

AGRARIAN LAND USE TRANSFORMATION IN UPLAND AREAS OF NORTHERN LAOS.

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Abstract

Farmers in northern Laos are experiencing rapid transformation from subsistence agricultural production to intensive cash crop cultivation since the last decade. This transformation has been especially accompanied by conversion of secondary forest areas in the upland which have been part of the upland swidden system into permanent agricultural land. Introduction of new crops such as sugar cane, maize, and rubber are incurring new economic opportunities for the upland farmers which have been primarily dependent on upland rice cultivation for household food consumption. While commercialization of agricultural production in the upland areas is promoted by the government which aims to alleviate rural poverty, by providing an alternative to shifting cultivation and opium production in the upland areas, not all upland communities are able to capture the emerging opportunities.

The current research examines land use change patterns and driving forces of farmer's decisions on changing land use and selecting crops particularly in areas along the new North-South Economic Corridor that pass through Luang Namtha and Bokeo provinces in northwest Laos. We incorporate spatial analysis using Landsat and Aster satellite images from different time periods to understand the recent trend of land use change in Sing and Vieng Phoukha District of Louang Namtha Province as well as Houayxay District of Bokeo Province. The research also incorporates different interview techniques including cognitive mapping, group interviews, household interviews to analyze key factors that influenced communities' land and resource management

practices as well as farmers' decision on land use and selection of crops over the last decade. Finally, the current research incorporates policy review and stakeholder discussions at the local level to understand the gaps between government policies that affect land and resource use in the study sites.

1. Introduction

Farmers in Lao People's Democratic Republic (hereafter Lao PDR or Laos) began to experience transition from subsistence agricultural production to cash crop cultivation since the market liberalisation in 1986. In the last decade, this transformation has been accelerated particularly by increased development of infrastructure and institutions that support regional trade (Leebouapao et al. 2005, Thongmanivong and Fujita 2006). It has also increased economic and investment opportunities for investors from neighbouring countries to engage in various forms of contract farming. In northern part of the country, which is mountainous and where many rural farmers have traditionally been engaged in subsistence food production, farmers are quickly converting their swidden and fallow fields to cultivate cash crops such as sugarcane, maize, cassava, and rubber (Socio Economic Unit 2006, Vernon 2006). Commercialization of agricultural production particularly in upland areas is promoted by the Lao government as an alternative to shifting cultivation practices and is deemed to eradicate rural poverty at the same time. However, the realities in the rural areas are complex. Commercialization of agriculture is pertinent in areas along the major road and cities particularly along the national borders. Conflicts over productive agricultural lands and resources are also becoming more rampant, often involving stakeholders from outside of the village.

2. Background

Current research is part of the on-going regional multidisciplinary research project carried out by researchers from Chiang Mai University, Kunming Institute of Botany in China, National University of Laos, World Agroforestry Centre and East West Center. Research in Laos is conducted jointly by a group of researchers from the Faculty of Forestry at the National University of Laos and the Environmental Program of East West Center in Hawaii. The overall goal of the regional research project is to understand dynamic patterns of land use and livelihood in the Montane Mainland Southeast Asia (MMSEA). It aims to project future scenarios of land use in MMSEA region especially in southern Yunnan Province of China (Xishuangbanna), northern Laos and northern Thailand based on past and present resource use practices.

Our current study based in Lao PDR particularly focuses on patterns of land use change along the National Route A3, and conditions under which rural farmers in different region make decision on their agricultural production system. Our research addresses the following questions:

- 1) What is the recent patterns of forest and land use in Luang Namtha and Bokeo provinces along the new Economic Corridor? What are proximate factors that drive forest and land use change in this region (i.e. government policy, population, and agricultural production system)?
- 2) How do farmers make decisions on their agricultural production and land use practices? What are the key factors for their decision making? How does this differ between different classes of households and ethnic groups?

