

CHAPTER II

THEORIES, CONCEPTS, CONCEPTUAL FRAMEWORK, RESEARCH APPROACHES AND STUDY AREA

2.1 Introduction

On the basis of information reviewed in chapter 2 some theoretical considerations relevant to this study will be presented, conceptual framework for the study will be developed and research approaches to study will be outlined in this chapter. Description of the study site will be given as a general background for other chapters to be followed.

2.2 Theoretical consideration

The forces on shifting cultivation may push the production system to many forms of alternative land uses. This has led to the ideas and concepts of intensification. In addition the concept of sustainability will have to be considered for both production and conservation of the overall ecology of the system in a large context. For the purpose of the present study, the concept of sustainability will be focused on land use and land management. It should be pointed out that the present study has treated shifting cultivation in different forms of land systems. Any attempts to change these forms of land use may lead to either sustainable or unsustainable forms of alternatives.

2.2.1 Concepts and argument

Intensification was traditionally thought to be associated with change in land use and fallow period. This led intensification to be defined as intensity of cultivation and simply measured in term of the length of the fallow and cropping phases (Ruthenburg, 1980). On theoretical consideration, Boserup (1965) argues that as population increases, technological changes occur and demand for labor increases to satisfy higher demand for food (figure 3.1).

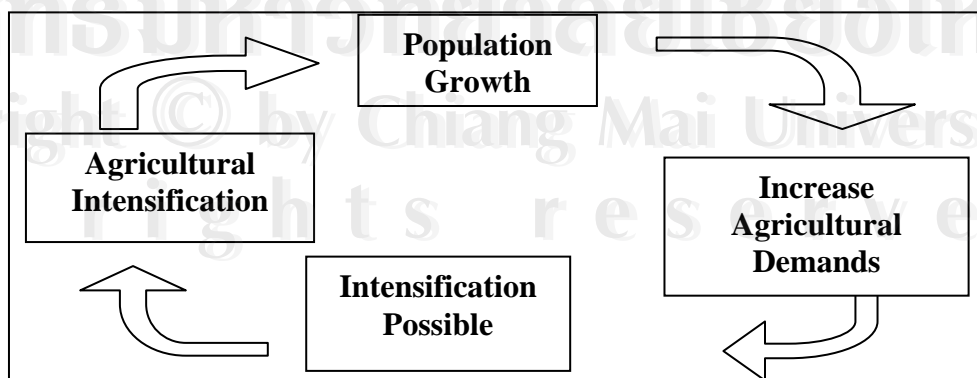


Figure 2.1 Argument on population theory proposed by Boserup (1965).

This is some what contrast to population theory proposed earlier by Maltus T. who stated that growth of population pressure on resources may lead to resource degradation (Malthus, 1789). The surplus generated from intensive cultivation also contributes to growth in other sectors of the economy through the linkages with transportation, networks, external markets, credit institutions and other services. In this study, intensification of rice production would be considered from the whole range of production systems in the village landscape; both traditionally and newly developed systems from upland rice in shifting cultivation to newly developed paddy field. The consequences of the above land use change are considered and the emphasis is given to fallow regeneration. The present study is also focusing on a shift from low to high input options on the given piece of land, increase productivity in village landscape.

2.2.2 Sustainable land use and land degradation

Sustainable land management is a system of technologies and/or planning that aims to integrate ecological with socio-economic and political principals in the management of land for agriculture and other proposals to achieve intra and inter generation equity (ISCO, 1996).

Sustainable land use refers to maintaining the three ecological functions of soils: (a) Biomass production; (b) Filtration, buffering and transformation of incoming materials e.g. water; (c) Habitats of organisms including people. It also refers to maintaining its sustainability for three spatial attributes: (a) space for holding, industry, infrastructure, etc; (b) space for extension for minimum and often non-earning resources (c) area of cultural heritage. Sustainable land use is having 2 meanings (a) with ecological overturns maintaining all the land in particular use in a condition of usefulness (on opposed to dereliction), long term productivity and ecological stability, or (b) with socio-economic overturns, maintaining a particular use on a particular piece of land, for example food security and income generation.

Farmers may also have their own perception and definitions of what they consider to be sustainable land use. Rural people's decision and action play significant part in determining whether present land use is sustainable or unsustainable (Shaxson, 1998).

Sustainable land management combines technologies, policies and certainties, and aims at integrating socio-economic principles with environmental concerns such to simultaneously (1) Maintain or enhance production security (productivity); (2) Under the level of production risks (security); (3) Protect of potential of natural resource and degradation of soil and water quality (protection); (4) Be economically viable (viability); and (5) Be socially acceptable (acceptability). These 5 objectives are called the pillars of sustainable land management and have been achieved simultaneously if true sustainability is to be predicted. Attainment of only one or several of the objectives, but not all, will result in partial on conditional sustainability. This definition is also adopted by the International Board for Soil Research and Management (IBSRAM).

According Stocking, et al. (2000), land degradation generally signifies the temporary or permanent decline in the productive capacity of the land (UN/FAO definition). It is also described as, "the aggregate diminution of the productive potential

of the land, including its major uses (rain-fed, arable, irrigated, rangeland, forest), its farming systems (e.g. smallholder subsistence) and its value as an economic resource". The link between degradation (which is often caused by land use practices) and its effect on land use appears to be the common concerns in the literature on land degradation (Blaikie and Brookfield, 1987). The emphasis on land, rather than soil, broadens the focus to include natural resources, such as climate, water, landforms and vegetation. The productivity of grassland and forest resources, in addition to that of cropland, is embodied in the concepts of land definition. The impact of land degradation may be differentiated between reversible and irreversible process of land degradation. The degree of reversibility is not a particularly useful measure-given sufficient time all degradation can be reversed, as illustrated by the landslide example above. Reversibility depends upon whose perspective is being assessed and what timescale is envisaged. Whilst soil degradation is recognized as a major aspect of land degradation, other processes which affect the productive capacity of cropland, rangeland and forests, such as lowering of the water table, deforestation and desertification, are captured by the concept of land degradation (UNEP/GEF, 2002).

