CHAPTER I

INTRODUCTION

1.1 Background and Rationale

Lao PDR is located in South-east Asia and surrounded by 5 countries: China, Myanmar, Thailand, Vietnam and Cambodia. Its total area is 236,800 square kilometers with about 4,600,000 inhabitants (1996). Over 90% of its terrain lies within the catchment of the Mekong River and the country contributes 35% of the river's annual flow. The terrain condition is characterized by flat area in the central and the southern parts, and by hilly area in the north (Figures 1.1 and 1.2).

Lao PDR is a country which has little flat land for agriculture in the middle-western part and along the bottom valleys, but the northern and eastern parts of Lao PDR are mountainous or highland areas. This shortage of agricultural land is most acute in the hilly provinces of the North where cultivation has encroached from the foot-hills well onto steep slopes. With a 2.9% annual increase of population, the use of forest land for shifting agriculture is expected to increase rapidly in the next few years, resulting in the loss of already depleted forests and land degradation.

Forests in Lao PDR not only play an important role in environmental protection and national income generation in the Mekong Basin but also support the livelihood of local population. Encroachment into forests has made proper land use a critical issue for sustainable development and natural resource conservation.

Lao PDR is considered as a country with high percentage of forest cover and rich in forest resources in South-east Asia. The economic development is mainly dependent on the exploitation of natural resources (forest resources), and agricultural production which is characterized by fully to semi-nature dependent type, is mostly done on subsistence basis. It means that the available forest area will still continue to be depleted.

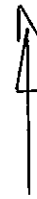**Figure 1.1   Map of Lao PDR Location in the Region**
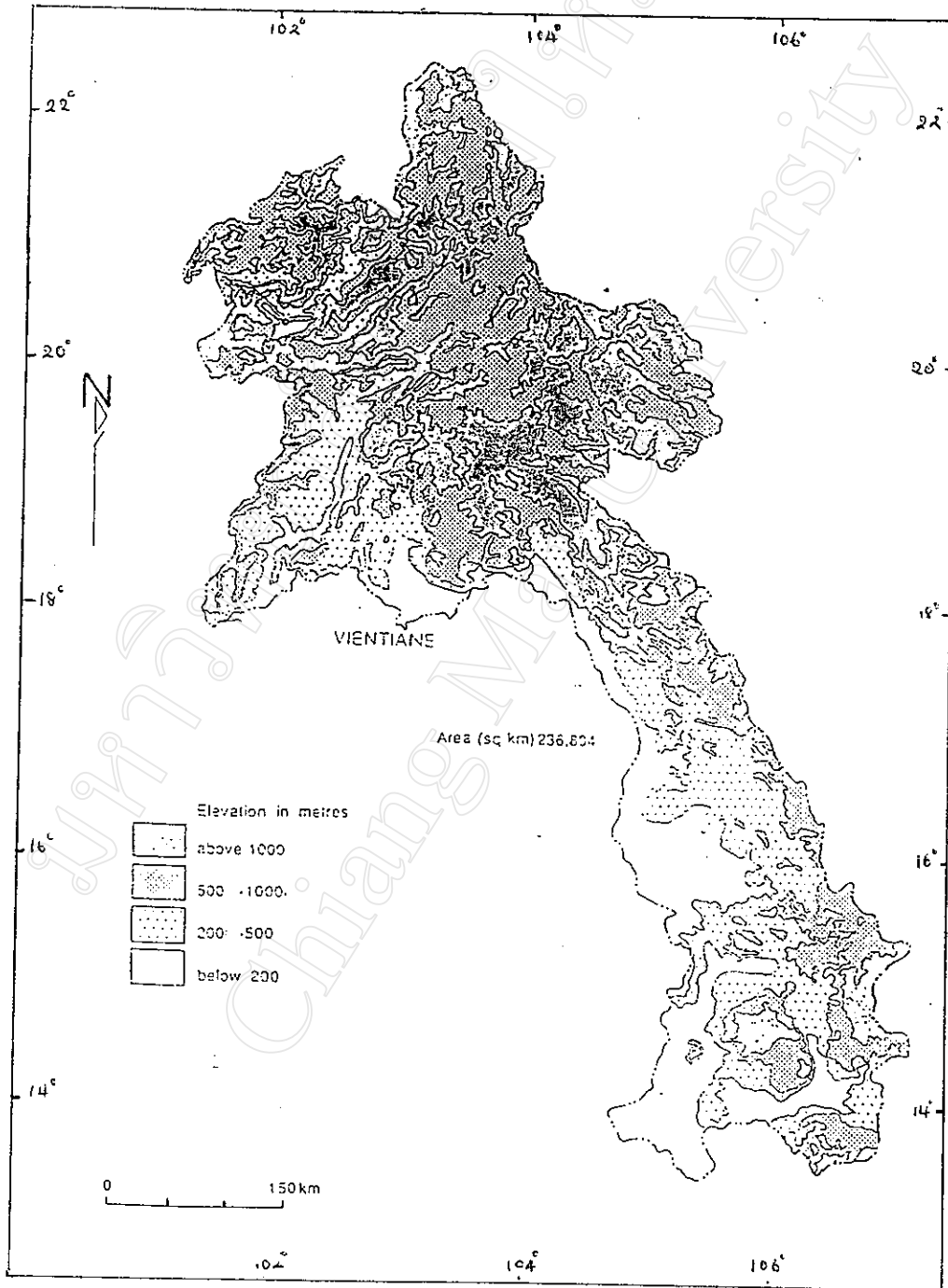
Figure 1.2   Relief Map of Lao PDR