Current paper summarizes preliminary findings of research conducted in northern Laos including two districts of Luang Namtha province (Sing and Viengphoukha District), and in Bokeo province (Houay Xay District). The paper presents recent patterns of land use, and addresses key concerns on land use transition and livelihood in the upland areas of northern Laos.

3. Research method

Land-use change can be defined as a change of an existing land-use category or a change in the intensity of an existing land use (Turner and Meyer 1994). While population pressure is often claimed as the source of resource deprivation and environmental destruction, land use change is caused by a range of factors that are both direct and indirect factors (Lambin et al. 2003). In particular, it is important to consider the power relationship and institutional factors that affect decision making on land and resource management, and the choice of development as they bear impact on local resources (Blaikie 1985). The changing land use is also a part of agrarian transformation as farmers in rural areas adapt their farming practices and reallocate resources for agricultural production (Hayami and Kikuchi 1981).

Our research incorporates different methods to understand the driving forces of land use and livelihood change in northern Laos. In particular, we used spatial analysis to detect trends of land use and demographic changes. Furthermore, we analyze agricultural production system and review resource policies to understand the patterns of human and environmental interaction that is taking place in northern Laos, and driving forces that are incurring these changes.

We conducted spatial analysis using Landsat satellite images for Sing District in Luang Namtha between 1973 and 2004. Out of the total district area of 142,957 ha¹, changes in forest and non-forest land use was assessed for 79,494 ha (56 percent). The main objective of the analysis was to understand the historical patterns of forest cover in Sing district. We define forest including both secondary as well as dense forest. While the district statistic on forest area includes shrubs, bamboos and degraded forest areas, we considered these land categories as non-forest area in the spatial analysis. We are also processing Aster satellite images in Sing and Vieng Phoukha District of Loung Namtha Province to compare the recent trend of land use change in detail.

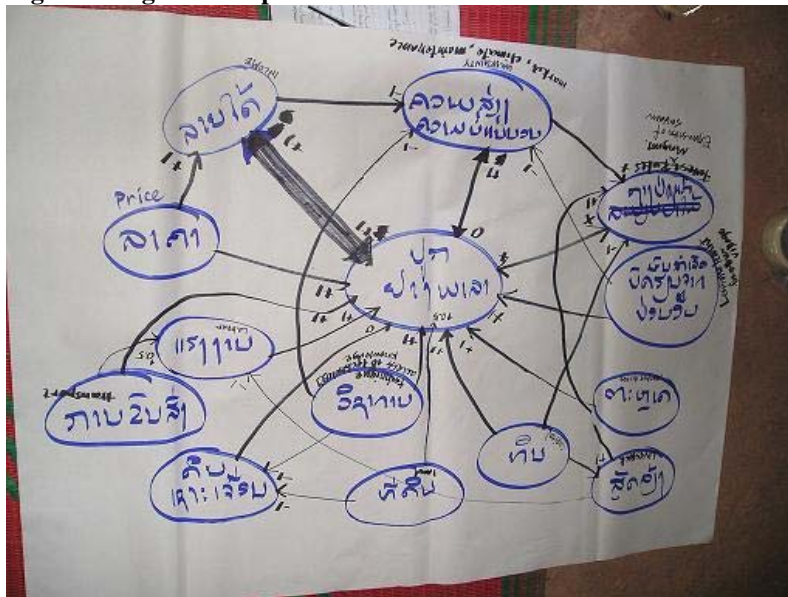
In addition to spatial analysis, we also incorporate different interview techniques to understand the key factors influencing communities' resource management practices and farmers' decisions on land use. This includes key informant interview, cognitive mapping, household interviews and stakeholder discussion. In each province, we interviewed Provincial Agriculture and Forestry Office (PAFO), as well as District Agriculture and Forestry Extension Office (DAFEO), and District Planning Office (DPO) to understand the development history of each research site. This was followed by a selection of research villages in each district based on discussions with DAFEO. After the selection of villages, we organized preliminary field visits and interviewed village leaders and households using cognitive mapping and group discussion to understand the land use history and resource management practices of the village. Cognitive mapping was

¹ While the district agricultural and forestry office records 187,900 ha as the official area of Sing district. This includes areas of Meuang Yuan which is now part of China. In our research, we used the actual district area based on field observation and interviews at the district government offices.

conducted with groups of farmers planting rubber to understand key factors determining their decisions to plant cash crop, especially rubber, and the relative importance of key factors (Figure 1).