In short, many factors may involve land degradation. Solutions to land degradation are not only based on technical solutions alone, but it depends largely on social solutions as well (Blaikie and Brookfield, 1987). The later may include:

- Land tenure
- Poverty
- Pressure on land
- Labor availability
- Economic incentives
- Appropriateness of technology
- Economic and financial return
- Off-site versus on-site cost
- Power and social status

While intensification is the core concepts and adopted for analytical framework in the present study, it has extended to examine the sustainability pathways of land use changes and alternative land management practices. The combination of these concepts is used to develop a proposed conceptual framework in the context of land use change in Lao PDR and this will be presented in a greater detail in the later section of this chapter.

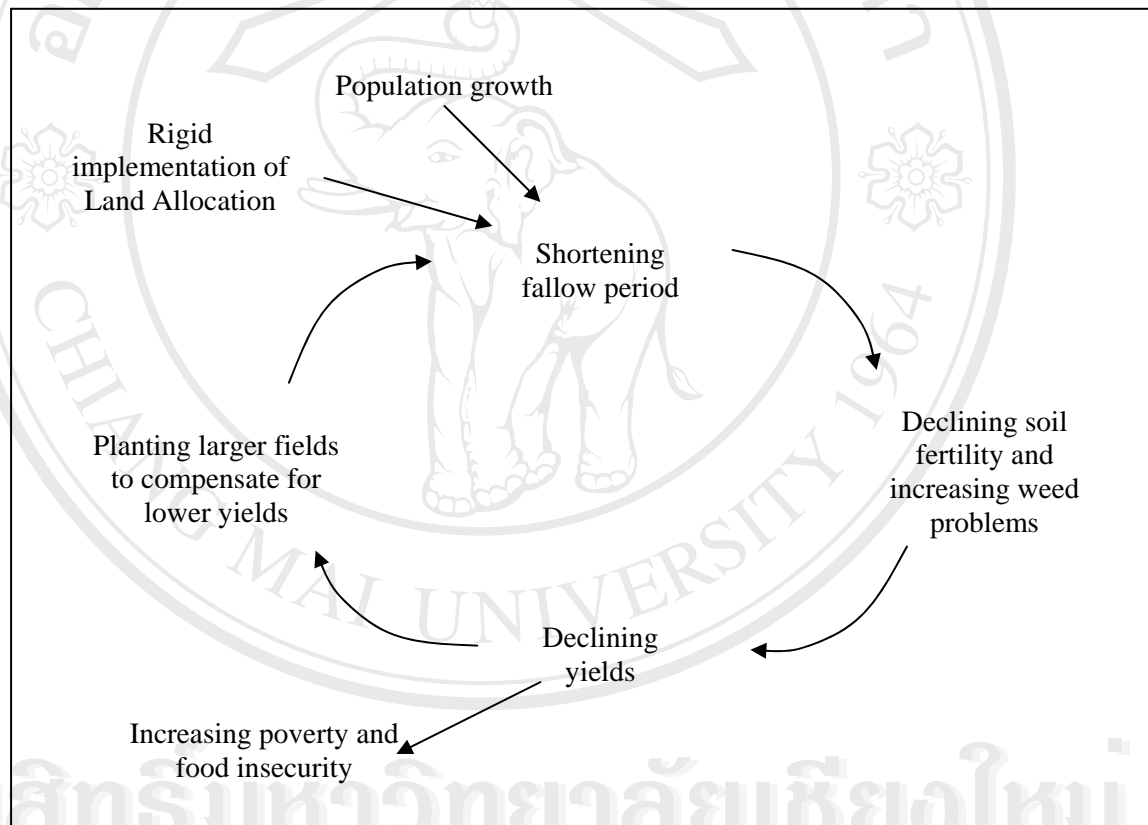
2.3 Process of land use change and degradation

2.3.1 Government Policies and Implementation: The Main Driving Force

While many pressures are drivers of the land use change in the region, the policy dimension appears to be the major driver of land use change in Lao PDR (Chapter III). As government policy on stabilization of shifting cultivation is strongly supported by land allocation implementation, the pressure on upland rice production builds up and subsequently reflects the decline in area and production. If development and policy assumption of production compensation from other alternatives to upland rice in shifting cultivation does not hold, the implementation of land allocation would increase population pressure on land with declining productivity of upland rice due to short cycle shifting cultivation. In this process, soil fertility would be declined due to

inadequate regeneration of fallow forests. On top of this, rapid building up of annual and shrub weeds is expected due to the delay in natural regeneration and succession processes. Hence, farmers are facing with significant yield decline and possible collapse of upland rice production system if no restorative action to regenerate the production is effectively undertaken.

Pravongviengkham (2003) analyzed the upland situation in Lao PDR and his results supported the argument. His conclusion is that with rapid implementation of land allocation cycle of the conditions that led to shortening of the fallow period would result in soil fertility declining and increasing of weeds problems and hence the decline in yielded of upland rice and consequently forced people to enter into larger shifting cultivation field to compensate for the yields loss.



Source: Pravongviengkham, 2003.