Population pressure due to immigration and natural population growth, as well as the higher demand for cash caused by socio-cultural changes has changed the demand for land. As a result more marginal forest has been encroached by people doing shifting cultivation for food supply, fallow periods decrease, deforestation and land degradation continue to take place. This development causes ecological imbalances in the highlands and reduces its watershed functions.

Since around 1986, the economy has been in transition from a centrally planned to a market system. A major element of the Lao government's policy in supporting the transition has been the development of efficient markets for land, capital and labor to complement improvements in the capacity of the public sector to both plan and implement development programs. Efficient land markets and security of land tenure, on which their depend, are important in order to permit land to get allocated to its most efficient use and users and to encourage land-related investments and sustainable use of land.

According to the above reasons, the strong emphasis by the Lao government to stabilize "shifting cultivation" and the current strategic efforts, in particular the implementation of **Land-Forest Allocation** program draws the attention to the Lao government strategy in achieving the sustainable use and management of forest resources. The primary objective of Land-Forest Allocation is to control shifting cultivation and reduce pressure on forest resources by assigning the responsibility to villagers for the management of land and forest resources. Through land-forest allocation, farmers are given land title with policy support for the development of more stable agricultural production systems.

The study area of Huay Khang village as called "village forestry" is defined as the management and use of forests and forest lands by organized villagers with the support of state forest agencies to sustain the flow of benefits, which are to be fairly shared by the villages concerned and the rest of the national community. In village forestry the villagers are the land and forest managers. The role of the state's forestry staff is to train and assist them in their resource management activities. Virtually, most of lands are used by Khamu (highland farmers) to sustain their livelihood systems. Constrained by poverty and technology, however, their livelihood pursuits have led to acute problems such as deforestation, land use conflicts, soil erosion, and

loss of upland agricultural productivity. However, the Lao government is trying to assist the villagers in managing their own resources. The use of New Economic Mechanism (NEM) and the LFA project are primarily concerned with changing land use behavior of highland farmers. It is recognized that their active involvement in land use and management activities must be secured and sustained. Therefore, it is necessary and important to do more research on which could be improved or developed the steps in Land-Forest Allocation procedure using in Lao PDR into more suitable in the future.

