetheless, the villagers still had their agriculture land at the areas around the village's first location, which had always been mentioned as Old Thong Khang. For three times, they had tried to cultivate paddy rice, but not succeeded, because the soil could not retain ground water.

From 1990 to 1997, the in-migrations and out-migrations of the population have been described as the followings.

For the *in*-migrations:

- In 1990, six households of Khamu ethnic came from Thong Khang Village.

- In 1991, the Ban Kang hamlet, which had earlier been a part of Thong Khang Village, was re-demarcated as a part of Pha Tonglom Village. Therefore, its population of 12 households, and all are Lao ethnic, were consequently registered as the population of Pha Tonglom.

- In 1993, four households of Khamu ethnic came from Huay Oun, in search of access to infrastructure.

Regarding the *out*-migrations:

- In 1991, 10 households emigrated to Na Waen to search for paddy land, because the soil in Pha Tonglom was not suitable for cultivating the paddy rice.

- In 1995, 10 households left the village for various destinations and for different reasons as follows;

    - one household moved to the provincial centre of Luang Prabang,
    - one household moved to the relatives in Kasi, a district of Vientiane,
    - one household moved to Huay Sala Village to cultivate paddy fields,
    - one household moved to the relatives in Huay Hoy Village,
    - one household moved to the district centre of Muang Nan,
    - one household moved to the relatives in Xaya Bouri Province,
    - two households moved to Pong Deua Village to cultivate paddy fields,
    - two households moved to the relatives in some other places.

In 1997, Pha Tonglom Village accommodated 67 households. The villagers mentioned that since they first came to this area, in 1973, and have spent their lives here until now, they have never experienced any serious disaster, as those in other villages have. So far, they have led their normal life..

## Time Line – Pha Tonglom

| *Years* | *Events* |
|---|---|
| 1969 | Thirty (30) households of Khamu ethnic built up a village named Pha Tonglom at a slope named Pha Ngam in Xieng Ngeun District of Luang Prabang Province. |
| 1972 | The whole village of Pha Tonglom fled the intensive war in Xieng Ngeun by accompanying a US-supported army group to its base in Thong Khang, a sub-district of Muang Nan District. The villagers were allowed to stay in the army camp. |
| 1973 | The war came to an end, the Pha Tonglom community moved out of the army camp. They rebuilt their new village, maintaining the named "Pha Tonglom", at the deserted old location of Thong Khang Village. |
| 1989 | Since the location of the village had been declared to be a reservation area of Nam Nan watershed, Pha Tonglom Village was moved to a new site, where it has been situated until now. The site is very close to the location of the old army camp. |
| 1994 | Land allocation was under way. |
| 1997 | The village had 67 households living in it. |

# THA LI

## *Historical Background*

Thali Village or Ban Thali is a village of Lao Loum ethnic group, located about 4 km. away from the main road, leading from Luang Prabang to Xaya Buri. and can be accessed by a gravelled road.

The history of the village started in early 1900s. Although the villagers insisted that this village had existed since many decades earlier than that, neither of them knew about the earlier episode of the village history. They could only confirm that before the settlers were satisfied with the living area, they had moved around to settle and resettle for some times.

Mr Vanna, a former village headman who was born in 1919 at Tha Li Village, described that his parents moved, in a group of six families, to this village before he was born. They came from a village named Nam Xueang, in Pak Xaeng District of Luang Prabang Province. By then, this village was located at a place called "Wang Hok" in very dense forest area.

Shortly afterwards, four other families from Nam Xueang joined the first group. Then the hamlet of Wang Hok was inhabited by 10 households. They lived on swidden upland agriculture, growing rice and some vegetables for their subsistence.

After living at Wang Hok for three years, the group moved to settle at a new place called "Tat Li", about 500 m. north of Wang Hok, because it was closer to "Thali,", the area of their agriculture land. They stayed at Tat Li for about two years, then they found that it would be most suitable for them to settle down at Thali where they had their agriculture land. Therefore they left Tat Li for resettling at Thali, and named the village after the name of that place.. Since then, they has had their permanent village..

In 1929, the population of Tha Li Village had grown into a number of 28 households. The only neighbouring village of Tha Li,, at the time, was Pha Kwuang Village with the population of about10-15 households. By the end of 1929, four households from Ban Na Some, a village situated about 4 km. south-west of Tha Li, migrated to Tha Li, and made the population increased to 32. Households. They grew rice, maize, tobacco, melon, and some species of vegetable.

Most of the Lao Loum ethnics are Bhuddhist, and traditionally always have a monastery within or in the vicinity of their permanent living area. Regarding the tradition, a monastery has been established in this village, and named after the village as "Tha Li Monastery" or *"Wat Tha Li",* since some time in 1920s. Apart from its religious function and social function -- as the village's forum -- the monastery also has an educational function. Since there was no official schooling at that time, the children was taught to read and write by Bhuddhist monks of the monastery, and therefore, only the boys could have opportunity to become literate.

The village was inhabited by 37 households in 1936. In this year, some of the villagers started paddy rice cultivation as an experiment after having studied a successful pattern of the cultivation at a neighbouring village named "Na Fai", located close to the district seat of Muang Nan. After one year of paddy rice cultivation, the villagers realised that the yields they obtained from their paddy fields were only half of those yields they used to gain from the upland rice cultivation. The paddy fields were thus left idle for this reason, and the swidden upland agriculture was taken up at full scale.

In spite of gradual increase of swidden upland agriculture, the forest in the area was still dense, composed of various tree species and inhabited by many kinds of wild animal, especially monkeys and tigers. It was said that the last tiger was seen in 1953.
.
The annual yields of upland rice in 1959 were found decreasing. Therefore, paddy rice cultivation was taken up again.

In 1961, a fire broke out at Pha Nip Village, which was situated by the main road. The whole village was burnt down, and its population scattered. Ten households moved to Tha Li,, adding up population of the village to 47.households.

Two years later, in 1963, a local school, with schooling levels up to grade three, was established in the village.

During 1965-1969, the period of intensive civil war, the people of all villages within Nam Nam watershed but those of Tha Li Village had to desert their village for security matters. The people of Tha Li, could remain staying in their village, leading rather normal lives and welcoming five households from Pha Kuang who came to take shelter at Tha Li. The village had then 52 households. As the matter of fact, Tha Li Village, as well as other villages in the rural areas, was disturbed by the two fighting parties. However, a neutral strategic policy was set up by the village headman and his committee, and the whole village strictly followed it. The villagers helped protect the members of their village who deserted the fighting areas, by hiding them somewhere in the jungle with food supply. In the meantime, they also supplied both parties of the war with provisions, whenever each of the parties came to the village with its demand. These strategies helped the villagers of Tha Li manage all critical situations throughout the war.

In 1970, peanut cultivation was introduced at this village, mainly because of its good price at the time rather than the villagers' idea of improving soil conditions.

By 1975, after the war was settled, there were 95 households living in Tha Li Village.

In 1983, the village's local school was developed into the complete primary-schooling system, with a 5-year curriculum.

Since paddy fields required much supply of water, it meant that an irrigation system was also required. An indigenous irrigation channel was, therefore, started being built

in 1986 by the villagers, in order to bring water from Nam Nan to irrigate the paddy fields. It became in function in 1989.

Between 1990-1991, the SCP made a feasibility study on providing a permanent irrigation system for the paddy fields of the village. Consequently, in 1992, the Village Committee submitted a proposal, on constructing a permanent weir and a reservoir for irrigating the paddy fields, to the SCP. A fund of 56 million Kips was then granted by the SCP in 1993.

In 1994, a gravelled road, supported by SCP, reached the village. The road is a very significant factor of the development of the village. The villagers can now gain benefits from market information more than they have done before the era of the access to the road. Those families who want their children to continue their schooling, after finishing the primary level at Tha Li, can encourage the children to pursue their further education in any larger neighbouring village or in the district.

As the result of access to the road, the cultivation of cotton and mungbeans was started in 1995 by suggestions of some middle men. So far, the villagers have had to be dependent on middle men, because their products have not yet been much enough for greater investment in buying or leasing any transport to bring the agricultural products to the market place.

In 1997, the village had 128 households living in it.

**Time Line – Thali**

| *Years* | *Events* |
|---|---|
| Around the year of 1900 | The first settlers of 6 households arrived at Wang Hok.. |
| Prior to 1920s | Numbers of settler increased to 10 households. They moved to Tha Li, and set up a permanent village. A Buddhist monastery of the village was established . |
| 1929 | Population increased to 28 households. |
| 1936 | Thirty-seven (37) households living in the village. Paddy rice was cultivated as an experiment, but the yields were not satisfactory. Consequently, the paddy fields were left idle. |
| 1953 | The last tiger was seen. |
| 1959 | Paddy rice cultivation was resumed. |
| 1961 | Pha Nip Village was completely burnt down, and 10 households migrated to Tha Li. Population increased to 47 households. |
| 1963 | Local school with 3-year schooling was established. |
| 1965-1969 | Intensive civil war, 52 households living at Tha Li.. |
| 1970 | Peanut was cultivated. |
| 1975 | The war had ended, Tha Li has 95 households |
| 1983 | The local school was developed into a complete primary schooling system, with a 5-year curriculum. |
| 1986 | Indigenous irrigation canal was built. |
| 1989 | The canal started its function. |
| 1990-1991 | SCP made a feasibility study on irrigation system. |
| 1994 | Land allocation was under way. The village was reached by a gravelled road. |
| 1995 | Cotton and mungbeans cultivations were started. |
| 1997 | There were 128 households living in Thali. |

## THONG KHANG

### *Historical Background*

Thong Khang, as well as Pha Tonglom, is a village of mixed ethnic groups, Khamu and Lao. The majority is Khamu. Housing compound of the village is adjacent to the SCP-Research Station. The village has access to a gravelled road. Water resources for household consumption are available all year round, even if it is not as convenient during the dry season as it is during the other seasons of the year.

No one knows exactly when Thong Khang Village, or *Ban Thong Khang*, was established. However, it was assured by the elders that this village has existed since the period prior to the 1950s.

As far as the elders' memories are concerned, the first group of settlers was a group of 47 households of Khanu ethnic, with a leader named Mr. Ngiang. The location where they first settled is now called "Old Thong Khang".

In 1953, the leadership was over-taken by Mr Saen Si, and 67 households were living in the village. All households, but one, lived on upland agriculture. The only household that both practised upland agriculture and cultivated paddy fields was Mr Saen Si's family. It was mentioned that the village at the time was surrounded by dense forest, being composed of various species of trees and plants. In addition, many kinds of wild life, such as tigers, monkeys, gibbons, deer, wild pigs, snakes, and birds were seen.

By 1957, political instability of the country was underway. However, it did not affected daily life of the villagers at Thong Khang.

The villagers led their lives as usual until 1967. This year, 19 families from Huay Oun moved to Thong Khang. Shortly afterwards, a mass of people in the village fell ill and died. With their belief in super-natural power, the whole village of 86 households moved to a new site, which is now locally called "Thong Khang Two".

"Thong Khang Two" was the location of Thong Khang Village until the end of 1968. Then a fighting, between the US-supported soldiers and the soldiers of Pathet Lao, broke out, bombing from the planes and firing on the ground.

Feeling unsafe, 34 households of the villagers, including those 19 households of the new-comers from Huay Oun, fled the village into the jungle, in 1969. The remaining 52 households moved to Khon Sok., where they added up the number of 17 existing households to 69 households.