Figure 2.2 The swidden degradation syndrome, a vicious cycle of acceleration poverty that becomes hard to stop

Shifting cultivation stabilization policy is also essentially eliminating the forest fallow option from the upland field component (Thomas, et al. 2003), Follows are seen as degraded or destroyed forest, rather than as a developing phase in bush-fallow cycle. If the farmer abandoned land after three years the land would be

reclassified as regeneration forest and fallow fields will be returning as natural forest for conservation. This pushes the pressure on local community to manage for regeneration with the maximum of tree years.

2.3.2 Consequence of changes

1) Land use

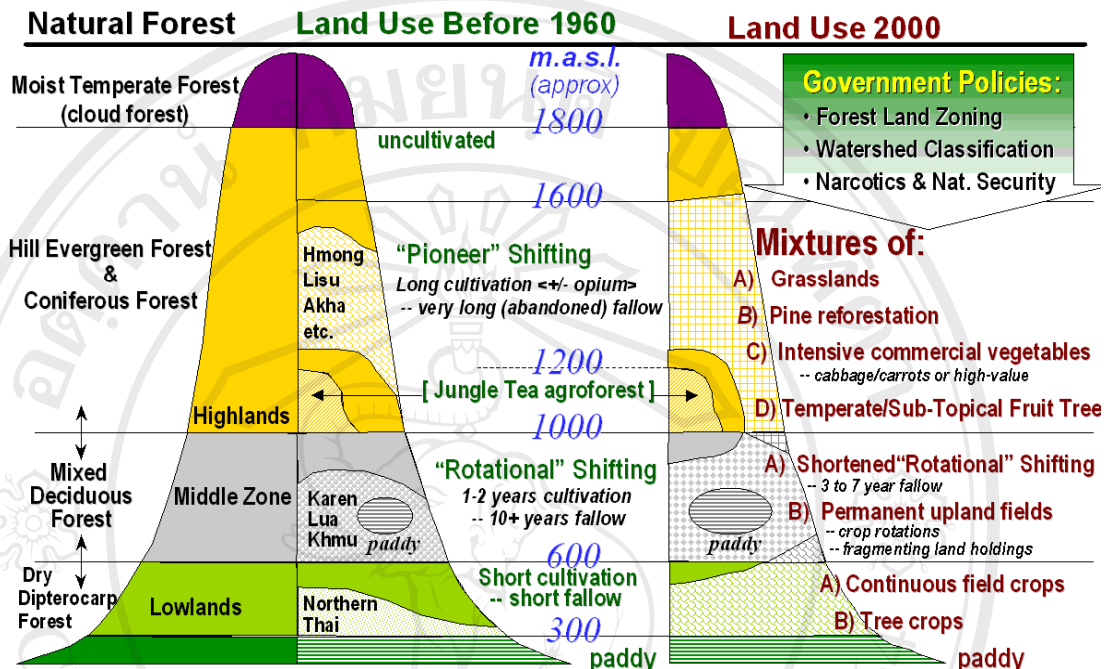
Despite the many forms of traditional shifting cultivation practices, the impact of government policy against shifting cultivation is rather uniform with pressure on increasing land use intensification. In Thailand and elsewhere, former pioneer shifting cultivation farmers have experienced with the sudden shift from traditional shifting cultivation of opium-based production systems to fixed cultivation of alternative cash crops due to government policy and international campaign to suppress opium growing (Rerkasem and Rerkasem, 1994, Bass and Morrison, 1994, McKinnon and Bhruksasri, 1983). In Yunnan of China, large scale plantation of perennial cash crop and industrial crops such as sugarcane, tea and rubber plantation, have virtually replaced traditional revolution in 1949 as the results of modernization policy and campaign against rural poverty (Yin, 2001). The farmer rotational shifting cultivation communities suffered from restriction of land use with reduction fallows.

The overall land changes of shifting cultivation landscape may be summarized and depicted in figure 3.3. During 1960 and 2000 in Northern Thailand and he pointed out that natural forest and ecological conditions vary along an altitudinal gradient, as do the traditional land use systems and associated ethnic groups. As suggested in the right side of the diagram, current land use and settlement patterns often deviate from traditional ones due to a variety of government policy, economic and social forces that have brought change to this region during recent decades.

In Lao PDR, recent changes have taken place in around 1980's when government introduced policy to stabilize shifting cultivation. Although the government policy seemed to emphasize the stabilization of pioneer shifting cultivation (*hai kheuan nhai*) but actual implementation with land allocation measures failed to distinguish the differences. Hence, the trend in land use change may inevitably follow those that experiences in country like Thailand, China and Vietnam. Virtually, all types of shifting cultivation were affected. Little is known about the diversity of land use for traditional shifting cultivation in Lao PDR and records of shifting cultivation appeared to be very little (Bass and Morrison, 1994). However, it is not difficult to find that the types of shifting cultivation vary along the altitude of the hilly landscape, on the higher altitude above 1,000 masl, Lao Sung basically practice pioneer shifting cultivation with subsistence crops, e.g. maize, upland rice, cassava, beans etc, as well as opium. With international assistance such as the United Nations Drug Control Programme (UNDCP), GTZ and the Norwegian Church Aid (NCA), alternative development with introduction of licit livelihood activities are replacing opium cultivation in rapid pace. Temporal village movement and spontaneous resettlement after abandoning of shifting cultivation are virtually stopped with low enforcement for permanent settlement. Many communities, e.g. Hmong, have settled with wet rice cultivation, others may continue shifting cultivation on short rotational basis with maximum of 3-5 years.



Changing Land Use Patterns in North Thailand



Source: Thomas, et al. 2002.