In Sing district we selected villages for further household interviews after the preliminary field visit. We selected villages of different ethnic groups to compare the factors that affect land use change. We also selected different classess of households within each village based on their access to land and household economy in order to understand how different factors affect each households' decisions on land use. Finally, our research incorporate stakeholder discussions to understand the impact of government policies on land use change in the study sites.

Figure 1 Cognitive map



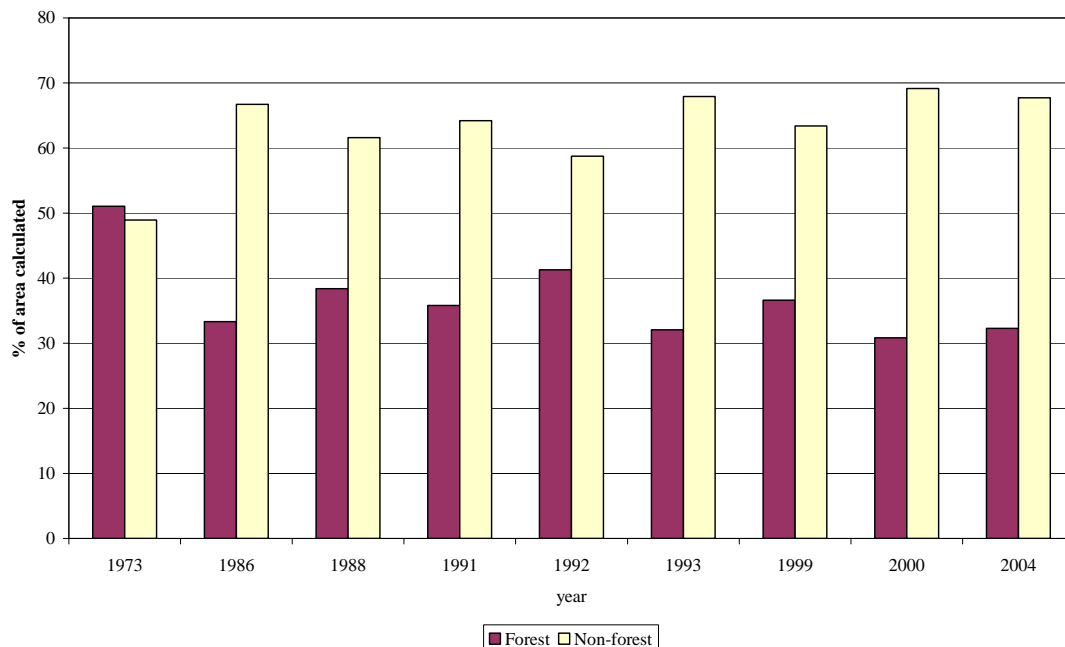
This is a cognitive map of a villager indicating key factors for planting rubber. Researchers and farmers discussed on key factors (i.e. labour, capital, access road, knowledge and technique, information on successful planting in other villages, income, and so forth) that are important for making decisions to plant rubber. Relationship between factors, and relative importance of factors are also shown by rating each factor (e.g. double plus, plus, zero, minus).

3. Trend in land use change

Based on the spatial analysis conducted for Sing district, forest area in the district declined from 50 to 30 percent of total area calculated between 1973 and 2004 (Figure 3). A period between 1974 and 1986 indicates the most significant decline of forest from 50 to 30 percent, while recovering to 40 percent in 1992. We can hypothesize several

proximate causes that led to forest loss between 1974 and 1986. The first proximate cause is forest fire. Satellite image in 1986 particularly indicates a large tract of areas affected by fire in Xiengkheng and Xay sub-districts located on the northwest part of the district along the Mekong River. During our stakeholder interview, staffs from District Agriculture and Forestry Office² in Sing district noted high incidence of forest fire in Xiengkheng and Xay sub-districts every year due to local hunting practices that use fire to chase wildlife. In the meantime, between 1986 and 2000 we generally observe a cycle of forest cover ranging between 30 to 40 percent. However, after 2000 the rate of forest remains approximate at 30 percent.