In 1971, a US-supported army group was stationed in the vicinity of Thong Khang Village. During this period, the first household of Lao ethnic came to Thong Khang.

In the following year, 1972, six households of Huay Oun people, among those who had fled into the jungle, were picked up and transferred to Khon Sok Village by the

soldiers of the US-supported army, making the inhabitants of Khon Sok increase to . us 75 households.

A gravelled road, leading from the main-road to the army camp was built in 1973.

In 1975, after the end of the civil war, the villagers of Khon Sok dispersed as follows:

- 56 households moved to Thong Khang and rebuilt the new village called "Thong Khang Three" which later became the location of the current Thong Khang Village
- eight households moved to Huay Hao;
- six households of Huay Oun returned to their village;
- five households moved to Huay Long.

During the same period, 27 households of Hmong ethnic moved to "Thong Khang Three", but settled in the northern part of the village and had their own administration. They lived on swidden upland agriculture, growing rice and maize.

In 1976, a group of 42 households of Khamu ethnic immigrated from Na Muang, to join their relatives in Thong Khang, adding up the population to 98.households.

The second households of Lao ethnic came to Thong Khang in 1981.

In 1989, the authority of Muang Nan announced that the location of Thong Khang Village be declared a part of Nam Nan watershed and the village be suggested to move. Complying with the suggestion, the villagers of Thong Khang moved to the fourth location called "Ban Kang", about 1 km. away from the present village, in the direction of Pha Tonglom Village. As for the Hmong community of 32 households, they moved farther away to Phou Luang in Chom Phet District of Luang Prabang Province.

After one year living at Ban Kang, a mass of people in the village fell ill and died of unknown diseases, often a sudden dead. Once again, with traditional belief in super-natural power, the villagers decided to flee their village. In the meantime, they made a request to the District of Muang Nan for returning to the location of "Thong Khang Three". While waiting for the response, 29 households moved to Na Nuan.

When the district authority approved the request in 1990, 63 households returned to "Tong Khang Three", which is the current location of Thong Khang Villge. The other seven households remained living at Ban Kang, which was later registered as a hamlet of Pha Tonglom Village.

Land allocation process began in 1994 and physically finished in 1995, but documents of the tenure-right is still in the handling process. Also in 1995, four households moved to their relatives in Na Waen, only 59 households remained at Thong Khang.

At the beginning of 1997, Thong Khang accommodated 68 households. Among them, only nine households are Lao ethnic or *"Lao Loum"*.

## Time Line – Thong Khang

| *Years* | *Events* |
|---|---|
| Prior to 1950s | Forty seven (47) households of Khamu ethnic or *Lao Toeng* lived in the first location of Thong Khang village. |
| 1953 | The second village headman was selected. |
| 1967 | A mass of people fell ill and died of unknown diseases. With their belief in super-natural power, the whole village deserted the location and built a new village at another site. It was locally called "Thong Khang Two". |
| 1968 | The civil war intensified. Fighting between the soldiers of both parties broke out in the area of Thong Khang. |
| 1969 | The villagers of Thong Khang split up into two groups, and both groups fled the village. One group sought shelter in the jungle, another group moved to Khon - Sok Village. |
| 1971 | A group of US-supported army stationed in the area of Thong Khang. Also in this year, the first household of Lao ethnic or *Lao Loum* immigrated to Thong Khang Village. |
| 1972 | Six households of Khamu ethnic, among those who fled to the jungle were picked up, by the soldiers of the US-supported army, and transferred to Khon Sok village. |
| 1973 | A gravelled road,leading from the main-road to the army camp, was constructed. |
| 1975 | The war was ended. A group of Hmong ethnic or *"Lao Soung"*, totally 27 households, moved to settle down in the northern part of Thong Khang Village and had their own administration, separated from the main village. |
| 1981 | The second household of Lao ethnic arrived at Thong Khang. |

| | |
|---|---|
| 1989 | The location of Thong Khang Village was declared a reservation part of Nam Nan watershed. The village was suggested to move to another location. Thong Khang Village was, again, rebuilt at the third location, named Ban Kang, but locally called "Thong Khang Four". At this occasion, the Hmong community left Thong Khang for Chom Phet, another district of Luang Prabang Province. |
| 1990 | A mass of people fell ill and died of unknown diseases. The villagers' request for returning to the "Thong Khang Three" was approved by the authority of Muang Nan, and the current village has been settled since then. |
| 1994-1995 | Land allocation was granted, but the tenure-right was still in handling process. |
| 1997 | Totally 68 households were living in the village. Among them, only nine households of *Lao Loum.* |

## TOU HO

### *Historical Background*

Tou Ho is among those young villages within Nam Nan water catchment area. It is a White Hmong community of animism tradition. Its historical settlement began at a place named "Tat Hoy", where various groups of different ethnic groups had been living together, Hmong groups and Khamu groups alike.

Two households of Hmong ethnic moved from Lang Thaen Village, in 1945, to Tat Hoy, where they had their relatives. This area is located outside Nam Nan wathershed, north-east of the current site of Tou Ho Village. There were more than 100 households living in the same area until the middle of 1950s.

Later, the people living at Tat Hoy gradually split up and moved away for different reasons, including the belief in supernatural power. In the end, only seven households of Hmong ethnic remained at Tat Hoy.

Feeling isolated, all seven households left Tat Hoy in 1957 for a new location named "Toup Ho", which was also outside the Nam Nan catchment. At Toup Ho, they joined the existed 20 Hmong households, and added up the population of Toup Ho to 27 households. The members of Toup Ho Village had their upland agricultural area at another location, called "Na Nou". (The location of "Na Nou" is unclear!)

The civil war between the Royalist and the Phatet Lao parties broke out in 1964, causing the villagers feel unsafe. During that period, 30 households were living at Toup Ho. In search of more secure place to live at, the whole village moved to Saen Kalok Village in Muang Khai, another district of Luang Prabang Province. After living there for two months, the Toup Ho group moved again. This time, they settled down at a place named "Huay Chia", about 20 km. from the current site of Tou Ho Village, and lived there for two years.

During the peak period of the civil war, in 1966, the population of Huay Chia Village were disturbed by the consequence of the war. As a result, most of the villagers fled Huay Chia, and only seven households remained.

In 1972, a negotiation between the two parties was put into the process. Finally, an agreement was signed in 1973. Shortly afterwards, the seven remaining households at Huay Chia returned to their deserted area at Tat Hoy.

Between 1974--1975, four Hmong households moved from Xaya Bouri to Tat Hoy, adding up the population to 11 households. In 1975, all of them left Tat Hoy for Huay Long, an area outside Nam Nan watershed) in order to carry out paddy rice cultivation. They considered that the paddy rice cultivation offered them more relaxed and more comfortable life than the upland cultivation did.

During the period of 1975-1976, four other Hmong households, who return from their refuge, joined the Hmong group at Huay Long.

From 1976 to 1977, all of the Hmong group at Huay Long , 15 households, successively moved to Huay Oun.

At Huay Oun, a Khamu group had already existed when the Hmong group arrived.. However, the two groups stayed in separate corners of the area and each group had its own administration. Different cultures and traditions, naturally, caused inconvenient circumstances for both groups. The Hmong group thus moved, in 1978, northwards to the upper slope, where they have been living until now. They named the village "Tou Ho" resembling "Toup Ho", their old living area. Consequently, Toup Ho is now called "*Old* Tou Ho". These 15 households have been considered the core group of Tou Ho Village.

In the meantime, a guerrilla organisation called *"Chao Fa"*, of which members are Hmong ethnic, had given up. A group of former members of the *"Chao Fa"*, consisting of 45 households, was placed by the Government at Tou Ho Village. The village then had 60 households. However, the village headman was selected from the core group.

Living at a high elevation of Tou Ho, the villagers faced a serious problem of lacking water supply. They had to walk about 30 minutes to reach the nearest well. Even worse, during the dry season, they had to spend the time in fetching water at the well as long as 2 hours.

Although, in 1978, the United Nations Organisation provided Tou Ho Village with a simple pipe-water system, the capacity of the system could not cover the need of the villagers. The villagers still had to go and fetch water from the old well.

In 1984 , a mass of out-migration occurred as the followings:

- 13 households, who wanted to cultivate the paddy rice, moved to Huay Long (in 1997, seven out of those 13 households have already owned paddy fields);
- 17 households moved to Huay Sai District of Bo Kaew Province in search of prosperity they have heard from some rumours;
- four households moved to Muang Khai, another district of Luang Prabang Provinc, for political reasons;
- three households moved to their relatives in Xaya Bouri Province;
- four households moved to their relatives in Thailand, and furthered to the USA;

After this mass migration, only 19 households remained at Tou Ho.

In 1990, some of those migrated from Tou Ho Village in 1984, returned to the village as follows;

- four out of those17 households, who moved to Huay Sai, made their return because they did not experience any prosperity at HuaySai as they had expected;

- four households, who moved to Muang Khai, returned to Tou Ho with one additional household of their relatives.

Including the nine returning developed it could sufficiently supply the village households, Tou Ho had 28 households in 1990. Also in this year, the capacity of pipe water of the village was developed by the assistance of the SCP. Since then, the villagers have had enough water for their household consumption.

In 1991, a mass of people in Pha Haen Village, another Hmong community, fell ill and died. The villagers of Pha Haen regarded the disaster as a bad luck affected by supernatural power. Many pwople fled Phahaen. Among them, 27 households moved to Tou Ho and added up its inhabitants to 55 households.

Land allocation process atTou Ho, as well as that at its neighbouring villages, took place in 1994. In the meantime, the locally schooling activities was developed into an initial stage of primary-schooling system, up to the level of grade 4. Two years later, in 1996, the complete system of 5-year-curriculum primary school was put into function. At this stage, 62 households were living in the village.

At the beginning of 1997, two small groups migrated from Tou Ho;

- the first group of three households moved to their relatives in other districts;

- the second group, also with three households, left the village for personal reasons.

In March 1997, Tou Ho was populated by 56 households.