Figure 2.3 Differences among altitude zones

In the middle attitude, Lao Theung who basically practice rotational shifting cultivation with longer rotation of up to 15 years have reduced their fallow periods to a maximum of 5 year or less. These communities have settled permanently with more or less stable production as long as fallow regrowth remains productive. In general, government efforts in the sub-region including Lao PDR have tried to stabilize shifting cultivation with alternative forms of land use on productive and sustainable basis. Many development approaches have been employed and implemented. However, people in the upland or shifting cultivator in mainland Southeast Asia, this including Lao PDR facing two problems, poverty and environmental deterioration (Yasuyuli, et al. 2003). The first discussion was on the upland people with very limited access to technology to increase their productivity and their farming diversity to earn additional income and the second was on the conditions of the mountainous, steep slope so there is a risk of soil erosion and nutrient loss. Over exploitation of the environmental resources may cause immediate environmental deterioration.

2) Upland rice production

Despite the strong national policy on food security and poverty reduction, production of upland rice steadily declined in the past few decades. Productivity of upland rice remains fairly low and relatively unstable with yields ranging from 0.8-1.5

t/ha (Roder, 2001). Although the rice production at national statistic appears to reach sufficient level at national scale for the past 4-5 years, the deficit is still widely spread among the upland farmers in most of area in the country. In the upper part of the country, ABD (2001) has documented the severe deficit of rice since 1975 and situation remains unchanged and in many cases it is worse.

NAFRI (2004) proposed that this issue of food insecurity has to be dealt with before any other interventions to alternative income generation activities. While FAO indicator for adequate food requirement of 2,250 Cal/day/capita has been set as an overall standard, food intake of the upland farming families in Lao PDR is falling behind that figure and this remains to be addressed.

After the implementation of shifting cultivation stabilization policy, Hansen (1998) requested that the Lao government development strategy has yet to read the satisfactory target in rice production. Despite the implementation of:

- Land use planning and land allocation
- Promotion of permanent cash cropping
- Expansion of paddy area
- Expansion of livestock production
- Tree planting by farmers
- Infrastructure development and
- Socio-economic development work.

He argued that based on rapidly changed due to the government policy implementation and efforts, however, it appeared that some measures were technically inappropriate, socially unacceptable, dependent on road access, or suitable only gentle slope. Some alternative land use practices especially the permanent arable cropping, may be more prone to accelerate erosion and fertility decline than shifting cultivation.

In the early this year, NGPES has been indicated the link between upland management and poverty reduction strategy of the Lao government.

The situation in Northern Thailand may be partially related to the Lao PDR situation. It should be, however, noted that market force in Thailand is one of the dominant drives in the situation of land use change. Huge supports from external and internal assistances have continued for at least 30 years. Government subsidies on production of cash crops are enormous.

2.4 Conceptual framework

At the general level, a simple input and output model was adopted to develop a general framework on land use change in Lao PDR (Figure 3.4). However, the process of land use change and the changes in land management practices depends upon both internal and external pressures or changes. As the results of changes, alternative production systems and management options have been developed but whether the outcomes of the changes may be manipulated. For the sake of simplicity, the terms of push and pull factors are preferred in this thesis, so that they can be easily distinguished. In consistent with the objective of this thesis (Chapter 1), the study is paying attention to upland rice production system as the core object. In the process of land use change, moving away from upland rice in shifting cultivation is also

affecting the ecology of the upland ecosystem because fallow lands are expecting to regenerate and contribute significantly ecological sustainability of the Headpond area of the project as a whole.

The general input/output model was further developed into more detail with specific identification of key factors, variables and determinants based on current knowledge and available information compiled and reviewed in Chapter 2. The interrelationships between these variable, determinants or factors affecting the changes could be established at this specific level. These may be expected and summarized as follow.

2.4.1 Push and pull factors

The push factors consists of 2 major components, government policies and provision of Theun-Hinboun Hydropower project assistance. Government policy that has the major impacts on land use change in this study site, is stabilization of shifting cultivation. This policy target is aimed to achieve by the implementation of land and forest allocation, village consolidation, poverty reduction and forest conservation policies.

With assistance from Theun-Hinboun Hydropower Project, villagers in the project are received various support and service. The supports are not aiming only to compensation and mitigation due to dam construction but they are delivered within the framework of national policy on shifting cultivation stabilization. Therefore, coordination and collaboration with local and national agencies would have to be established at all level to ensure the effective implementation and complimentary of various sources of support and services. Overlapping activities have been largely avoided.

Improvement and development of infrastructure have been focused on rural road construction and improvement, installation of electricity as well as improved health and education services. With request to alternative land use to shifting cultivation, promotion of cash crops with input and technology supports. Irrigation is also provided to allow opportunities for crop intensification. Rural credit systems are initiated to support alternative land use and production systems for intensification. Access to markets has been improved markedly with improved transportation and rural road networks. The networks also link to the major highway to the middle part of Vietnam.

In the transition of land use change, community and member households have to adjust to these development changes. The pull factors may be thought in terms of the balance to the push factors within the context of local livelihood agenda. Food security becomes the top agenda on rural development for local people. However, improvement of livelihoods could be taken as the advantages from external assistances but the process may not be just straight forward. Any alternative production systems will have to be fine-tuning in this heterogeneous landscape of the study village.

Within the above context, the present study proposed to examine those factors relating to local strategies in rice sufficiency, the processes in development of alternative production systems as land security has been improved recently with

tenure agreement and management based on land and forest allocation policy. Local land management practices and local knowledge and taken into account for development of alternative land use.

The overall variables of push and pull factors would allow adequate information to assess the outcome of land use change in the village for the present study.