Figure 2 Forest and non-forest land in Sing district



Source: Thongmanivong (2005)

We are currently processing using ERDAS Imagine to process satellite images (Landsat and Aster) from 2000 and 2005 in Sing district, Viengphouka district and Houay Xay district to detect detailed land use changes. We classify land cover into five main categories including (1) forest, (2) secondary forest, (3) shrub forest (4) agricultural land,

² In 2005 this was changed to the District Agriculture and Forestry Extension Office (DAFEO) under the Provincial Agriculture and Forestry Extension Office (PAFEO).

and (5) water body. Through integration analysis with Digital Elevation Model in GIS, agriculture land will be further reclassified into upland agriculture and lowland agricultural land. The main purpose of this spatial analysis is to distinguish the trends of commercial cash crop expansion in upland areas (especially rubber) and assess its impact on forest.

4. Agrarian transition in the uplands

4.1 Commercialization of agricultural production

Raintree and Soybara (u.d.) describes that the upland farming system in Laos is based on long history of extensive land including shifting cultivation practices due to low population density (p3). The upland farming systems in Laos is also characterized for its high dependency on forest resources and its diversified activities. However, over the last decades, improved economic relations with neighbouring countries, and infrastructure development is rapidly integrating rural communities into market economy and influencing the farming systems. There are greater pressures on commercially valuable forest resources, and increased competition for agricultural land as more farmers are becoming engaged in commercial agricultural production. Commercialization of upland agriculture is also supported by government of Laos as an alternative to shifting cultivation practice, which has long been blamed as the source of forest destruction (MAF and NAFRI 2005), and a way to alleviate rural poverty particularly in upland areas.

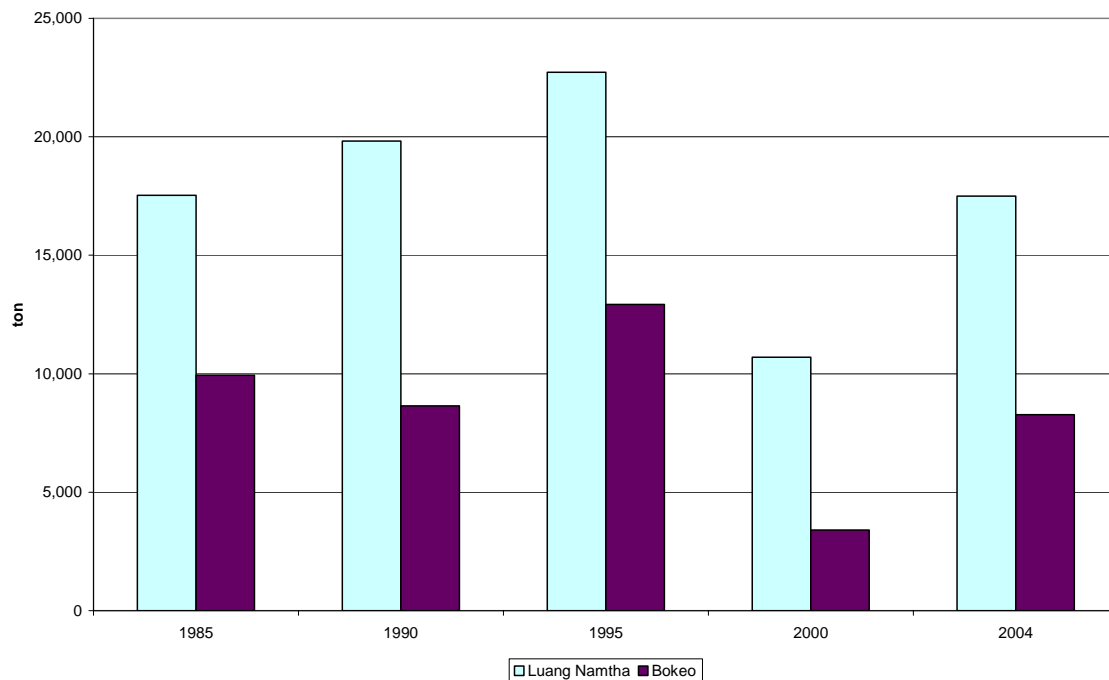
Table 1 indicates rice production area in Luang Namtha, and Bokeo Provinces. In both Luang Namtha and Bokeo, increased production of paddy rice was achieved during the last two decades through the expansion of paddy field. In the meantime, area under swidden cultivation for upland production has declined particularly during 1995 and 2000 indicating the impact of government policy on the Land and Forest Allocation Programme (LFA) that regulated household access to upland swidden (Figure 2).