**Time Line – Tou Ho**

| *Years* | *Events* |
|---|---|
| 1945 | Two households of White Hmong arrived at Tat Hoy, where more than 100 households of different ethnic groups were living. |
| In the middle of 1950s | Most of the people deserted Tat Hoy. Only seven households of a Hmong group remained |
| 1957 | The 7 remaining households left Tat Hoy for Toup Ho, joining the 20 other households who were living there. |
| 1964 | Civil war broke out. All 30 households, living at Toup Ho, deserted the village to seek shelter at Huay Chia and later settled down there. |
| 1966 | The war intensified, and most of the population fled the village. Only seven households remained. |
| 1972 | A negotiation between the fighting parties was put into process. |
| 1973 | An agreement was signed, leading to the end of the war. The seven households at Huay Chia returned to Tat Hoy, and later reunited with four other households. |
| 1975 | The re-united group of 11 households moved from Huay Chia to live at Huay Long in order to cultivate paddy rice. At Huay Long, they re-united with four more Hmong households. |
| 1977 | All 15 re-united households left Huay Long for Huay Oun, where the Khamu ethnic group had already existed. |
| 1978 | The Hmong group left Huay Oun, and settled at a higher slope. They named the village "Tou Ho". The United Nations Organisations provided the village with a simple pipe-water system |
| 1984 | Solely 19 households, of totally 60 households, remained at the village. The rest moved away for different reasons |

| | |
|---|---|
| 1990 | Nine households, among those migrated in 1984, returned to Tou Ho. The water system was properly developed. |
| 1991 | Some deadly diseases caused many deads in Pha Haen Village, and the villagers believed that it was caused by supernatural power. Consequently, 27 households moved to Tou Ho. |
| 1994 | Land allocation was under way. |
| 1996 | There were 62 households in the village. A local primary school was established. |
| 1997 | Six households, who once left Tou Ho, returned and added up the population of Tou Ho to 56 households. |

# Annex D

# Upper Nam Nan Water Catchment Area
# 1900 -1997

## Population development (D1)
## Causes of migration (D2)
## Sources of information (D3)

Annex D1

**Village households settled within the Upper Nam Nane Water Catchment Area:**

| Year | Thali | P.Kuang | P.Haen | TouHo | H.Oun | PTL | BTK | Total |
|---|---|---|---|---|---|---|---|---|
| 1900 | 6 hh | (0) | 0 | 0 | 0 | 0 | 0 | 6 hh |
| 1925 | (25 hh) | (10 hh) | 0 | 0 | 0 | 0 | 0 | 35 hh |
| 1950 | (35 hh) | (20 hh) | 0 | 0 | 3 hh | 0 | 60 hh | 118 hh |
| 1951 | | | | | 3 hh | | | |
| **1953** | **(40 hh)** | **(22 hh)** | **0 (**)** | **0** | **(6 hh)** | **0** | **67 hh** | **135 hh** |
| 1955 | | | | | | | | |
| 1957 | | | | 27 hh | | | 86 hh (?) | |
| 1959 | | | | | | | | |
| 1961 | 52 hh | | 11 hh | | | | | |
| 1963 | | 32 hh | | | 20 hh | | | |
| 1965 | | | 35 hh | 30 hh | 18 hh | | | |
| 1966 | | | | | 6 hh | | | |
| **1967** | **(60 hh)** | **(35 hh)** | **(35 hh)** | **0** | **0** | **0** | **86 hh** | **216 hh** |
| 1968 | | | | | | | | |
| 1969 | 65 hh | | | | | | 69 hh | |
| 1970 | | | | | | | | |
| 1971 | | 35 hh | | | | | | |
| 1972 | | 0 | | | | 30 hh | 75 hh | |
| 1973 | | 0 | | | | | | |
| 1974 | | 9 hh | 52 hh | | | | | |
| 1975 | **95 hh** | **20 hh** | **(53 hh)** | **11 hh** | **7** | **(35 hh)** | **83 hh** | **304 hh** |
| 1976 | | | | 15 hh | | | 125 hh | |
| 1977 | | 30 hh | | | | | | |
| 1978 | | | | | | | | |
| 1979 | | | | | | | | |
| 1980 | | | | | | | | |
| 1981 | | | | | | | | |
| **1982** | **(100 hh)** | **(32 hh)** | **(55 hh)** | **(58 hh)** | **(25 hh)** | **(50 hh)** | **(130 hh)** | **450 hh** |
| 1983 | | | | | | | | |
| 1984 | | | | 60 hh | | | | |
| 1985 | | | | 19 hh | | | | |
| 1986 | | | | | | | | |
| 1987 | | | | | | | | |
| 1988 | | | | | | | | |
| **1989** | **(108 hh)** | **(35 hh)** | **(55 hh)** | **(19 hh)** | **40 hh** | **65 hh** | **(135 hh)** | **457 hh** |
| 1990 | | | | 28 hh | | | (68 hh) | |
| 1991 | | | | 55 hh | | | | |
| 1992 | | | | | 32 hh | | | |
| 1993 | | | | | | | | |
| 1994 | | | (57 hh) | | | | | |
| 1995 | | | | | | | | |
| **1996** | **126 hh** | **39 hh** | **29 hh** | **62 hh** | **32 hh** | **72 hh** | **62 hh** | **422 hh** |
| 1997 | 128 hh | 42 hh | 27 hh | 56 hh | 34 hh | 70 hh | 66 hh | 423 hh |

*(**) Note: Pha Haen had their agriculture area within the watershed years before settling there*

**Identified reasons for moving:**

| *Local cause (villagers initiative):* | *External causes and initiatives:* |
|---|---|
| 1. Mass-disease and superstition | 6. War insecurity |
| 2. Agriculture | 7. GoL declared end of war and encourage people to return home |
| 3. Village site, water | 8. Government policy |
| 4. Join relatives | 9. Political reasons |
| 5. Achieve better infra structure | 10. Other reasons. |

**Result of analysis:**

| Reason | Year | Village | No of Households | Share of the village (when major) | Comments |
|---|---|---|---|---|---|
| 1 | 1963 | Huay Oun | 20 | whole | |
| 1 | 1965 | Huay Oun | 20 | whole | |
| 1 | 1967 | Thong Khang | 86 | whole | |
| 1 | 1990 | Thong Khang | 92 | almost whole | |
| 1 | 1992 | Pha Haen | 26 | half | |
| Mass disease and superstition : 244 house holds occasions | | | | | |
| 2 | 1977 | Pha Haen | 52 | whole | Too poor conditions in the new place |
| 2 | 1973 | Pha Kuang | 35 | whole | Too poor conditions in the new place |
| 2 | 1987-96 | Pha Kuang | 3 | | Try start paddy cult. Two of the families moved twice |
| 2 | 1991 | Pha Tonglom | 10 | | Try start paddy cult. |
| 2 | 1995 | Pha Tonglom | 3 | | Try start paddy cult. |
| 2 | 1910-15 | Thali | Around 10 | whole | move closer to agriculture land |
| 2 | 1910-15 | Thali | Around 10 | whole | move closer to agriculture land |
| 2 | 1975 | Tou Ho | 11 | | Try start paddy cult. |
| 2 | 1978 | Tou Ho | 15 | whole | too close to another village |
| 2 | 1984 | Tou Ho | 13 | | Try start paddy cult. |
| 2 | | Tou Ho | 17 | | Rumors of better life in another province |
| 2 | 1990 | Tou Ho | 4 (in) | | Returnees from the other province |
| Agricultural conditions : 183 household occasions | | | | | |
| 3 | 1965 | Pha Haen | 35 | whole | Not enough water when village grew bigger |
| Village site, water conditions: 35 household occasions | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 1987-96 | Pha Kuang | 5 | | Join or take care of relatives |
| 4 | 1995 | Pha Haen | 5 | | |
| 4 | 1976 | Thong Khang | 42 (in) | | "join relatives" (check reason !) |
| 4 | 1995 | Thong Khang | 4 | | |
| 4 | 1945 | Tou Ho | 2 | | |
| 4 | 1984 | Tou Ho | 7 | | Of whom 4 hh moved abroad |
| 4 | 1997 | Tou Ho | 3 | | |
| Join relatives : 68 household occasions | | | | | |
| 5 | 1995 | Huay Oun | 1 | | Moved to Pha Tonglom by the road |
| 5 | 1987-96 | Pha Kuang | 1 | | Moved to Thong Khang by the road |
| 5 | 1993 (in) | Pha Tong Lom | 4 | | (check why differs from Huay Oun info!) |
| 5 | 1992 | Pha Tong Lom | 2 | | Moved to M. Nan and to LP town resp. |
| Better infra structure : 8 household occasions | | | | | |
| 6 | 1966 | Huay Oun | 17 | | Pressure from parties at war, 6 hh moved to Khonsokand 11 hh "scattered" |
| 6 | 1961 | Pha Haen | 31 | | Tried to stay out of war conflict, 11 hh moved first, the other 20 moved gradually |
| 6 | 1977 | Pha Haen | 52 | whole village | Unrest caused by guerilla, ordered by Govt to move to town |
| 6 | 1971 | Pha Kuang | 35 | whole village | Had to flee when outsiders assaulted the village |
| 6 | 1972 | Pha Tonglom | 30 (in) | whole village | In search of shelter from ar the village joined army groupers to Thong Khang |
| 6 | 1965-69 | Thali | 5 (in) | | Group from Pha Kuang came in search for shelter |
| 6 | 1967 | Thong Khang | 19 | | From Huay Oun |
| 6 | 1969 | Thong Khang | 86 | whole village | 34 hh fled to the jungle, 52 hh moved to Khonsok |
| 6 | 1972 | Thong Khang | 6 | | "Caught in the jungle by the army " and moved to Khonsok |
| 6 | 1964 | Tou Ho | 30 | | |
| 6 | 1966 | Tou Ho | around 20 | | |
| War and insecurity: 331 house hold occasions | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 7 | 1976 | Huay Oun | around 20 | whole village | |
| 7 | 1974 | Pha Kuang | 9 | | |
| 7 | 1974 | Pha Kuang | 10-15 (in) | | From Huay Hao - Govt policy to gather small hamlets |
| 7 | 1973 | Pha Tonglom | 30 | whole village | war ended, no need for army protection |
| 7 | 1975 | Thong Khang | 75 | | Returnrrs from Khonsok, jungle.. |
| 7 | 1975 | Thong Khang | 27 (in) | | Arrival of Hmong hamlet |
| 7 | 1973 | Tou Ho | 7 (in) | | |
| 7 | 1974-75 | Tou Ho | 4 (in) | | |
| 7 | 1976 | Tou Ho | 4 (in) | | |
| End of war, government declaration and incentives to return home : 188 household occasions | | | | | |
| 8 | 1989 | Huay Oun | 28 | Main part of the village | Complied with policy of GoL to resettle people in the uplands |
| 8 | 1989 | Huay Oun | 12 | | Disagreed with GoL policy, but moved in another direction |
| 8 | 1992 | Huay Oun | 32 | whole village | Compromise following negotiation by the GoL |
| 8 | 1988 | Pha Tonglom | 65 | whole village | GoL established protected area |
| 8 | 1989 | Thong Khang | About 100 | whole village | GoL established protected area |
| 8 | 1989 | Thong Khang | 32 | whole Hmong hamlet | GoL established protected area |
| Government policy : 269 household occasions | | | | | |
| 9 | 1978 | Tou Ho | 45 | | |
| 9 | 1984 | Tou Ho | 4 | | |
| Political reasons : 49 household occasions | | | | | |
| 10 | 1987-96 | Pha Kuang | 1 | | |
| 10 | 1990 | Pha Tonglom | 6 | | |
| 10 | 1991 | Pha Tonglom | 12 | | group living in the Ban Kaeng hamlet transferred from Thong Khang village |
| 10 | 1961 | Thali | 10 | | Homeless when fire in another village |
| 10 | 1977 | Tou Ho | 15 | whole village | moved to Huay Oun |
| Other reasons : 44 household occasions | | | | | |