2.4.2 Change in land use and management practices

With the implementation of land and forest allocation policy with development provision from Theun-Hinboun Hydropower Project, farmers are expected to improve their traditional land use system with dominant shifting cultivation by establishing more intensification land use systems with fix cultivation and possible crops and perennial or higher value trees for external markets. Elsewhere in Lao PDR, this has been found to be an uneasy task under current socio-economic and biophysical set up of the mountain region with steep slopes (NAFRI, 2004, Thomas, et al. 2003).

In Theun-Hinboun Hydropower Project area, the development efforts have been partially success. Majority of village of villages in Project area are facing many difficulties in moving away from shifting cultivation. At the beginning of Project implementation, many villages gave up production of upland rice in shifting cultivation. The sudden shift toward greater intensification of land use with emphasis on cash cropping has failed to sustain livelihood of farming households. Inadequate rice production is increasing and this imposes many difficulties on the households. In 2005, many farmers returned to their former shifting cultivation fields and opened them up for upland rice production. This has been arranged under certain agreement with the Project and other local authorities in order to allow the implementation of government policy on stabilization of shifting cultivation to be proceeded. It appears that this short term solution may not work on a longer term basis if relevant implementation strategy and necessary action have not been found.

In this thesis, the land use change at village level is to be established and analyze with respect to the above context. This would be focused on rice production systems with specific examination of fallow regeneration in shifting cultivation.

2.4.3 Alternative options for rice production

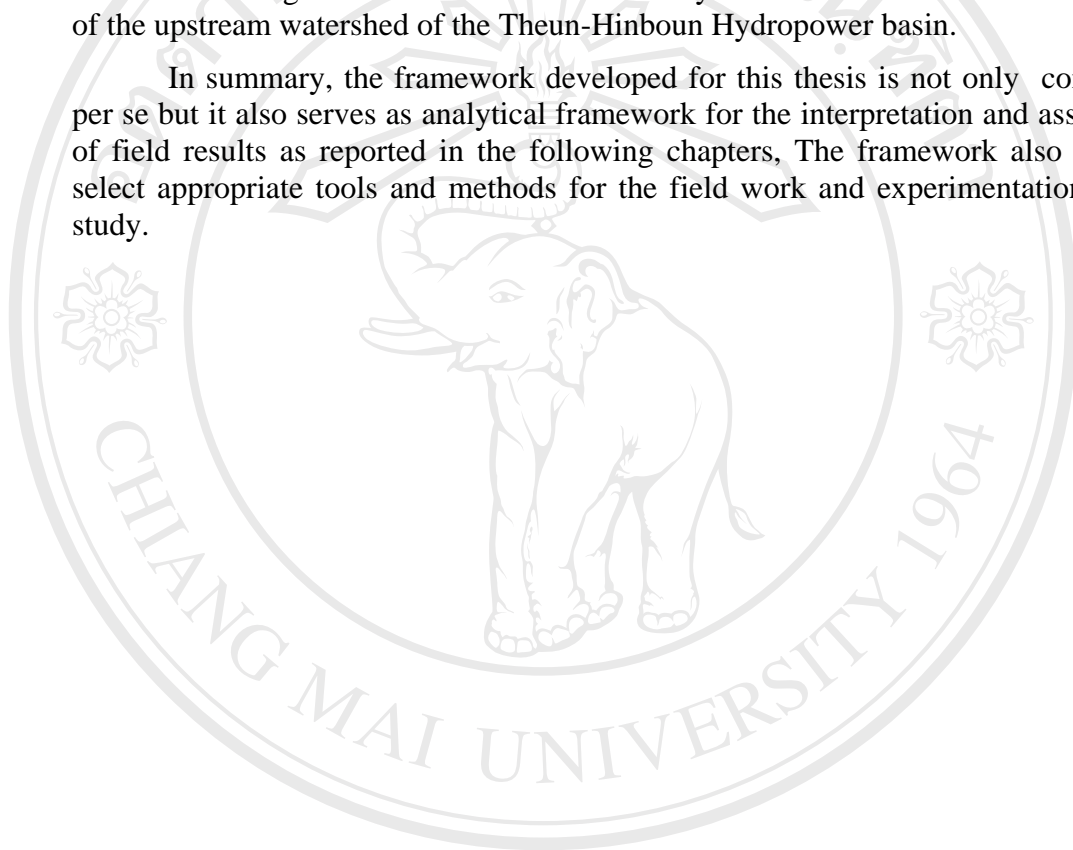
In the face of land use change, newly developed production systems may offer an opportunity for farmers to grow rice to compensate production loss from shifting cultivation stopping. As rice subsistence remains to be the dominant production strategy in the farming household, production of rice could have been developed in association with older production crops in alternative production systems.

In this study, much attention is given to diversity of production system with appropriate management practices of intensive cropping where growing of rice could be integrated and/or developed independently. Assessment of the systems is focusing on its productivity and sustainability of the rice component in the production systems.

2.4.4 Regeneration ecology of secondary forests

According to the National Forest Strategy 2020, the overall achievement of stabilization of shifting cultivation is expected to increase forest cover due to the release of fallow fields for natural regeneration or re-vegetation of the forests. It is perhaps too early to judge whether the process would take place as the above expectation. No concrete data is available to support this, except the rapid increase in teak plantation in the upper part of country, e.g. Luangphabang (Roder, 2001). However, teak plantation may be seen as alternative cash crop rather than secondary forests. Its ecological functions and services may not serve the conservation objective of the upstream watershed of the Theun-Hinboun Hydropower basin.

In summary, the framework developed for this thesis is not only conceptual per se but it also serves as analytical framework for the interpretation and assessment of field results as reported in the following chapters. The framework also helps to select appropriate tools and methods for the field work and experimentation in this study.