Table 1 Rice production area in Luang Namtha and Bokeo provinces

Unit: ha

Crops	Province	1985	1990	1995	2000	2004
Paddy rice	Luang Namtha	4,056	4,460	5,802	8,500	11,130
	Bokeo	2,931	4,458	7,083	10,000	12,455
Upland rice	Luang Namtha	14,610	14,266	13,370	6,500	9,270
	Bokeo	6,208	4,324	7,184	2,000	4,240

Source: National Statistic Center (2006)

Figure 3 Upland rice production in Luang Namtha and Bokeo Provinces

Source: National Statistic Center (2006)

Meanwhile, Figure 2 also indicates between 2000 and 2004, upland swidden area has increased in both provinces. This is possibly linked to the expansion of rubber plantations

that surged in 2003. Farmers cleared their former swidden and fallow lands for rubber plantation, while cultivate upland rice during the first few years on the rubber field.

Table 2 indicates increasing importance of cash crop production in both Luang Namtha and Bokeo. The table particularly focuses on key cash crops (i.e. maize and sugarcane) that are planted on the uplands. In Luang Namtha sugarcane production particularly began to increase in the mid 1990s as more farmers began contract farming with Chinese investors (Manivong et al. 2003). In the meantime, in Bokeo both maize and sugarcane production steadily increased between 1985 and 2000. Table 2 also indicates boom and bust cycle of cash crop production in both provinces. For instance, in Luang Namtha, the maize production dropped nearly by half between 1995 and 2000, but increased again in 2003 due to increased demand for maize supplies for animal feed in southern part of Yunnan Province in China (Socio-economic Unit 2003). Meanwhile, in Bokeo, sugarcane production plunged after 2000 indicating a possible decline in the market demand for sugarcane in neighbouring Thailand.

Table 2 Maize and sugarcane production in northern Laos

Unit: ton

Crops	Province	1985	1990	1995	2000	2003
Maize	Luang Namtha	150	2,500	1,260	743	3,212
	Bokeo	133	1,440	1,272	4,471	5,577
Sugarcane	Luang Namtha	390	2,620	10,500	43,900	66,926
	Bokeo	1,436	1,680	1,632	5,250	192

Source: National Statistic Center (2006)

Another notable increase over the last five years is the rapid expansion of rubber plantation. Table 3 indicates areas of rubber plantation in two provinces. Field observation and discussions with DAFEO indicate steady increase of rubber plantation in both provinces particularly since 2003. Rubber is currently planted in old swidden and

fallow land³ which corresponds to the increased areas of upland swidden field between 2000 and 2004 shown in Table 1.