Annex D3

**Village and District representatives providing information for the study of Nam Nan Water Catchment Area in February-March 1997:**

| | | |
|---|---|---|
| 15/2 | (Pha Tong Lom): | Mr Khammuane, extensionist |
| 16/2 | (B. Thong Khang): | Mr Bounphaeng, Village Headman |
| 17/2 | (Pha Tong Lom): | Mr Khammuane, extensionist |
| 19/2 | (Muang Nan): | Mr Khamkhanh, Head of District |
| | | Mr Seng Thanongsak, Deputy Head of District |
| | | Mr Xieng Pheng, Head of District Agriculture and Forestry Office |
| 20/2 | (Tou Ho): | Mr Viengporn (former village headman) |
| 21/2 | (Tou Ho): | Mr Phetsavorn (Deputy Village Headman) |
| | | Mr Boonsai (village security staff) |
| 22/2 | (Houey Oun): | Mr Lee, Village Headman |
| | | Mr Phaeng, Deputy Village Headman |
| 25/2 | (Muang Nan): | Mr Khamkhanh, District Chief |
| 26/2 | (B. Thali): | Mr Titchan Bounsili (former village headman) |
| | | Mr Xieng Samphan Sifan (Deputy Village Headman) |
| | | Mr Boa Hongvilayphan (extensionist) |
| | | Mr Wong Wangsouk (village security staff) |
| 27/2 | (B. Thali): | Mr Xieng Phanh Vongpachan (Member of the Village Committee) |
| 28/2 | (B. Thali): | Mr Xieng Phanh Vongpachan |
| 4/3 | (Pha Kuang): | Mr Cham (village elder) |
| 5/3 | (Pha Kuang): | Mr Phoey (Deputy Village Headman) |
| 6/3 | (Pha Haen): | Mr Chang Cuu Loo (sr) |
| | | Mr Yaa Vuu (extensionist) |
| | | Mr Kam Mua (former village headman) |
| | | Mr Lau Yua Vuu (former village headman) |
| | | Mr Pati (village elder) |
| 7/3 | (Pha Haen): | Mr Wada (Village Headman) |
| | | Mr Bi (former village headman) |
| 8/3 | (Tou Ho): | Mr Phetsavorn (Deputy Village Headman) |
| | | Mr Bi (Village Committee Adviser) |
| | | Mr Sisomphorn (Village Committee Member) |
| | | Mr Viengphorn (former village headman) |
| | | Mr Lau Laa (village elder) |
| 9/3 | (Tou Ho): | same persons as 8/3 |
| 11/3 | (B. Thong Khang): | Mr Bounphaeng, Village Headman |
| 12/3 | (B. Thong Khang): | Mr Bounphaeng, Village Headman |
| | | Mr Mau, Deputy Village Headman |
| | | Mr Bounmi, village elder |
| | | Mr Xieng Phoey, village elder |
| 13/3 | (Pha Tong Lom): | Mr Hing (former village headman) |
| | | Mr Waan Yai (village elder) |

14/2-13/3: Mr Wandee Panyachack (SCP research staff. During 1981- 1991, he was the head of the sub-district covering the whole study area).

# Annex E

# Methodology and design of field work in relation to the use of aerial photos

*Methodology and design of field work in relation to the use of air photos (extract of field manual)*

B1 Sampling design

In total, 30 interpreted photos cover the watershed area. On those photos five different land use categories are delinetated and every delineated area (compartment) is given a number. In addition, there are areas on the photos belonging to other land use categories, which are not delineated or classified in detail.

On each delineated photo, five (5) sampling points and three (3) areas interpreted as cultivated in 1995 are allocated. The sampling points are allocated in a systematic pattern covering the entire watershed area. The allocation is made by superimposing a transparent overlay, on which five points have been drawn, on top of each photo (see figure 1). Actually, the "photo" in the figure only represents that inner part of the entire photo, in which delineation has been made. After that, the cultivated areas most closely situated to point 1,2 and 3 are selected as the cultivated upland areas to be sampled.

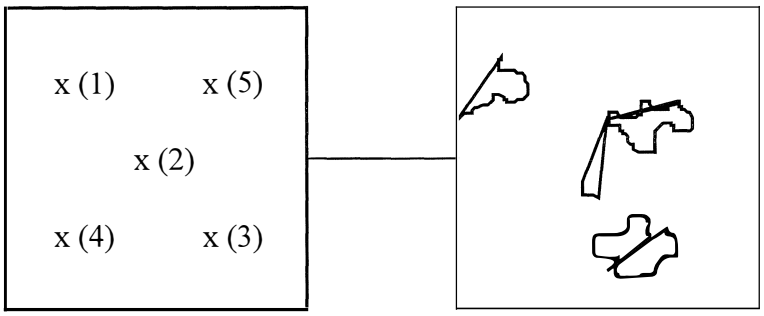



Figure 1: The location of the sampling points (Nos 1,2,3,4 and 5) on each photo and the way they are transferred from the overlay to the photo.

As mentioned above, two types of sampling units are identified:

The *sampling point* itself. On that point the photo interpretetion is carefully checked in the office. After that the interpretation is confirmed in the best possible way during field visit. It is *not* necessary to visit the exact location of the sampling point in the field (unless it co-incides with "nearest hay"), but only a place where it is possible to verify the land use in the sampling point (i.e. a nearby hill). Village representatives should be asked for help to clarify the land use and also to describe the land use history and the prospected future land use in each sample point location. The information is recorded on Sheet B1.

The nearest swidden or "*nearest hay"*. The compartments classified as "hay 95" being most closely located to each of the sampling points No 1,2 and 3 are named "nearest hay". Those compartments shall be visited in the field jointly with a representative of the concerned village, and their cultivation history verified and recorded on the field form (Sheet B2). If other information is obtained in the village (i.e that a certain field was not cultivated the year interpreted by NOFIP), it is still the classification made at NOFIP which is used as a base for selecting what fields to visit.

In some cases the sampling point may co-incide with the "nearest hay". In other cases the "nearest hay" of two sampling points might co-incide, in the latter case the swidden which is second nearest shall be selected.

In the outer boundaries of the watershed area, where only a part of the photo has been delineated, only sampling points inside the watershed are considered.

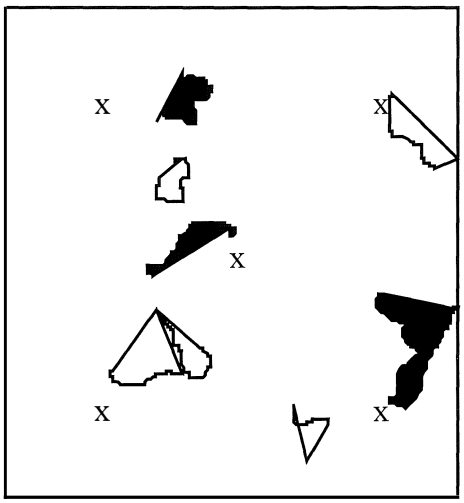



Figure 2: Photo with delineated swidden fields, and sampling points (x). The sampled swidden fields ("nearest hay") have been indicated with black colour.

As a result of the sampling some 75 sampling points and about 45 "nearest hay" fields will be be selected for field verification.

## B2 Classification of swidden fields ("nearest hay) during field verification

Concerning the classification of swidden fields all activities should be recorded in chronological order.

*The most important informationconcerns activities taken place during 1995.* In this study, "during 1995" is defined to be from February 1995 to February 1996. In other words such activities that should be most easily detectable on the photo.

It is also important to record such information as,

- if only part of an area has been cultivated
- if areas have been burnt unintentionally
- what crop was grown
- intended future land use

All activities in the latest 50 years are of interest but special attention should be given to the last 5-6 years period or the latest two cultivations. If not possible to determine every years activities, priority is given to identifying the years when the field was cultivated.

B3 Changes and complementary additions to the photo interpretation

The delineation made at NOFIP prior to field work is considered as a *completed data base* (Data Base A). Data Base A consists of delineated compartments as drawn on the overlay film and the harmonised information of the recording sheet used during Phase 2.

Data Base B will consist of the sampled compartments and the data recorded on Sheet B. Data Base B will be used to verify the accuracy of the initial photo interpretation.

Any geographic information added during field work shall not be drawn on the same film or in such a way that Data Base A is changed. Instead, corrections and additions shall be added to a Data Base D. Therefore a new set of OH films shall be used for the additions of the field work. Besides for analyses, Data Base D will be used when completing the GIS map of the watershed area.

B4 General discussion with village representatives:

The co-operation of the villagers will be sought in the following situations:

- Initially, to help defining/confirming the outer boundaries of the village and which photos and swiddens refer to the concerned village
- To accompany during the field check and confirm the cultivation history of sampled points and cultivated areas and also on other delineated areas seen along the walk.
- To explain about the village history while studying old photos of the village area.

The villagers are an important source of information. We are their visitors and it is important to maintain a§good relation, listen to what they have to say and continuosly explain and discuss what we are going to do and why.

**Scope of field work in Nan District, Luang Prabang Province, Feb-March 1997:**

*Village level:*

- Verification of photo interpretation data and describe land use history of some 45 sampled fields and describe land use history of about 75 sampling points. Visit plots and fields together with village representatives, discussing cultivation history, taking photographs etc.

- Discussion over map-photo on the location of the fields swidden in previous years.

- Reconstruction of the village history, interview of village elders. Old photos will be used in the discussion.

- Start up discussion of agriculture production (current situation) and other sources of income for the village (see also village reports, SCP study etc).

- Start up general discussion on the villager´s ambitions and "strategies" for future improvement of their life, environment etc.

*District level:*

- Search for data on agriculture, demography, trade, economy etc, incl. village reports

- Discussion on the history of the area

- Initial APM pilot run and subsequent strategy discussion

- The land allocation process, status and comments on result

*Shifting Cultivation Stabilisation Project:*

- Socio-economic base line data

*Province:*

- Search for certain data and discuss land use strategies

# Annex F

# Simulation of Forest Land Use (APM)
# Upper Nam Nan Water Catchment Area
# 1952 - 1997

# Data set

## Description: Upper NamNan History

| | | |
|---|---|---|
| District | Nan, Luang Prabang | |
| Country | Lao PDR | |
| Land area | 9170 | |
| Years | 1952 | 1997 |

| | |
|---|---|
| 1 ton agriculture residue to Giga Calories (GCal) | 4,0 |
| 1 cubic meter solid wood to Giga Calories (GCal) | 2,6 |
| 1 cubic meter solid wood to 1 forest cubic meter | 1,0 |

***Land use transfer priorities***

| | |
|---|---|
| Other land, potential agriculture land | 6 |
| Farm forest land, natural forests | 4 |
| Other land, potential forest land | 7 |
| Industrial forest land, natural forests | 5 |
| Nat. environmental forest, in-accessible | 3 |
| Nat. environmental forest, protection areas | 1 |
| Nat. environmental forest, rerserves and NP | 2 |

**Growth factors, start value and period growth in %.**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Total population | 810 | 3,20 | 3,20 | 3,20 | 3,20 | 6,40 | 5,80 | 0,20 | -3,00 | 1,50 |
| Rural population | 810 | 3,20 | 3,20 | 3,20 | 3,20 | 6,40 | 5,80 | 0,20 | -3,00 | 1,50 |
| Gross Domestic Product | 50 | 1,50 | 1,50 | 1,50 | 1,50 | 1,50 | 1,50 | 1,50 | 1,50 | 2,00 |
| Production subsistence food | 100 | 1,00 | 1,00 | 1,00 | 2,00 | 5,00 | 5,00 | 2,00 | 1,00 | 1,00 |
| Production marketed food | 200 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 2,00 | 2,00 | 2,00 |
| Production cash crop | 200 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 2,00 | 2,00 | 2,00 | 2,00 |
| Rur. biomass energy demand | 3 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Urb. biomass energy demand | 3 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

## Agriculture data

| Agriculture land | Area (hectares) | Volume wood per hectare | Autoproduction of wood $m^3$/ hectare and year | Yield of residues kg per hectare | Amount of residues used as fuelwood (%) |
|---|---|---|---|---|---|
| Subsistence food | 3 000 | 10 | 0,02 | 200 | 100 |
| Marketed food | 100 | 10 | 0,03 | 300 | 100 |
| Cash Crop | 50 | 10 | 0,1 | | 100 |
| **Other land** | | | | | |
| Potential agricultural | | 10 | 0,2 | | |
| Potential forest | | 10 | 0,2 | | |
| Unproductive | 20 | 2 | 0,1 | | |