1.2 Objectives of the Study

The study of land-use in the highland areas of Lao PDR with a case of Huay Khang village in Xieng Ngeun district of Luang Prabang province has two main objectives.

First. to investigate the changes in land use and land ownership during 1982-1999 (before Land-Forest Allocation appeared and land use in recent years);

Second, to study the impact of two factors--population growth and the Lao Land-Forest Allocation policies on the change of land use systems.

1.3 Scope of the Study

This study seeks to answer the following questions related to land use in Houay Khang village.

What changes have been made in the use of land, the use of technology in steep land and the tenure system that defines the rights and obligations of highland farmers in the use and management of their resources (particularly land and forest)?

What impact has been brought about by the land and forest tenure reforms, particularly in term of improving land use efficiency, changing cropping patterns, and stimulating highland community and households to adopt conservation oriented land use practices?

Is there any relationship between community rules and actual land use?

1.4 Hypotheses

1) Before land allocation implementation, land-use system was characterized by extensive shifting cultivation of subsistence traditional crops with long fallow period.

2) After land allocation implementation, land-use system has gradually changed from shifting cultivation to more intensive rotational cultivation of both subsistence crops and newly introduced cash crops with shorter fallow period.

3) Relatively rapid population growth in the 1980's resulted in expansion of cropland into marginal land, causing severe degradation and loss of forest areas.

4) Land allocation implementation in the 1990's, to certain extent has stimulated sustainable agriculture and helped alleviate deforestation problems.

1.5 Study Area

The study area is Huay Khang Village in Luang-Prabang Province. This village was selected for several following reasons.

First, after a first assessment in the field, Huay Khang village could be represented for the villages in the highland areas in Lao PDR and it is also a village which lies in the village forestry systems;

Second, Huay Khang village has been chosen by the Lao government as one of the 1,026 focal villages in the integrated rural development program, as a field selected area for the Lao-Swedish Forestry Co-operation Program and as a field research area for Community-based natural resources management and livelihood improvement of the United Nations Center for Regional Development (UNCRD, Japan);

Third, this area contains a diversity of land use, and is thus particularly suitable for researching where is easy to visit;

Fourth, for this region, sequential remote-sensing data (aerial photographs from different periods) which have been used for producing land-use maps and tables are available; and

Fifth, the researcher is familiar with the area and the characteristics of the land use in the area.

1.6 Research Methodology

This part concerns the preparation of the basic data required for land use and land-use change analysis. It includes the derivation of land use information from the air photos through visual interpretation, the contour lines from the topographical map and the information from interviews to generate the land use and land-use change maps.

1.6.1 Data Sources and Data Collection

Land use and land-use change are associated with time and population growth. To be able to trace the land use and land-use change, it requires data representing different periods in time. In this case study, the basic data are mainly derived from 3 main data sources: air photos, topographical map and reports.

The change in land use can be considered of three types: change from forest to other land use, change in land ownership and change in farming system on agricultural land.

To identify and analyze the land use change, data from different periods were collected. In this study, the input data were the land use/cover data sets of 3 time periods. Thus the land use change by 3 different time intervals:

- Land Use change (1982-89)
- Land Use change (1989-98)
- Land Use change (1982-98)

The change inventory had been done by aerial photograph interpretation and field visits (using questionnaires, fields observation and interviewing of 3 selected farmers representing each farming system utilization). The questionnaires had also been used for land ownership survey and for socio-economic data collection and analysis.

In detecting land use changes overtime the following data are required:

Primary data: community land use plan and regulation, methods of land management, frequency of land use, land tenure, cropping calendar and its farming system.

Secondary data: land use map interpretation from aerial photographs on a scale of 1:30,000, topographic maps on a scale of 1:50,000, watershed classification maps and land (agricultural land and forest) policies from Department of Forestry of Laos and related offices.

In the examination of socio-economy and sustainable land use plan these data are necessary:

Primary data: population and population change, size and number of agricultural plots, crop and planting sequence, production and economic return of each crop, marketing and harvesting, return and expenses, participation and in effect of LFA with the occurrence of agricultural and forestry problems.