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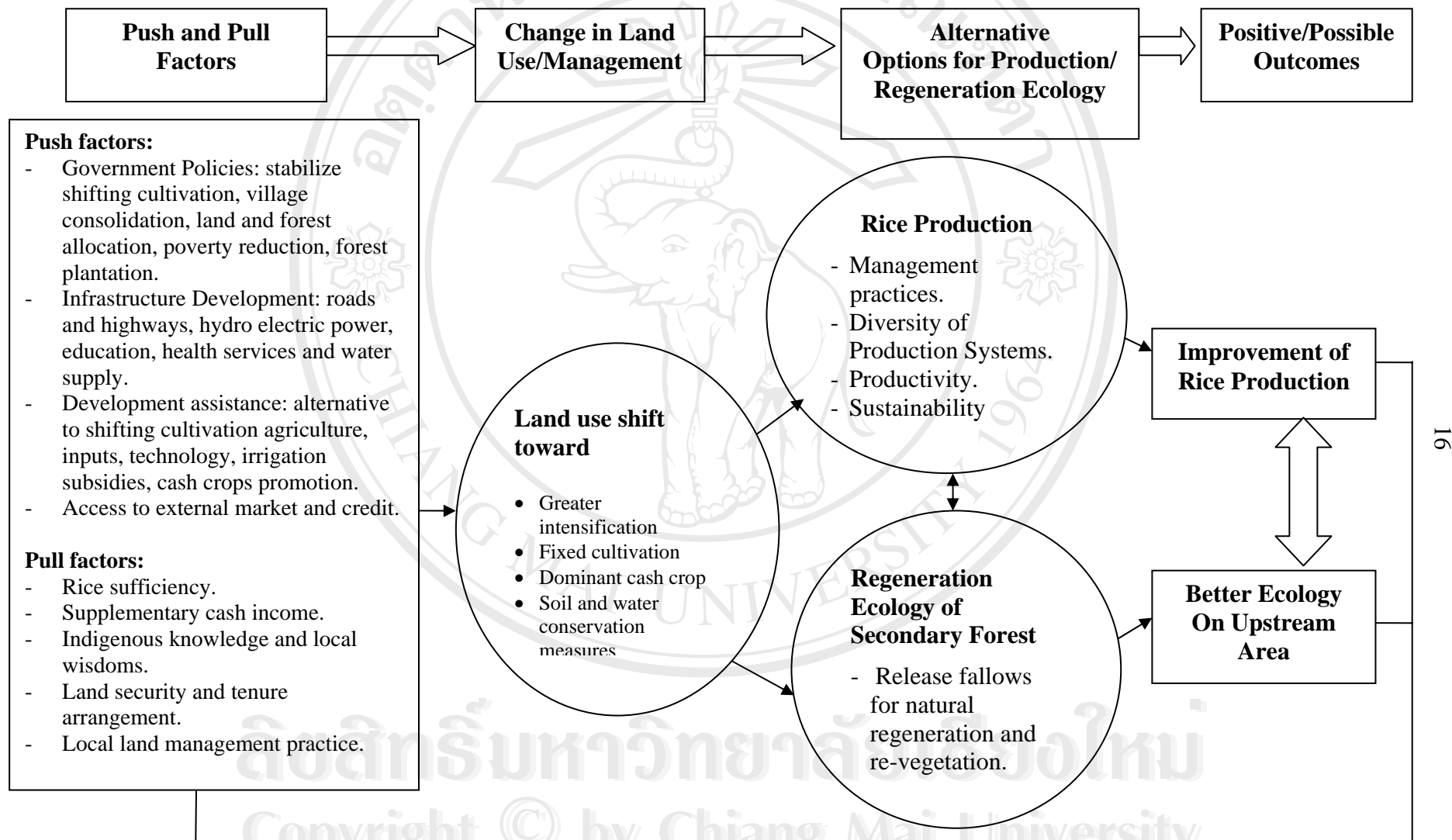


Figure 3.4: Conceptual Framework- External Push and Internal Pull of Sustainable Upland Rice Production and Its Interrelationship with Ecology of Theun-Hinboun Hydropower Project: A Case Study of Sobngouang Village, Khamkeuth District, Bolikhamxay Province, Lao PDR

2.5 Research approaches

To arrive at the answers to the proposed research questions, an interdisciplinary approach has been adopted with multiple tools and methods from both natural and social sciences. The analytical approach in ecosystem analysis was applied to social, ecological and production data for assessment of the impact of land use change on rice production as well as ecological aspect of forest regeneration (Walker, et al. 1978, Conway, 1987). The analysis of spatial and temporal data is focusing on properties of upland rice ecosystems with cropping and fallow fields in different stage.

Primary and secondary data were collected and field measurements were also undertaken to assess the changes in natural resource and village status. Sustainability assessment in the present study was based on actual field measurements of rice productivity and fallow forest regeneration. Livelihood approach was incorporated in the analysis to link production system with socio-economic conditions of the farming households and community (Chamber and Conway, 1992).

Primary data collection and field surveys were based on participatory rural appraisal (PRA) approach (Chambers, 1992). Within the elements of conceptual framework (Figure 3.4), specific methodologies, tools and sampling techniques will be given in appropriate chapters.