## Forest data

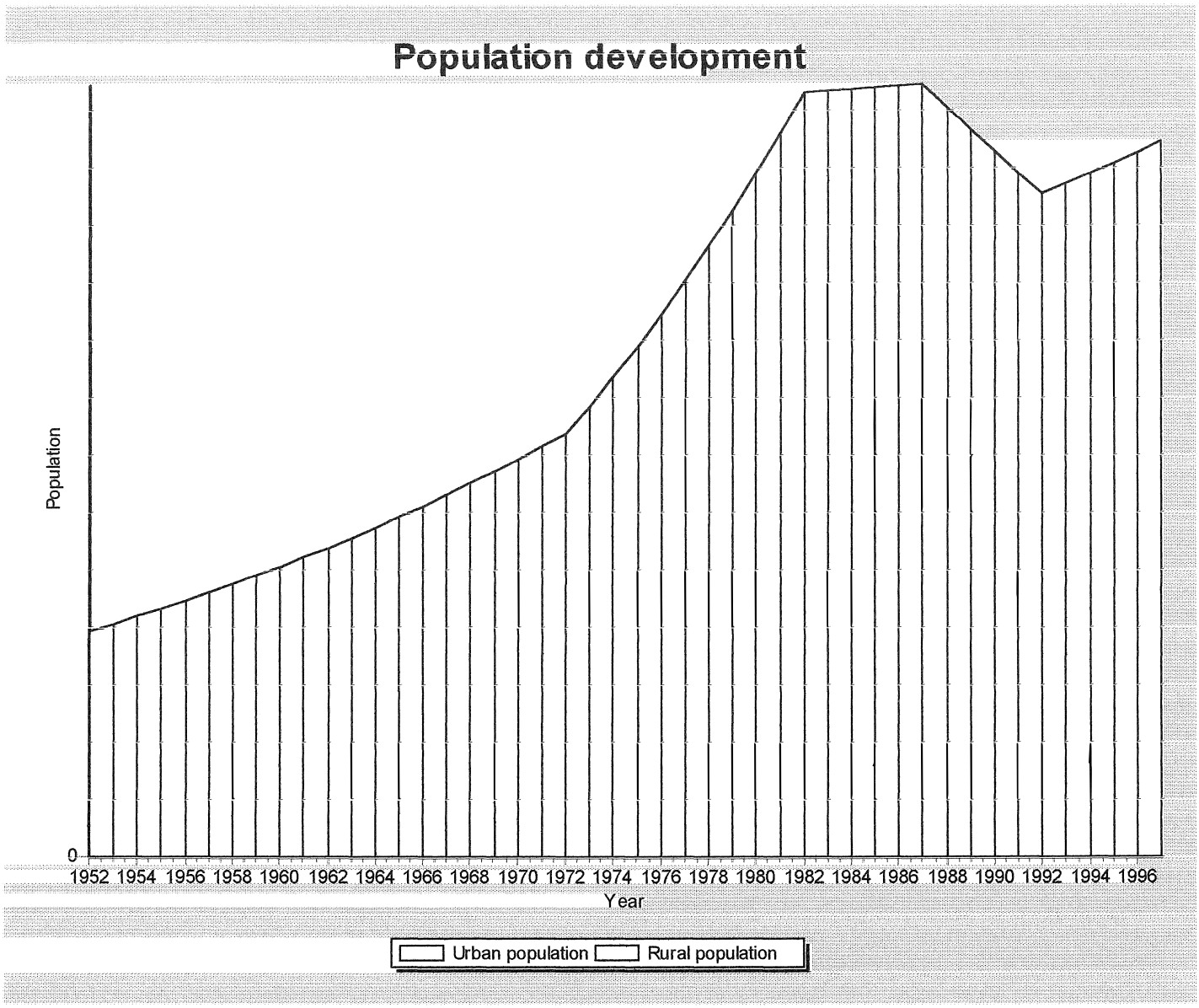
| I Unavailable for production | Area (hectares) | MAI $m^3$ | Ann fuel wood removal $m^3$ | Ann. Logging $m^3$/ hectare | Total volume in $m^3$ per ha | Total volume in $m^3$ altogether | Commercial volume in $m^3$ per ha | Commercial volume in $m^3$ altogether |
|---|---|---|---|---|---|---|---|---|
| NP and reserves | | 1 | 1 | | 0 | | | |
| Protection | | 2 | 1 | | 0 | | | |
| Inaccessible areas | 5 000 | 2 | 2 | | 0 | | | |
| Existing plantations | 0 | | | | | | | |
| **II Available for production** | | | | | | | | |
| Industrial | | 2 | 1 | 1 | 60 | 60 | 20 | |
| Existing plantations | | | | | | | | |
| Farm forest | 1 000 | 2 | 1 | 1 | 45 | 45 | 15 | |
| Existing plantations | | | | | | | | |

# Steering indicies

| Year | Population | | GDP | | Energy Demand | | Productivity in agriculture | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Rural | Total | Per capita | Urban | Rural | Subsistence | Marketed | Cash Crop |
| 1952 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 |
| 1953 | 1,03 | 1,03 | 1,05 | 1,01 | 1,00 | 1,00 | 1,01 | 1,00 | 1,00 |
| 1954 | 1,07 | 1,07 | 1,10 | 1,03 | 1,00 | 1,00 | 1,02 | 1,00 | 1,00 |
| 1955 | 1,10 | 1,10 | 1,15 | 1,05 | 1,00 | 1,00 | 1,03 | 1,00 | 1,00 |
| 1956 | 1,13 | 1,13 | 1,20 | 1,06 | 1,00 | 1,00 | 1,04 | 1,00 | 1,00 |
| 1957 | 1,17 | 1,17 | 1,26 | 1,08 | 1,00 | 1,00 | 1,05 | 1,00 | 1,00 |
| 1958 | 1,21 | 1,21 | 1,32 | 1,09 | 1,00 | 1,00 | 1,06 | 1,00 | 1,00 |
| 1959 | 1,25 | 1,25 | 1,38 | 1,11 | 1,00 | 1,00 | 1,07 | 1,00 | 1,00 |
| 1960 | 1,29 | 1,29 | 1,45 | 1,13 | 1,00 | 1,00 | 1,08 | 1,00 | 1,00 |
| 1961 | 1,33 | 1,33 | 1,52 | 1,14 | 1,00 | 1,00 | 1,09 | 1,00 | 1,00 |
| 1962 | 1,37 | 1,37 | 1,59 | 1,16 | 1,00 | 1,00 | 1,10 | 1,00 | 1,00 |
| 1963 | 1,41 | 1,41 | 1,67 | 1,18 | 1,00 | 1,00 | 1,12 | 1,00 | 1,00 |
| 1964 | 1,46 | 1,46 | 1,74 | 1,20 | 1,00 | 1,00 | 1,13 | 1,00 | 1,00 |
| 1965 | 1,51 | 1,51 | 1,83 | 1,21 | 1,00 | 1,00 | 1,14 | 1,00 | 1,00 |
| 1966 | 1,55 | 1,55 | 1,91 | 1,23 | 1,00 | 1,00 | 1,15 | 1,00 | 1,00 |
| 1967 | 1,60 | 1,60 | 2,01 | 1,25 | 1,00 | 1,00 | 1,16 | 1,00 | 1,00 |
| 1968 | 1,66 | 1,66 | 2,10 | 1,27 | 1,00 | 1,00 | 1,18 | 1,00 | 1,00 |
| 1969 | 1,71 | 1,71 | 2,20 | 1,29 | 1,00 | 1,00 | 1,21 | 1,00 | 1,00 |
| 1970 | 1,76 | 1,76 | 2,30 | 1,31 | 1,00 | 1,00 | 1,23 | 1,00 | 1,00 |
| 1971 | 1,82 | 1,82 | 2,41 | 1,33 | 1,00 | 1,00 | 1,26 | 1,00 | 1,00 |
| 1972 | 1,88 | 1,88 | 2,53 | 1,35 | 1,00 | 1,00 | 1,28 | 1,00 | 1,00 |
| 1973 | 2,00 | 2,00 | 2,73 | 1,37 | 1,00 | 1,00 | 1,35 | 1,00 | 1,00 |
| 1974 | 2,13 | 2,13 | 2,95 | 1,39 | 1,00 | 1,00 | 1,41 | 1,00 | 1,00 |
| 1975 | 2,26 | 2,26 | 3,19 | 1,41 | 1,00 | 1,00 | 1,48 | 1,00 | 1,00 |
| 1976 | 2,41 | 2,41 | 3,44 | 1,43 | 1,00 | 1,00 | 1,56 | 1,00 | 1,00 |
| 1977 | 2,56 | 2,56 | 3,71 | 1,45 | 1,00 | 1,00 | 1,64 | 1,00 | 1,00 |
| 1978 | 2,71 | 2,71 | 3,99 | 1,47 | 1,00 | 1,00 | 1,72 | 1,00 | 1,02 |
| 1979 | 2,87 | 2,87 | 4,28 | 1,49 | 1,00 | 1,00 | 1,80 | 1,00 | 1,04 |
| 1980 | 3,03 | 3,03 | 4,60 | 1,52 | 1,00 | 1,00 | 1,89 | 1,00 | 1,06 |
| 1981 | 3,21 | 3,21 | 4,94 | 1,54 | 1,00 | 1,00 | 1,99 | 1,00 | 1,08 |
| 1982 | 3,39 | 3,39 | 5,31 | 1,56 | 1,00 | 1,00 | 2,09 | 1,00 | 1,10 |
| 1983 | 3,40 | 3,40 | 5,40 | 1,59 | 1,00 | 1,00 | 2,13 | 1,02 | 1,13 |
| 1984 | 3,41 | 3,41 | 5,49 | 1,61 | 1,00 | 1,00 | 2,17 | 1,04 | 1,15 |
| 1985 | 3,41 | 3,41 | 5,58 | 1,63 | 1,00 | 1,00 | 2,22 | 1,06 | 1,17 |
| 1986 | 3,42 | 3,42 | 5,68 | 1,66 | 1,00 | 1,00 | 2,26 | 1,08 | 1,20 |
| 1987 | 3,43 | 3,43 | 5,77 | 1,68 | 1,00 | 1,00 | 2,31 | 1,10 | 1,22 |
| 1988 | 3,33 | 3,33 | 5,68 | 1,71 | 1,00 | 1,00 | 2,33 | 1,13 | 1,24 |
| 1989 | 3,23 | 3,23 | 5,60 | 1,73 | 1,00 | 1,00 | 2,35 | 1,15 | 1,27 |
| 1990 | 3,13 | 3,13 | 5,51 | 1,76 | 1,00 | 1,00 | 2,38 | 1,17 | 1,29 |
| 1991 | 3,03 | 3,03 | 5,42 | 1,79 | 1,00 | 1,00 | 2,40 | 1,20 | 1,32 |
| 1992 | 2,94 | 2,94 | 5,34 | 1,81 | 1,00 | 1,00 | 2,42 | 1,22 | 1,35 |
| 1993 | 2,99 | 2,99 | 5,53 | 1,85 | 1,00 | 1,00 | 2,45 | 1,24 | 1,37 |
| 1994 | 3,03 | 3,03 | 5,72 | 1,89 | 1,00 | 1,00 | 2,47 | 1,27 | 1,40 |
| 1995 | 3,08 | 3,08 | 5,93 | 1,93 | 1,00 | 1,00 | 2,50 | 1,29 | 1,43 |
| 1996 | 3,12 | 3,12 | 6,14 | 1,96 | 1,00 | 1,00 | 2,52 | 1,32 | 1,46 |
| 1997 | 3,17 | 3,17 | 6,35 | 2,00 | 1,00 | 1,00 | 2,55 | 1,35 | 1,49 |