Table 3 Rubber plantation in Luang Namtha and Bokeo

Province	Existing plantation (ha)	Area targeted for rubber up to year 2010 (ha)
Luang Namtha	4,490	20,000
Bokeo	701	15,000

Source: Forest Research Center (2006)

4.2 Contract farming

One of the main driving forces of rapid expansion of commercial agriculture is improved trade relationship with neighbouring countries and increased flow of investment from countries such as China. Since the early 1990s trade relations with neighbouring countries, particularly China and Thailand had increased the flow of investment and goods from neighbouring countries into northern Laos. In Sing district, contract farming emerged when the regional border with China was opened in 1992. The first wave of contract farming began with rice production in the lowland areas as Chinese companies brought hybrid rice varieties to the local farmers. Incurring Chinese investment also promoted intensive use of lowland fields as the Chinese farmers and investors sought land to cultivate vegetables and watermelons during the dry season (Lyttleton et al. 2004). By mid 1990s, contract farming for sugarcane rapidly expanded in the upland areas of Sing district as the Chinese sugar processing companies signed contracts with local villagers. However, in the early 1990s, contracts with Chinese investors were very informal often without written form. Also, during the early 1990s farmers were often unable to assess how much volume of sugarcane were actually being sold to the companies as the products were paid by truckloads in Laos and weighed in China.

³ During the interviews, farmers preferred using the old swidden fallow land for rubber plantation. This requires slashing and burning of the fallow land before planting rubber.

Towards the late 1990s and early 2000, Chinese investors began to take interest in rubber planting in northern Laos. Investors began to survey different parts of Sing District during the early 2000 to identify potential areas for plantation. In the meantime, local villagers' interest in rubber also began to surge after 2000 as they observed increasing price of rubber, and success of farmers in Hat Yao Village (Namtha District) that planted rubber in the mid 1990s (Alton et al. 2005). While wealthy farmers in Sing District began to invest in rubber on their own⁴, other farmers began to take interest in contract farming with Chinese investors due to shortage of their own capital and lack of access to institutional credit. Up to this date, contract farming in Sing district ranges from informal family based contract farming supported by relatives in China (especially Akha and Tai Lu ethnic minority groups), to a more formal contract farming relationship with small and medium-scale investors.

4.3 Land tenure

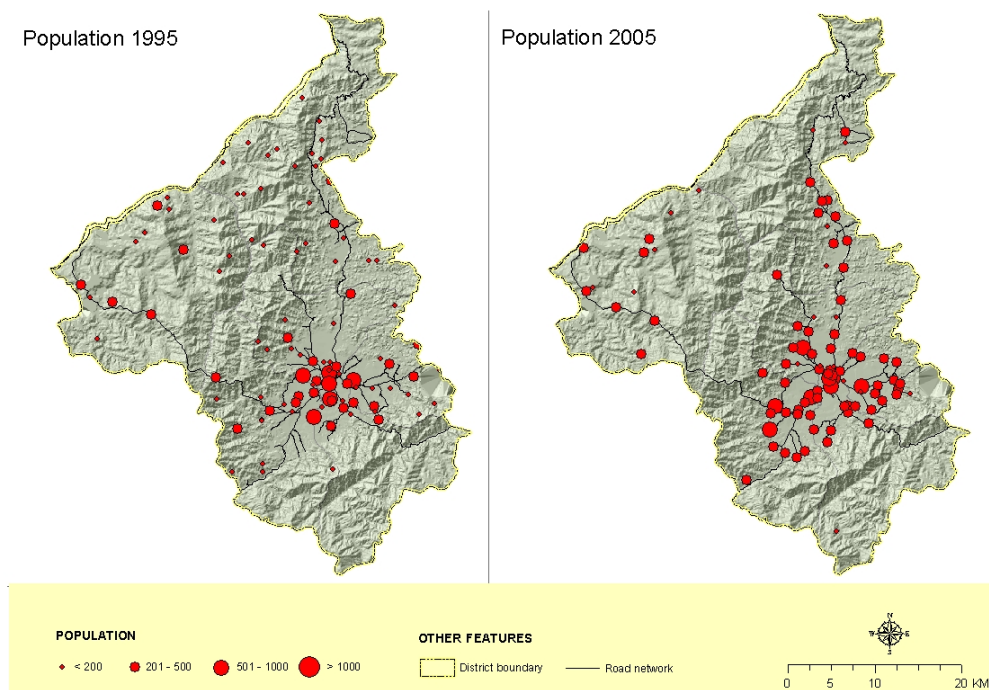
In both Sing and Viengphoukha district, we observe shift of rural population towards lower elevation, particularly along the road. Figure 3 in particular indicates increased population along the road in Sing district over the last decade. Based on the stakeholders interviews relocation of upland population to lower elevation and to roadside areas began in the 1980s in Viengphoukha district and 1990s in Sing district. Relocation was aimed to restrict expansion of shifting cultivation, and at the same time was aimed to extend government services to rural villages by concentrating them to roadside area.