2.6 Project area and study site

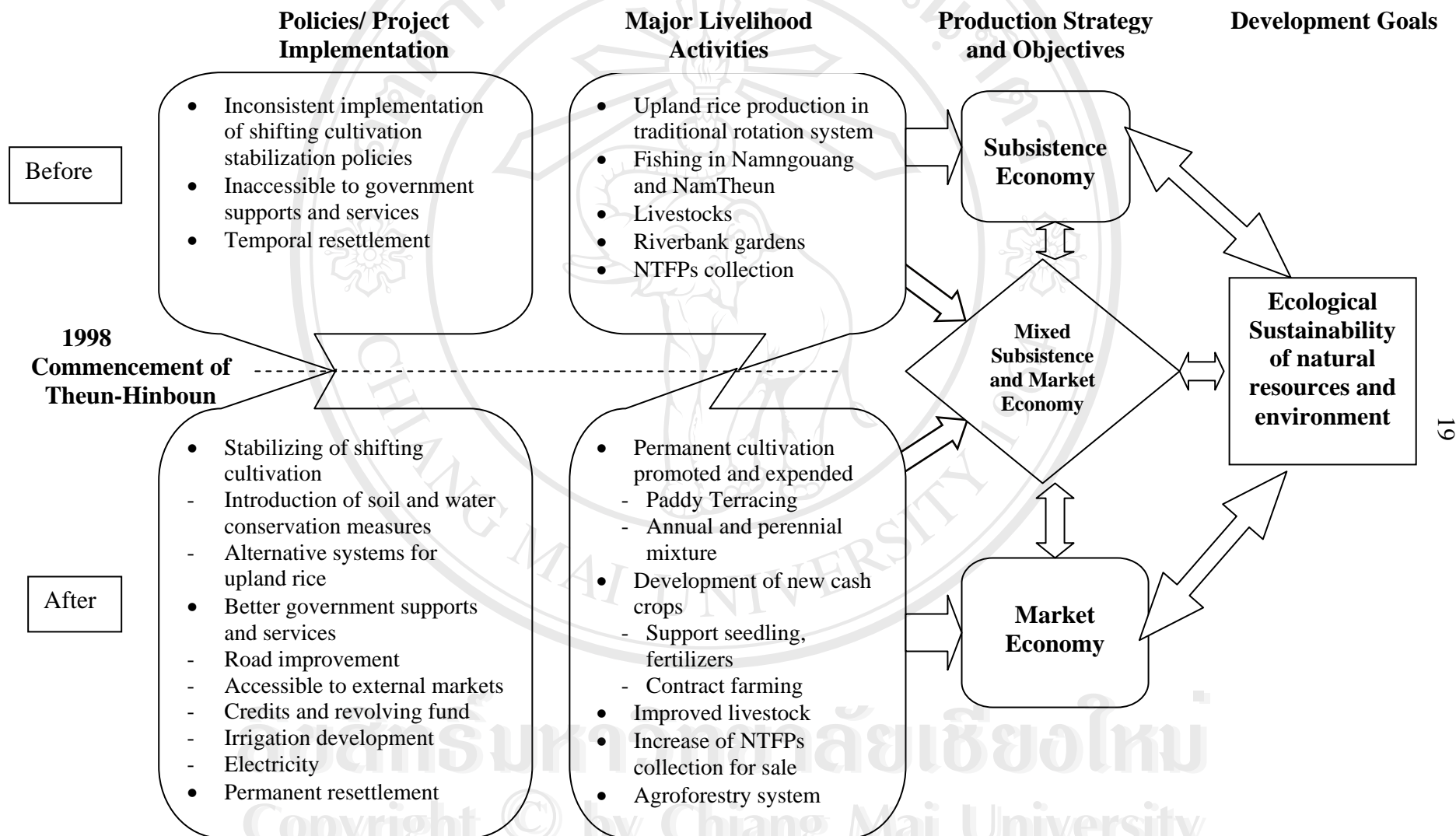
Sobngouang village was chosen as a typical village on the upstream area within the boundary of Theun-Hinboun Hydropower Project. The village consisted of two communities after merging as one administration village in 2000. In the past, there were Sobngouang and Kapap villages. The merging of two villages was based on government policy on village consolidation. At present, there are some 66 households with 359 of population. The village belongs to Lao Lum ethnic group with further division of Meu and Man sub-ethnic groups. These people came from the upstream of Namngouang River close to Lao-Vietnam border. According to traditional beliefs and custom, villagers may move to new resettlement site when severe outbreaks of human diseases with large number of dead toll. Other reason for relocation and resettlement was due to the decline in productivity of shifting cultivation. They refer to as “*Hai Kau Lau Cheud*”, literally translated as “Old Field Bad Fallow”. Rice production fell behind household requirement, i.e. severe rice deficit. In the case of Sobngouang, people moved down along Namngouang River and settled in a new site along the lower part Namngouang river and one of these communities are now Sobngouang village.

Since completion of Theun-Hinboun Hydropower Project, there have been many changes in the village. Government policy on stabilization of shifting cultivation has been fully implemented with extensive land and forest allocation policy in the Project site and the study site. Socio-economic condition of the villages has improved greatly, especially with infrastructure development. There is some loss in livelihood activities after the completion of the dam, but overall livelihood activities have increased with alternative income generation activities.

Farmers' objective in agricultural production is expected to shift from subsistence economy to market economy. This expectation may be achieved partly, majority of farmers may fall somewhat in between the two contrasting objectives. Whatever production strategies and farmers' objective will be, the major development goal of the Project is enhancement of ecological sustainability of the Project area for national benefit. This, in turn, feedbacks to the villages in terms of government supports and services on a long run.