# Population & GDP

| Year | Population | | | Gross Domestic Product | |
|---|---|---|---|---|---|
| | Rural | Urban | Total | Total (in millions) | Per capita |
| 1952 | 810 | | 810 | 0 | 50 |
| 1953 | 836 | | 836 | 0 | 51 |
| 1954 | 863 | | 863 | 0 | 52 |
| 1955 | 890 | | 890 | 0 | 52 |
| 1956 | 919 | | 919 | 0 | 53 |
| 1957 | 948 | | 948 | 0 | 54 |
| 1958 | 979 | | 979 | 0 | 55 |
| 1959 | 1 010 | | 1 010 | 0 | 55 |
| 1960 | 1 042 | | 1 042 | 0 | 56 |
| 1961 | 1 075 | | 1 075 | 0 | 57 |
| 1962 | 1 110 | | 1 110 | 0 | 58 |
| 1963 | 1 145 | | 1 145 | 0 | 59 |
| 1964 | 1 182 | | 1 182 | 0 | 60 |
| 1965 | 1 220 | | 1 220 | 0 | 61 |
| 1966 | 1 259 | | 1 259 | 0 | 62 |
| 1967 | 1 299 | | 1 299 | 0 | 63 |
| 1968 | 1 341 | | 1 341 | 0 | 63 |
| 1969 | 1 384 | | 1 384 | 0 | 64 |
| 1970 | 1 428 | | 1 428 | 0 | 65 |
| 1971 | 1 474 | | 1 474 | 0 | 66 |
| 1972 | 1 521 | | 1 521 | 0 | 67 |
| 1973 | 1 618 | | 1 618 | 0 | 68 |
| 1974 | 1 722 | | 1 722 | 0 | 69 |
| 1975 | 1 832 | | 1 832 | 0 | 70 |
| 1976 | 1 949 | | 1 949 | 0 | 71 |
| 1977 | 2 074 | | 2 074 | 0 | 73 |
| 1978 | 2 194 | | 2 194 | 0 | 74 |
| 1979 | 2 321 | | 2 321 | 0 | 75 |
| 1980 | 2 456 | | 2 456 | 0 | 76 |
| 1981 | 2 599 | | 2 599 | 0 | 77 |
| 1982 | 2 749 | | 2 749 | 0 | 78 |
| 1983 | 2 755 | | 2 755 | 0 | 79 |
| 1984 | 2 760 | | 2 760 | 0 | 81 |
| 1985 | 2 766 | | 2 766 | 0 | 82 |
| 1986 | 2 771 | | 2 771 | 0 | 83 |
| 1987 | 2 777 | | 2 777 | 0 | 84 |
| 1988 | 2 694 | | 2 694 | 0 | 85 |
| 1989 | 2 613 | | 2 613 | 0 | 87 |
| 1990 | 2 534 | | 2 534 | 0 | 88 |
| 1991 | 2 458 | | 2 458 | 0 | 89 |
| 1992 | 2 385 | | 2 385 | 0 | 91 |
| 1993 | 2 420 | | 2 420 | 0 | 93 |
| 1994 | 2 457 | | 2 457 | 0 | 94 |
| 1995 | 2 494 | | 2 494 | 0 | 96 |
| 1996 | 2 531 | | 2 531 | 0 | 98 |
| 1997 | 2 569 | | 2 569 | 0 | 100 |


Population development
Population
0
1952 1954 1956 1958 1960 1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996
Year
Urban population
Rural population

# Agriculture development

| Year | Subsistence food | | Marketed Food | | Cash Crop | | Accumulated |
|---|---|---|---|---|---|---|---|
| | Area | Production/Ha | Area | Production/Ha | Area | Production/Ha | transfer |
| 1952 | 3 000 | 100 | 100 | 200 | 50 | 200 | 0 |
| 1953 | 3 065 | 101 | 101 | 200 | 52 | 200 | 68 |
| 1954 | 3 132 | 102 | 103 | 200 | 55 | 200 | 140 |
| 1955 | 3 200 | 103 | 105 | 200 | 57 | 200 | 212 |
| 1956 | 3 270 | 104 | 106 | 200 | 60 | 200 | 286 |
| 1957 | 3 341 | 105 | 108 | 200 | 63 | 200 | 362 |
| 1958 | 3 414 | 106 | 109 | 200 | 66 | 200 | 439 |
| 1959 | 3 488 | 107 | 111 | 200 | 69 | 200 | 518 |
| 1960 | 3 564 | 108 | 113 | 200 | 72 | 200 | 599 |
| 1961 | 3 642 | 109 | 114 | 200 | 76 | 200 | 682 |
| 1962 | 3 721 | 110 | 116 | 200 | 80 | 200 | 767 |
| 1963 | 3 802 | 112 | 118 | 200 | 83 | 200 | 853 |
| 1964 | 3 885 | 113 | 120 | 200 | 87 | 200 | 942 |
| 1965 | 3 970 | 114 | 121 | 200 | 91 | 200 | 1 032 |
| 1966 | 4 056 | 115 | 123 | 200 | 96 | 200 | 1 125 |
| 1967 | 4 145 | 116 | 125 | 200 | 100 | 200 | 1 220 |
| 1968 | 4 193 | 118 | 127 | 200 | 105 | 200 | 1 275 |
| 1969 | 4 243 | 121 | 129 | 200 | 110 | 200 | 1 332 |
| 1970 | 4 293 | 123 | 131 | 200 | 115 | 200 | 1 389 |
| 1971 | 4 343 | 126 | 133 | 200 | 121 | 200 | 1 447 |
| 1972 | 4 394 | 128 | 135 | 200 | 126 | 200 | 1 505 |
| 1973 | 4 453 | 135 | 137 | 200 | 137 | 200 | 1 577 |
| 1974 | 4 512 | 141 | 139 | 200 | 147 | 200 | 1 648 |
| 1975 | 4 572 | 148 | 141 | 200 | 159 | 200 | 1 722 |
| 1976 | 4 633 | 156 | 143 | 200 | 172 | 200 | 1 798 |
| 1977 | 4 695 | 164 | 145 | 200 | 186 | 200 | 1 876 |
| 1978 | 4 731 | 172 | 147 | 200 | 196 | 204 | 1 924 |
| 1979 | 4 767 | 180 | 149 | 200 | 206 | 208 | 1 972 |
| 1980 | 4 803 | 189 | 152 | 200 | 217 | 212 | 2 022 |
| 1981 | 4 840 | 199 | 154 | 200 | 228 | 216 | 2 072 |
| 1982 | 4 877 | 209 | 156 | 200 | 240 | 221 | 2 123 |
| 1983 | 4 791 | 213 | 156 | 204 | 240 | 225 | 2 037 |
| 1984 | 4 706 | 217 | 155 | 208 | 239 | 230 | 1 950 |
| 1985 | 4 623 | 222 | 154 | 212 | 238 | 234 | 1 865 |
| 1986 | 4 542 | 226 | 153 | 216 | 237 | 239 | 1 782 |
| 1987 | 4 461 | 231 | 153 | 221 | 237 | 244 | 1 701 |
| 1988 | 4 285 | 233 | 152 | 225 | 229 | 249 | 1 516 |
| 1989 | 4 115 | 235 | 151 | 230 | 221 | 254 | 1 337 |
| 1990 | 3 952 | 238 | 150 | 234 | 213 | 259 | 1 165 |
| 1991 | 3 796 | 240 | 150 | 239 | 206 | 264 | 1 002 |
| 1992 | 3 645 | 242 | 149 | 244 | 198 | 269 | 842 |
| 1993 | 3 663 | 245 | 149 | 249 | 201 | 275 | 863 |
| 1994 | 3 681 | 247 | 149 | 254 | 204 | 280 | 884 |
| 1995 | 3 700 | 250 | 149 | 259 | 207 | 286 | 906 |
| 1996 | 3 718 | 252 | 149 | 264 | 211 | 291 | 928 |
| 1997 | 3 736 | 255 | 149 | 269 | 214 | 297 | 949 |

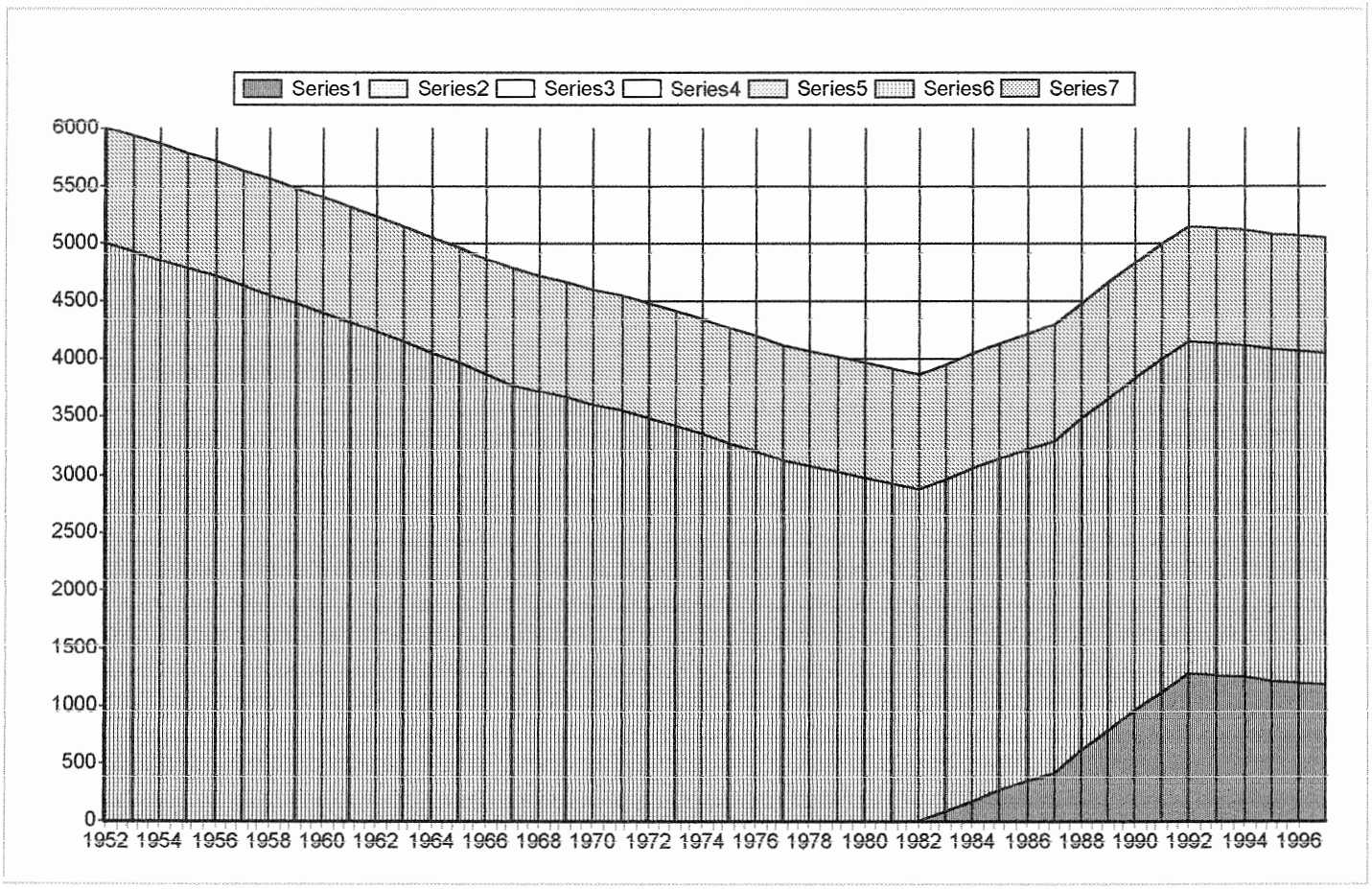
# Land use transfers

1 = Nat. environmental forest, protection areas
2 = Nat. environmental forest, rerserves and NP
3 = Nat. environmental forest, in-accessible
4 = Farm forest land, natural forests
5 = Industrial forest land, natural forests
6 = Other land, potential agriculture land
7 = Other land, potential forest land