Secondary data: documentation of the socio-economic development in the highland (rural) areas, the Laos' tropical forest action plan, the plan to the year 2000 for stabilizing shifting cultivation and its reports of the past, criteria for an assessment of sustainability of an agricultural system from the experience of many research projects. These were obtained from Chiang Mai University library and related offices.

1.6.2 Procedures to Acquire Information about Land Use and Land Use Change

To identify and analyze the land use change, data from different periods are required. In this study, the input data are the land use data sets as discussed in chapter V, which can be obtained from the database.

The land use change analysis is done through the combination of land use data sets of different time periods. In this study, the land use data sets of 3 periods are involved. Thus the land use change will represent 3 different time intervals. The procedures of acquiring land use change begin with first combination of the land use

data sets of different dates and then generation of the summary of statistics for each types of land use change.

1.6.3 Basic Data for Socio-Economic Analysis

As the scope of the research is limited to land use and, to a certain extent, others relevant to sustainable use of natural resources. The PRA (Participatory Rural Appraisal) exercises were used for collecting all data relevant to the understanding of land use conditions, the way on how to improve the livelihood of the local people conditions and the importance of cash crop productions and other non timber forest products (NTFPs) were collected.

During the preparation phase, it became obvious that I could not properly speak the language of the Khamu people in the research village well enough to assure from the beginning of the survey sufficient communication. For such reason one resource person was recruited from the Khamu ethnic group.

During the survey a combination of formal and non-formal methods for data collection was used: a) the socio-economic and bio-physical background information was collected by using a formal questionnaire at the beginning of the survey; and b) the main information was gathered by using selected tools of the PRA methodology, such as: semi-structured interview, village mapping, land-use mapping, calendar, historical profile, forest and agricultural land field measurements.

Based on the criteria coming up during the internal mapping exercise, all 36 households were selected for individual interviews. The criteria were as follows: 1) slash-and-burn cultivator; 2) rice sufficiency or insufficiency; 3) other occupations (trader, officer); 4) special family status (widow); and 5) possession of large animals like buffaloes or cattle.

These 36 households were categorized into three economic status groups (very poor, poor, and medium wealthy). The classification criteria (Table 1.3) were identified through discussions with the Xieng Ngeun District Authority.

1) Very Poor Family: These families are limited in labor force. The reasons include a) children are too young to work with their parents and to contribute to the family work force; and b) drug addiction of the father. Rice

insufficiency for several months per year is the consequence. Due to no savings, none or only a small investment in livestock is possible. The risk of raising livestock can be taken just for a few chickens and one or two pigs. The main sources of cash income are non timber forest products and some agricultural/horticultural products like chili or sesame. Some individuals go to sell their labor force in other nearby villages.

2) Poor Family: The majority of families in this group are past and present job's tear growers. All other characteristics are in between the two extremes described above and below. Rice is insufficient for around 6 months in the year for the families in this group. Their houses are mostly strong enough, because of their use wooden poles.

3) Medium Wealthy Family: Besides the parents, elder children contribute their work to the labor force within the family. Some family members follow other occupations (policeman, trader, shop-owner). For that reason, cultivating in upland areas is not important to them anymore. One family does not have an upland cultivation area at all. They have sufficient money or sell some livestocks to buy the needed rice in the periods of rice shortage.

Livestock is of higher importance. In addition to poultry and pigs. they own buffaloes, cattle and goats. NTFPs still play the role in the family economy, but they are not as important as for "very poor" and "poor" families. Families in this relatively wealthy group have alternatives in gaining cash. Collecting NTFPs, besides trading, is not attractive enough for them.