We can say that concentration of population in lower elevation was induced as a result of government policy that encouraged consolidation of scattered upland villages. At the same time, increased economic opportunities in the lowland areas also attracted more upland farmers to move out to roadside areas. Concentration of population in lower elevation and areas along the road began to affect communal resource use. While LFA distinguished village boundaries, demand for agricultural land began to increase during the last decade as more farmers began to engage in commercial agricultural production.

⁴ These farmers started to invest in rubber starting mid 1990s. However, much of the trees were damaged and destroyed by the frost during 1999 and 2000.

Commercial agricultural production is also accompanied with privatization of agricultural land, particularly areas of swidden and fallowlands which had been part of the communal land and resource management system. Although, the extent to which private individuals both within and outside of the village enclose common property by exercising their economic and political power requires further study, we have observed numbers of incidences where productive land was converted into rubber fields under the name of village and local leaders. In the mean time, we also observe that poor farmers lacking access to capital and household labour continue to depend on the use of communal land for rice production and NTFP collection to meet the family need for food and income.

Figure 4 Population map in Sing district



5. Discussion and future research plans

Based on our preliminary work, we observe a significant transition from rural farming system based on self-sufficient rice production towards commercialization. This agrarian transition is characterized by intensification of existing agricultural land, namely swidden

and fallow lands for production of higher value commodities. Spatial analysis in Sing district indicate overall decline of forest area.. Expansion of cash crop production in the upland areas (i.e. rubber and sugarcane) is also encouraging conversion of swidden and fallow lands into permanent agricultural lands. We are learning that this is not only driven by farmers' demand for cash income, but also is driven by declining productivity of upland agricultural land for uplandrice production after the Land and Forest Allocation Programme (LFA) that restricted household access to swidden and shortened the fallow cycle. In other words, low labour productivity of upland rice production under the current land use defined by the government policy had urged many upland farmers to seek alternative ways to improve the productivity of their agricultural production.

Transitions towards commercial agricultural production is also changing the way farmers allocate resources, particularly household labour. Households that are engaged in commercial agricultural production are also opting to chose key farming activities, moving away from multiple livelihood system, particularly as increased labour input is required for improving agricultural production. It is also changing the social relationship of farmers with land as they invest more capital on land. Conversion of swidden and fallow lands into long-term tree crops transforms its tenure relationship from a semi-communal land into private property.

There are several areas in which further research is pertinent. First, the environmental impact of agricultural commercialization on forest requires further study. It also calls for a need to review government policies on resource management such as LFA. It is also imperative to consider resource management beyond village boundary delineated through LFA process, in order to consider the implication of land use change across the watershed and develop a more comprehensive management plan involving multi-stakeholders.

Second, the expansion of commercial agricultural production in the upland area is also changing how local people access and manage communal land. For instance, in Sing and Viengphoukha districts, farmers are beginning to sell their cattles as they are losing grazing lands to permanent agricultural land. The villages are beginning to define more

rules for households that are grazing cattle, and adapting new grazing methods (i.e. developing communal grazing land, developing fodder production system, etc.). This exemplifies farmers' transition from multiple livelihood basis towards more focused agricultural production system but at the same time requiring a greater cooperation within village in adapting new techniques and building local institutions to redefine resource management practices.