| Year | Accumulated transfer | Remaining area after land transfer, classes as listed above. 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1952 | 0 | 0 | 0 | 5 000 | 1 000 | 0 | 0 | 0 |
| 1953 | 68 | 0 | 0 | 4 932 | 1 000 | 0 | 0 | 0 |
| 1954 | 140 | 0 | 0 | 4 860 | 1 000 | 0 | 0 | 0 |
| 1955 | 212 | 0 | 0 | 4 788 | 1 000 | 0 | 0 | 0 |
| 1956 | 286 | 0 | 0 | 4 714 | 1 000 | 0 | 0 | 0 |
| 1957 | 362 | 0 | 0 | 4 638 | 1 000 | 0 | 0 | 0 |
| 1958 | 439 | 0 | 0 | 4 561 | 1 000 | 0 | 0 | 0 |
| 1959 | 518 | 0 | 0 | 4 482 | 1 000 | 0 | 0 | 0 |
| 1960 | 599 | 0 | 0 | 4 401 | 1 000 | 0 | 0 | 0 |
| 1961 | 682 | 0 | 0 | 4 318 | 1 000 | 0 | 0 | 0 |
| 1962 | 767 | 0 | 0 | 4 233 | 1 000 | 0 | 0 | 0 |
| 1963 | 853 | 0 | 0 | 4 147 | 1 000 | 0 | 0 | 0 |
| 1964 | 942 | 0 | 0 | 4 058 | 1 000 | 0 | 0 | 0 |
| 1965 | 1 032 | 0 | 0 | 3 968 | 1 000 | 0 | 0 | 0 |
| 1966 | 1 125 | 0 | 0 | 3 875 | 1 000 | 0 | 0 | 0 |
| 1967 | 1 220 | 0 | 0 | 3 780 | 1 000 | 0 | 0 | 0 |
| 1968 | 1 275 | 0 | 0 | 3 725 | 1 000 | 0 | 0 | 0 |
| 1969 | 1 332 | 0 | 0 | 3 668 | 1 000 | 0 | 0 | 0 |
| 1970 | 1 389 | 0 | 0 | 3 611 | 1 000 | 0 | 0 | 0 |
| 1971 | 1 447 | 0 | 0 | 3 553 | 1 000 | 0 | 0 | 0 |
| 1972 | 1 505 | 0 | 0 | 3 495 | 1 000 | 0 | 0 | 0 |
| 1973 | 1 577 | 0 | 0 | 3 423 | 1 000 | 0 | 0 | 0 |
| 1974 | 1 648 | 0 | 0 | 3 352 | 1 000 | 0 | 0 | 0 |
| 1975 | 1 722 | 0 | 0 | 3 278 | 1 000 | 0 | 0 | 0 |
| 1976 | 1 798 | 0 | 0 | 3 202 | 1 000 | 0 | 0 | 0 |
| 1977 | 1 876 | 0 | 0 | 3 124 | 1 000 | 0 | 0 | 0 |
| 1978 | 1 924 | 0 | 0 | 3 076 | 1 000 | 0 | 0 | 0 |
| 1979 | 1 972 | 0 | 0 | 3 028 | 1 000 | 0 | 0 | 0 |
| 1980 | 2 022 | 0 | 0 | 2 978 | 1 000 | 0 | 0 | 0 |
| 1981 | 2 072 | 0 | 0 | 2 928 | 1 000 | 0 | 0 | 0 |
| 1982 | 2 123 | 0 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1983 | 2 037 | 86 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1984 | 1 950 | 173 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1985 | 1 865 | 258 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1986 | 1 782 | 341 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1987 | 1 701 | 422 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1988 | 1 516 | 607 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1989 | 1 337 | 786 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1990 | 1 165 | 958 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1991 | 1 002 | 1 121 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1992 | 842 | 1 281 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1993 | 863 | 1 260 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1994 | 884 | 1 239 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1995 | 906 | 1 217 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1996 | 928 | 1 195 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |
| 1997 | 949 | 1 174 | 0 | 2 877 | 1 000 | 0 | 0 | 0 |

# Land use transfers

Series 1 = Nat. environmental forest, protection areas
Series 2 = Nat. environmental forest, rerserves and NP
Series 3 = Nat. environmental forest, in-accessible
Series 4 = Farm forest land, natural forests
Series 5 = Industrial forest land, natural forests
Series 6 = Other land, potential agriculture land
Series 7 = Other land, potential forest land



# Energy demand

Units: giga calories

| Year | Rural Population | | Urban Population | | Total Population | |
|---|---|---|---|---|---|---|
| | Per capita | Total | Per capita | Total | Per 100 ha land | Total |
| 1952 | 3,0 | 2 430 | 3,0 | 0 | ,3 | 2 430 |
| 1953 | 3,0 | 2 508 | 3,0 | 0 | ,3 | 2 508 |
| 1954 | 3,0 | 2 588 | 3,0 | 0 | ,3 | 2 588 |
| 1955 | 3,0 | 2 671 | 3,0 | 0 | ,3 | 2 671 |
| 1956 | 3,0 | 2 756 | 3,0 | 0 | ,3 | 2 756 |
| 1957 | 3,0 | 2 844 | 3,0 | 0 | ,3 | 2 844 |
| 1958 | 3,0 | 2 936 | 3,0 | 0 | ,3 | 2 936 |
| 1959 | 3,0 | 3 029 | 3,0 | 0 | ,3 | 3 029 |
| 1960 | 3,0 | 3 126 | 3,0 | 0 | ,3 | 3 126 |
| 1961 | 3,0 | 3 226 | 3,0 | 0 | ,4 | 3 226 |
| 1962 | 3,0 | 3 330 | 3,0 | 0 | ,4 | 3 330 |
| 1963 | 3,0 | 3 436 | 3,0 | 0 | ,4 | 3 436 |
| 1964 | 3,0 | 3 546 | 3,0 | 0 | ,4 | 3 546 |
| 1965 | 3,0 | 3 660 | 3,0 | 0 | ,4 | 3 660 |
| 1966 | 3,0 | 3 777 | 3,0 | 0 | ,4 | 3 777 |
| 1967 | 3,0 | 3 898 | 3,0 | 0 | ,4 | 3 898 |
| 1968 | 3,0 | 4 022 | 3,0 | 0 | ,4 | 4 022 |
| 1969 | 3,0 | 4 151 | 3,0 | 0 | ,5 | 4 151 |
| 1970 | 3,0 | 4 284 | 3,0 | 0 | ,5 | 4 284 |
| 1971 | 3,0 | 4 421 | 3,0 | 0 | ,5 | 4 421 |
| 1972 | 3,0 | 4 562 | 3,0 | 0 | ,5 | 4 562 |
| 1973 | 3,0 | 4 854 | 3,0 | 0 | ,5 | 4 854 |
| 1974 | 3,0 | 5 165 | 3,0 | 0 | ,6 | 5 165 |
| 1975 | 3,0 | 5 496 | 3,0 | 0 | ,6 | 5 496 |
| 1976 | 3,0 | 5 847 | 3,0 | 0 | ,6 | 5 847 |
| 1977 | 3,0 | 6 222 | 3,0 | 0 | ,7 | 6 222 |
| 1978 | 3,0 | 6 583 | 3,0 | 0 | ,7 | 6 583 |
| 1979 | 3,0 | 6 964 | 3,0 | 0 | ,8 | 6 964 |
| 1980 | 3,0 | 7 368 | 3,0 | 0 | ,8 | 7 368 |
| 1981 | 3,0 | 7 796 | 3,0 | 0 | ,9 | 7 796 |
| 1982 | 3,0 | 8 248 | 3,0 | 0 | ,9 | 8 248 |
| 1983 | 3,0 | 8 264 | 3,0 | 0 | ,9 | 8 264 |
| 1984 | 3,0 | 8 281 | 3,0 | 0 | ,9 | 8 281 |
| 1985 | 3,0 | 8 297 | 3,0 | 0 | ,9 | 8 297 |
| 1986 | 3,0 | 8 314 | 3,0 | 0 | ,9 | 8 314 |
| 1987 | 3,0 | 8 331 | 3,0 | 0 | ,9 | 8 331 |
| 1988 | 3,0 | 8 081 | 3,0 | 0 | ,9 | 8 081 |
| 1989 | 3,0 | 7 838 | 3,0 | 0 | ,9 | 7 838 |
| 1990 | 3,0 | 7 603 | 3,0 | 0 | ,8 | 7 603 |
| 1991 | 3,0 | 7 375 | 3,0 | 0 | ,8 | 7 375 |
| 1992 | 3,0 | 7 154 | 3,0 | 0 | ,8 | 7 154 |
| 1993 | 3,0 | 7 261 | 3,0 | 0 | ,8 | 7 261 |
| 1994 | 3,0 | 7 370 | 3,0 | 0 | ,8 | 7 370 |
| 1995 | 3,0 | 7 481 | 3,0 | 0 | ,8 | 7 481 |
| 1996 | 3,0 | 7 593 | 3,0 | 0 | ,8 | 7 593 |
| 1997 | 3,0 | 7 707 | 3,0 | 0 | ,8 | 7 707 |