Table 1.1   Classification Criteria for the Economic Status of Families

Very Poor	Poor	Medium Wealthy
Family problems (lack of labor)	Farming problems (lack of labor)	Other occupation than being farmer
No or few small animals	Few small or medium sized animals	Several large animals
Rice sufficiency (3 months)	Rice sufficiency (8 months)	Rice sufficiency
Bamboo with grass roofing house	Wooden with grass roofing house	Wooden with zinc roofing house

1.6.4 Basic Data for Land Use Change Analysis

This chapter also concerns the preparation of the basic data required for land use change analysis. It includes the derivation of land use information from the air photos through visual interpretation, the contour lines from the topographic map are used to generate the relief map.

Change in land use is associated with space and time. To be able to trace the change, it requires data representing different periods in time. In this case study, the basic data are mainly derived from 2 main data sources: air photos and the topographic map. The air photos are panchromatic black and white and were taken at 3 different dates: November 1982, November 1989 and December 1998. The 1982 and 1989 air photos were taken by a Russian company at the scale 1:30,000. The 1998 air photos were taken by the JICA at the scale 1:50,000. The topographic map is at the scale 1:50,000, it is of French origin from the 1965's and was up-dated by air photos in the early 1980's.

The basic data required for the system is of three types: land use, village boundary and topographical data. For the land use, the needed data are the land use types at different dates. In this case study, these data are derived from three types of data sources (air photos, field survey and questionnaires) taken at 3 different dates.

The village boundary is actually defined and drawn on the topographic map. This data is used to confine the study area. Within the topography, the important aspect is the slope. The slope can be generated from the hand made by using cycle system and the Mekong Secretariat criteria. The village base map has been prepared from the 1:50,000 topographic map before land survey activities being carried out on the ground together with information from aerial photographs.

1.6.5 The Land Use Classes and Vegetation Types Used in the Research

The forests and other land uses are classified according to the classification system of land use and forest types which is applied in the Nation-wide Reconnaissance Survey and National Forest Inventory (NFI) in Laos (Figure 1.3). The main emphasis of the system is to put on the forest land use types. The system was,

based upon an older FAO system, worked out by Mr. Jozsef Fidloczky in 1987 (NOFIP, 1992). A minor revision was then made in 1990 at the start of the NFI, mainly in order to make it updated to the ground survey. As result, the forests and other land uses were put into 6 main groups as follows: 1) areas of current forest, 2) areas of potential forest, 3) other wooded areas, 4) areas of permanent agriculture, 5) areas with other land use, and 6) water.

Areas of current forest (forest) are defined as areas being suitable for forest production and having a tree cover with a crown density of at least 20% (forest plantations are excepted from the rule of a minimum crown density).

Areas of potential forest (forest-fallow) are defined as areas suitable for forest production having a crown density of less than 20% and not permanently being used for other purposes (i.e. housing, agriculture.).

Other wooded areas (bush-fallow) are defined as areas with a certain cover of tree or shrubs but being unsuitable (too poor) for forest production. The tree cover is less than 20% (if it would be more, it should be considered as current forest).

Areas of permanent agriculture include areas for production of crops, fruit trees, rice paddy, etc. and areas permanently used for grazing.

Areas of other land uses include land that for various reasons is "non-productive" and/or is used for other purposes than agriculture and forestry.

Water includes natural or artificial water bodies.

In the village, the land is also divided into five different categories according to the Land-Forest Allocation Scheme:

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) Reserved land for future generations
5) Forest is subdivided into three categories: (1) **Protecting forest** which is classified for the prevention of soil erosion, particularly the remaining forest cover on the top of the hills and at the water source; (2) **Village forest reserve**

which is classified for the purpose of protecting and conserving nature and cultural value. It also includes areas of sacred forest, cemetery and divine forest; and (3) **Utility forest** or **production forest** which is classified for the purpose of satisfying the requirements of social development and of people's livelihoods, for timber and other forest products on sustainable basis and without significant negative environmental impacts.

Figure 1.3   Forest and Land Use Classification Flowchart

CLASSIFICATION OF LAND USE
AND FOREST TYPES IN LAO PDR