Thirdly, commercialization of agricultural production is accompanied with privatization of agricultural lands, and it also calls for considerations of social equity particularly in terms of access to land. Those who are able to mobilize capital, labour, and have ability to negotiate with local authorities are often advantaged in terms of claiming more productive land. Planting tree crops such as rubber which can be cultivated for 40 years will change flexibility of tenure relation and particularly strengthens privatization of agricultural lands in rural areas.

Finally, despite the increasing commercialization of agriculture, access to capital and market information remains a significant constraint for rural farmers, particularly for those farmers who lack capital resources. Lack of institutional credit supporting commercial agricultural production and information on market access also leaves local agencies as well as rural farmers without much choice but to work with foreign investors that provide agricultural inputs on credit and promises to purchase their products. This often leads to unfavourable profit sharing arrangement between farmers and investors. In order to solve these problem, more researches are necessary to understand the information flow and share the results to policy makers to improve the existing constraints. Furthermore, local extension offices needs to be strengthened to provide the necessary services to support farmers rather than facilitating as a coordinator of the private company. This will also require a greater cooperations between researches and extension organization to generate more knowledge and information that are accessible for local farmers.

References

- Ducourtieux, O., et al. (2006). "Introducing Cash Crops in Shifting Cultivation Regions - the experience with cardamom in Laos." Agroforestry Systems **66**: 65-76.
- Alton, C., et al. (2005). Para Rubber Study: *Hevea brasiliensis*. Vientiane, Lao - German Program Rural Development in Mountainous Areas of Northern Lao PDR.
- Blaikie, P. (1985). The Political Economy of Soil Erosion in Developing Countries. Essex, Longman Scientific and Technical.
- Hayami, Y. and M. Kikuchi (1981). Asian Village Economy at Crossroads: An Economic Approach to Institutional Change. Tokyo, University of Tokyo Press.
- Lambin, E. F., H. J. Geist, et al. (2003). "Dynamics of Land-use and Land-Cover Change in Tropical Regions." Annual Review of Environment and Resources **28**: 205-241.
- Leebouapao, L., et al. (2005). Lao PDR's Cross Border Economy: Case Study in Dansavanh, Savannakhet and Houaysay/Tonpheung, Bokeo, Lao PDR. The Cross Border Economies of Cambodia, Laos, Thailand, and Vietnam. A. Myers and D. Wharton. Phnom Phen, Graphic Roots Co. Ltd: 79-138.
- Lestrelin, G., et al. (2005). When 'Conservation' Leads to Land Degradation: Lessons from Ban Lak Sip, Laos. Colombo, Sri Lanka, International Watershed Management Institute.
- Lyttleton, C., et al. (2004). Watermelon, bars and trucks: dangerous intersections in Northwest Lao PDR, Macquarie University.
- Manivong, V., et al. (2003). Field Report on Rubber and Sugarcane Markest in Northern Laos, August -September 2003. Vientiane, National Agriculture and Forestry Research Institute.
- Ministry of Agriculture and Forestry and NAFRI (2005). *Kaan Kamnot Neuaiti Kasikham le Puk Mai* [Land Zoning for Agriculture and Forest Plantation]. Survey and Agricultural Land Zoning Centre of NAFRI.
- Rigg, J. (2005). Living with Transition in Laos: Marketing Integration in Southeast Asia. London, Routeledge.
- Socio-economic research comoponent (2006). Study tour on maize production and market chain in Xishuangbanna, Yunnan province of China. Vientiane, LSUAFRP, NAFRI.
- Thongmanivong, S. and Y. Fujita (2006). "Recent Land Use and Livelihood Transition in Northern Laos." Mountain Research and Development **26**(3): 237-244.
- Turner, B.L. & Meyer, W.B. (1994). Global Land-Use and Land-Cover Change: An Overview. In W.B. Meyer and B.L. Turner, editors, *Changes in Land Use and Land Cover: A Global Perspective*. Cambridge University Press. Cambridge. 3-10.
- Vernon, E. (2006). Marketing Analysis Report Vientiane, Oudomxay Community Initiative Support Project.