# Energy - supply

| Year | Agriculture land | | Forest land | Other land | Total |
|---|---|---|---|---|---|
| | Residues | Wood | Wood | Wood | |
| 1952 | 2 520 | 177 | 28 600 | 5 | 31 302 |
| 1953 | 2 573 | 181 | 28 246 | 5 | 31 006 |
| 1954 | 2 629 | 185 | 27 872 | 5 | 30 692 |
| 1955 | 2 686 | 189 | 27 498 | 5 | 30 378 |
| 1956 | 2 743 | 194 | 27 113 | 5 | 30 055 |
| 1957 | 2 802 | 199 | 26 718 | 5 | 29 724 |
| 1958 | 2 862 | 203 | 26 317 | 5 | 29 388 |
| 1959 | 2 924 | 208 | 25 906 | 5 | 29 043 |
| 1960 | 2 987 | 213 | 25 485 | 5 | 28 690 |
| 1961 | 3 050 | 218 | 25 054 | 5 | 28 327 |
| 1962 | 3 116 | 223 | 24 612 | 5 | 27 956 |
| 1963 | 3 183 | 228 | 24 164 | 5 | 27 581 |
| 1964 | 3 252 | 234 | 23 702 | 5 | 27 193 |
| 1965 | 3 321 | 240 | 23 234 | 5 | 26 800 |
| 1966 | 3 392 | 245 | 22 750 | 5 | 26 393 |
| 1967 | 3 466 | 251 | 22 256 | 5 | 25 978 |
| 1968 | 3 507 | 255 | 21 970 | 5 | 25 737 |
| 1969 | 3 549 | 259 | 21 674 | 5 | 25 487 |
| 1970 | 3 592 | 263 | 21 377 | 5 | 25 237 |
| 1971 | 3 634 | 268 | 21 076 | 5 | 24 982 |
| 1972 | 3 677 | 272 | 20 774 | 5 | 24 728 |
| 1973 | 3 727 | 278 | 20 400 | 5 | 24 409 |
| 1974 | 3 776 | 284 | 20 030 | 5 | 24 096 |
| 1975 | 3 827 | 290 | 19 646 | 5 | 23 768 |
| 1976 | 3 878 | 297 | 19 250 | 5 | 23 430 |
| 1977 | 3 930 | 304 | 18 845 | 5 | 23 084 |
| 1978 | 3 961 | 308 | 18 595 | 5 | 22 870 |
| 1979 | 3 992 | 313 | 18 346 | 5 | 22 656 |
| 1980 | 4 025 | 318 | 18 086 | 5 | 22 434 |
| 1981 | 4 057 | 323 | 17 826 | 5 | 22 211 |
| 1982 | 4 089 | 328 | 17 560 | 5 | 21 983 |
| 1983 | 4 020 | 324 | 17 784 | 5 | 22 133 |
| 1984 | 3 951 | 319 | 18 010 | 5 | 22 285 |
| 1985 | 3 883 | 314 | 18 231 | 5 | 22 434 |
| 1986 | 3 817 | 310 | 18 447 | 5 | 22 579 |
| 1987 | 3 752 | 306 | 18 658 | 5 | 22 721 |
| 1988 | 3 610 | 294 | 19 139 | 5 | 23 048 |
| 1989 | 3 473 | 283 | 19 604 | 5 | 23 366 |
| 1990 | 3 342 | 273 | 20 051 | 5 | 23 671 |
| 1991 | 3 217 | 263 | 20 475 | 5 | 23 960 |
| 1992 | 3 095 | 253 | 20 891 | 5 | 24 244 |
| 1993 | 3 109 | 254 | 20 836 | 5 | 24 205 |
| 1994 | 3 124 | 256 | 20 782 | 5 | 24 167 |
| 1995 | 3 139 | 258 | 20 725 | 5 | 24 126 |
| 1996 | 3 153 | 260 | 20 667 | 5 | 24 086 |
| 1997 | 3 168 | 262 | 20 613 | 5 | 24 047 |

# Energy balance

| Year | Supply (giga calories) | Demand (giga calories) | Balance (giga calories) | Balance (cubic meters) |
|---|---|---|---|---|
| 1952 | 31 302 | 2 430 | 28 872 | 11 105 |
| 1953 | 31 006 | 2 508 | 28 498 | 10 961 |
| 1954 | 30 692 | 2 588 | 28 104 | 10 809 |
| 1955 | 30 378 | 2 671 | 27 707 | 10 657 |
| 1956 | 30 055 | 2 756 | 27 299 | 10 500 |
| 1957 | 29 724 | 2 844 | 26 879 | 10 338 |
| 1958 | 29 388 | 2 936 | 26 452 | 10 174 |
| 1959 | 29 043 | 3 029 | 26 014 | 10 005 |
| 1960 | 28 690 | 3 126 | 25 564 | 9 832 |
| 1961 | 28 327 | 3 226 | 25 101 | 9 654 |
| 1962 | 27 956 | 3 330 | 24 626 | 9 472 |
| 1963 | 27 581 | 3 436 | 24 145 | 9 287 |
| 1964 | 27 193 | 3 546 | 23 647 | 9 095 |
| 1965 | 26 800 | 3 660 | 23 140 | 8 900 |
| 1966 | 26 393 | 3 777 | 22 616 | 8 699 |
| 1967 | 25 978 | 3 898 | 22 081 | 8 493 |
| 1968 | 25 737 | 4 022 | 21 715 | 8 352 |
| 1969 | 25 487 | 4 151 | 21 336 | 8 206 |
| 1970 | 25 237 | 4 284 | 20 953 | 8 059 |
| 1971 | 24 982 | 4 421 | 20 561 | 7 908 |
| 1972 | 24 728 | 4 562 | 20 166 | 7 756 |
| 1973 | 24 409 | 4 854 | 19 555 | 7 521 |
| 1974 | 24 096 | 5 165 | 18 931 | 7 281 |
| 1975 | 23 768 | 5 496 | 18 272 | 7 028 |
| 1976 | 23 430 | 5 847 | 17 583 | 6 763 |
| 1977 | 23 084 | 6 222 | 16 862 | 6 485 |
| 1978 | 22 870 | 6 583 | 16 287 | 6 264 |
| 1979 | 22 656 | 6 964 | 15 692 | 6 035 |
| 1980 | 22 434 | 7 368 | 15 065 | 5 794 |
| 1981 | 22 211 | 7 796 | 14 415 | 5 544 |
| 1982 | 21 983 | 8 248 | 13 735 | 5 283 |
| 1983 | 22 133 | 8 264 | 13 869 | 5 334 |
| 1984 | 22 285 | 8 281 | 14 004 | 5 386 |
| 1985 | 22 434 | 8 297 | 14 137 | 5 437 |
| 1986 | 22 579 | 8 314 | 14 265 | 5 487 |
| 1987 | 22 721 | 8 331 | 14 390 | 5 535 |
| 1988 | 23 048 | 8 081 | 14 968 | 5 757 |
| 1989 | 23 366 | 7 838 | 15 527 | 5 972 |
| 1990 | 23 671 | 7 603 | 16 067 | 6 180 |
| 1991 | 23 960 | 7 375 | 16 585 | 6 379 |
| 1992 | 24 244 | 7 154 | 17 090 | 6 573 |
| 1993 | 24 205 | 7 261 | 16 944 | 6 517 |
| 1994 | 24 167 | 7 370 | 16 797 | 6 460 |
| 1995 | 24 126 | 7 481 | 16 646 | 6 402 |
| 1996 | 24 086 | 7 593 | 16 493 | 6 343 |
| 1997 | 24 047 | 7 707 | 16 341 | 6 285 |

# Farm forest development

| Year | Area | Non commercial volume per hectare | Non commercial volume total | Commercial volume per hectare | Commercial volume total | Alltogether volume per hectare | Alltogether volume total |
|---|---|---|---|---|---|---|---|
| 1952 | 1 000 | 30 | 30 000 | 15 | 15 000 | 45 | 45 000 |
| 1953 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1954 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1955 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1956 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1957 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1958 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1959 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1960 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1961 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1962 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1963 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1964 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1965 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1966 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1967 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1968 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1969 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1970 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1971 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1972 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1973 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1974 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1975 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1976 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1977 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1978 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1979 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1980 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1981 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1982 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1983 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1984 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1985 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1986 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1987 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1988 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1989 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1990 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1991 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1992 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1993 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1994 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1995 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1996 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |
| 1997 | 1 000 | 30 | 30 333 | 16 | 16 000 | 46 | 46 333 |

# Forest available for timber production - development

| Year | Industrial forest | | | | Farm forest | | | |
|---|---|---|---|---|---|---|---|---|
| | Total volume | | Commercial volume | | Total volume | | Commercial volume | |
| | Per ha | Total | Per ha | Total | Per ha | Total | Per ha | Total |
| 1952 | 60,0 | | 20,0 | | 45,0 | 45 000 | 15,0 | 15 000 |
| 1953 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1954 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1955 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1956 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1957 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1958 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1959 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1960 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1961 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1962 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1963 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1964 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1965 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1966 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1967 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1968 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1969 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1970 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1971 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1972 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1973 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1974 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1975 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1976 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1977 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1978 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1979 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1980 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1981 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1982 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1983 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1984 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1985 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1986 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1987 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1988 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1989 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1990 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1991 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1992 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1993 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1994 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1995 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1996 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |
| 1997 | ,0 | | ,0 | | 46,3 | 46 333 | 16,0 | 16 000 |

Serien Arbetsrapporter utges i första hand för institutionens eget behov av viss dokumentation. Rapporterna är indelade i följande grupper: Riksskogstaxeringen, Planering och inventering, Biometri, Fjärranalys, Kompendier och undervisningsmaterial, Examensarbeten samt Internationellt. Författarna svarar själva för rapporternas vetenskapliga innehåll.

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2 Riksskogstaxeringen och Ståndortskarteringen vid regional miljöövervakning. - metoder för att förbättra upplösningen vid inventering i skogliga avrinningsområden. ISRN SLU-SRG-AR--2--SE.

1997 23 Lundström, A., Nilsson, P. & Ståhl, G. Certifieringens konsekvenser för möjliga uttag av industri- och energived. - En pilotstudie. ISRN SLU-SRG-AR--23--SE.

24 Fridman, J. & Walheim, M. Död ved i Sverige. - Statistik från Riksskogstaxeringen. ISRN SLU-SRG-AR--24--SE.

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37 Odell, G. & Ståhl, G. Vegetationsförändringar i svensk skogsmark mellan 1980- och 90-talet. -En studie grundad på Ståndortskarteringen. ISRN SLU-SRG-AR--37--SE.

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1995 3 Holmgren, P. & Thuresson, T. Skoglig planering på amerikanska västkusten - intryck från en studieresa till Oregon, Washington och British Columbia 1-14 augusti 1995. ISRN SLU-SRG-AR--3--SE.

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19 Ståhl, G., Ringvall, A. & Lämås, T. Guided transect sampling - An outline of the principle. ISRN SLU-SRG-AR--19--SE.

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26 Lämås, T. & Ståhl, G. Om dektektering av förändringar av populationer i begränsade områden. ISRN SLU-SRG-AR--26--SE

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1997 22 Ali, Abdul Aziz. Describing Tree Size Diversity. ISRN SLU-SRG-AR--22--SE.

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1997 28. Hagner, O. Satellitfjärranalys för skogsföretag. ISRN SLU-SRG-AR--28--SE.

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7 Henriksson, L. The thinning quotient - a relevant description of a thinning? Gallringskvot - en tillförlitlig beskrivning av en gallring? Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--7--SE.

8 Ranvald, C. Sortimentsinriktad avverkning. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--8--SE.

9 Olofsson, C. Mångbruk i ett landskapsperspektiv - En fallstudie på MoDo Skog AB, Örnsköldsviks förvaltning. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--9--SE.

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11 Djurberg, H. Den skogliga informationens roll i ett kundanpassat virkesflöde. - En bakgrundsstudie samt simulering av inventeringsmetoders inverkan på noggrannhet i leveransprognoser till sågverk. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--11--SE.

12 Bredberg, J. Skattning av ålder och andra beståndsvariabler - en fallstudie baserad på MoDo:s indelningsrutiner. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--12--SE.

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16 Tormalm, K. Implementering av FSC-certifiering av mindre enskilda markägares skogsbruk. Examensarbete i ämnet skogsuppskattning och skogsindelning. ISRN SLU-SRG-AR--16--SE.

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