

CHAPTER 1

INTRODUCTION

1.1 Background to the study

Luang Prabang is a mountainous province, located in the Central North of Laos. It lies in the 21° 10' N latitude and 102° 8' E longitude with elevations ranging from 240 to 2,257 meters; 85% of the total provincial area is mountainous. Its topography is characterized by complicated rocky mountains and narrow valleys, which has bordering provinces of Oudomxay, Phongsaly to the north and Houaphanh, Vietnam to the northeast, Vientiane and Sayabouly to the south and southwest and Xiengkhouang to the east. Total land area is about 16,875 km² (covered 7.1% of the country's area). Luang Prabang province has a total population of just over 428,800 people that including 12 distinct ethnic groups. The Khmu are the largest ethnic group in the province and make up the majority covering about 44% of the provincial population. The Hmong are the second most populous ethnic minority 16%, Lowland Lao comprise 39% of the population and live mostly in lowland valleys. Luang Prabang province consists of 12 districts: Luang Prabang, XiengNgeun, Nan, Pak Ou, Nambak, Ngoi, Pakxeng, Phonxay, Chomphet, Viengkham, Phoukhoun and Phonthong with 1,208 villages and 61,132 families. For the last ten years, population growth rate was 1.7%, and population density was 19 people per km². The increase of population exerts pressure on natural resources and supply of more food (Lao Agricultural Census, 1999).

Over the last decade, the landscape of northern Laos, which consists of a continuum of rugged mountainous terrain, is rapidly undergoing change. Upland shifting cultivation had been considered the root cause of forest degradation in this mountainous region; many attempts have been made by the central government of Laos to restrict the expansion of swidden agricultural practices. The processes driving actual land use change that is observed today in northern provinces of Laos are highly complex. Shifting cultivation in Laos has been on the decline in the last 2 decades leading to an increase in the areas of degraded forests (Thongmanivong and Fujita 2006). However, at the same time there has been an increasing conversion of degraded forests into a more permanent agriculture and land use intensification. The transformation in the last decade is accompanied by increased concentration of population in lowland areas as well as changes in agricultural production systems from subsistence to commercial agricultural production.

The land use change pattern of this region is an outcome of natural and socio-economic factors and their utilization by man in time and space. Land is becoming a scarce resource due to immense agricultural and demographic pressure. Hence, information on land use change and possibilities for their optimal use is essential for the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs and welfare. It also assists in monitoring the dynamics of land use resulting out of changing demands of increasing population.

Remote Sensing (RS) and Geographic Information System (GIS) are now providing new tools for advanced ecosystem management. The collection of remotely sensed data facilitates the synoptic analyses of earth-system function, patterning, and

change at local, regional and global scales over time; such data also provide an important link between intensive, localized ecological research and regional, national and international conservation and management of biological diversity (Wilkie and Finn, 1996).

Therefore, attempt will be made to map out the status of land use change between 1990 and 2010 with a view to detect the land consumption rate and the changes that has taken place in this status particularly in agriculture land, forest land and built up area so as to predict possible of changes that taken place in the last 20 years using both Geographic Information System and Remote Sensing data and determine factors affected on land use change which influences on farmers' livelihoods of the study area.

1.2 Rationale of the study

The landscapes and ecological conditions in the mountainous in northern Laos are transformed rapidly as road access is being improved and the area is integrated into the regional economies of Southeast Asia, particularly China. Rural livelihoods in the upland areas long based on subsistence agricultural production are changing as more households engage in the market economy. Although economic development in Laos faces many challenges, northern Laos is starting to undergo rapid socio-economic and environmental transformation as in many other regions of the country, the natural vegetation cover of this area particularly forests has been destroyed or altered through human activities.

This problem has led to the reclamation of forestlands for agriculture and over exploitation of forests for timber and fuel wood. The study area is surrounded by mountains where many rural farmers have traditionally engaged in subsistence food production. The farmers are quickly converting their swidden cultivation plots and fallow fields to cultivate cash crops such as vegetables, maize, fruit tree, teak wood and rubber. Farmers in this area are particularly keen to convert any remaining areas of swidden and fallow lands near the roads to teak wood and rubber plantation.

The demographic movement of different ethnic groups in this area of Pak Ou district has become highly complex as upland population began to relocate to lower elevations more permanently. Intensification of agricultural land use not only affects the landscape, but also bears a significant impact on agricultural production. Immigration and increasing of population density and commercialization of agricultural production is also increasing. The competition over communal land which is affecting customary land but also the potential and success of the private sector investment on rubber, small industrial and teak wood plantation are becoming dominant land use in this area.

1.3 Research questions

Given the above context the study has the following research questions:

1. What was the spatial extent of the land use change? Where was the highest rate of land use changes in the study area?

2. What were the major driving forces for the land use change in this region (i.e. government policy, population growth and intensification in agricultural production systems)?

1.4 Objectives of the study

The study aims to establish previous and current trends and assess the spatial land use change, analyze socio-economic factors and their impacts on land use of the study area, so the objectives of the study were identified as follows:

1. To assess the spatial land use change pattern in the last two decades from 1990 to 2010 of the study area.
2. To determine factors affecting land use change and their effects on farmers' livelihoods.

1.5 Usefulness of the study

This study is an attempt to extract useful information from remotely sensed images and analysis in the context of a given rationale of the study. Hence, the outputs of the study will be a methodological and empirical contribution of the significance of geographic information system and remote sensing in the analysis of spatial land use change and pattern detection.

The aim of the study are also to evaluate how and what extent terrain factors control the land use pattern and intends to compare different temporal situations in order to find out whether the relations between physical features (geomorphology, geology) and the land use pattern has changed during the last 20 years. Results of the

study will aim to develop replicable maps and presenting the pattern of land use change over the two decades of the study area as part a region of Pak Ou district for further planning and development.

The results of this study will provide information for decision makers and development practitioners about the magnitude and dimensions of long term land use, their drivers, impacts and community mitigating strategies in the study areas and surrounding. Understanding such changes is critical for formulating effective government's policies and management strategies for formulate future development.