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Source: Author's field works, 2005

Figure 2.5: Changes in government policies and project implementation, major livelihood activities and production strategy and impact on development goals of Theun-Hinboun Power Project

The area under this study is located in the upper part of Theun-Hinboun Hydropower Development Project. Sobngouang village was selected as a study site. In Sobngouang village land area is comprising of village area, Road, River, Permanent garden, Protection forest, Conservation forest, Rehabilitation forest, Production forest and cemetery with total area of nearly 2,600 ha. Overall, Sobngouang village represents a typical village in the upstream of the watershed. Findings from this village is expected to wider implication for further project implementation. Location of the study area can be found in figure 3.3 and figure 3.4 below:

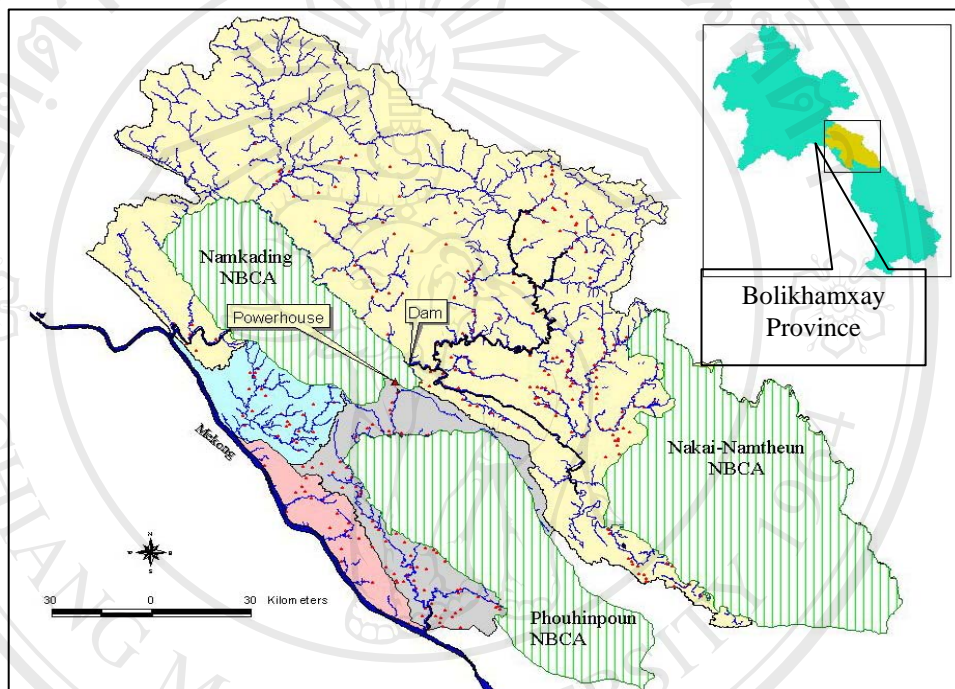


Figure 2.6 Research Site, Theun-Hinboun Hydropower Project

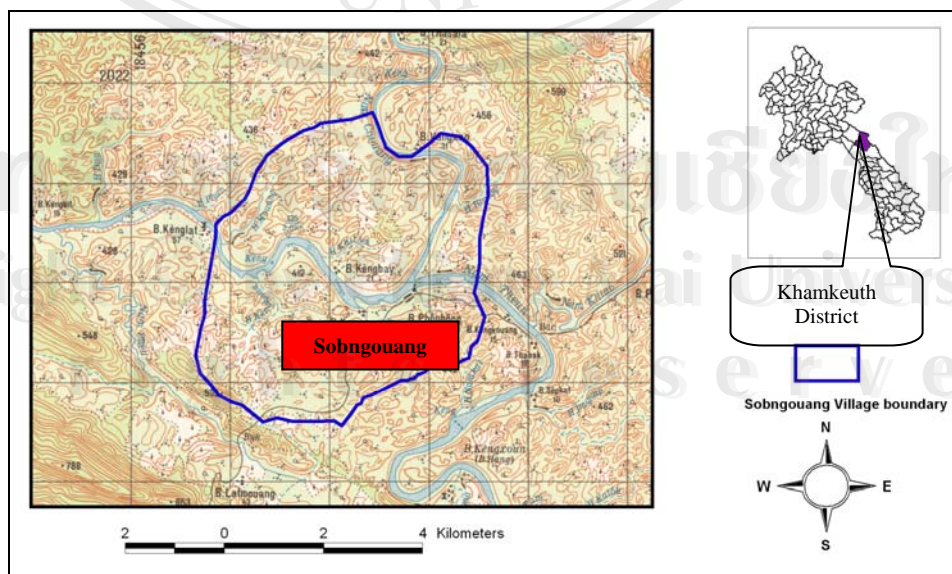


Figure 2.7 Research Area, Sobngouang village at map scale 1:100,000

2.7 Scope of the study

The scope of this study is overlapping between social and natural science components. Assessment of rice production systems and their consequences on land and forest may be biased toward natural science component. However, the results would require for the assessment of land use changes and policy impacts on support of upland rice.

- Assessing the change in rice production system and its consequences on land and forest.
- Assessing the social and economic changes due to suppression of upland rice and the significance of upland rice on food security of the rural development.

This study is expecting to obtain a better understanding of the significance of upland rice production and its potential consequences to forest and vegetation and land (soil) degradation. Assessment would be based on the government policies and its implementation whether they would fit the local condition and contribute significantly to increase food security of the local households. Finally from this how we could learn and adjust for a better and sustainable of land use and natural resource management. To make sure all components would be balancing between socially people and natural resources. This study is also expected to provide direct benefits to the Environment Management Division (EMD) of Theun-Hinboun Hydropower Project, the major implementing agency in the project area. The most beneficiary of this study is expected to be further to local people in the area who are coping with all the changes to a better and over come of this transition period of upland rice production. Other beneficiary is to help government agencies understand what are really happening in villages and their concerns, etc.