

Dynamic Land Use Change in  
Sing District, Luang Namtha Province, Lao PDR

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**SUMMARY REPORT**

Faculty of Forestry  
National University of Laos

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## RESEARCH METHODS

Our research incorporates several interdisciplinary methods to understand the processes of land use transition and demographic change in Sing district. In particular, this study aims to incorporate spatial analysis and socio-economic analysis (See also Rindfuss and Stern 1998). We use aggregated data on demography and agricultural production collected from local government offices, as well as primary field data collected in seven villages of Sing district during December 2003 and August 2005.

In order to understand the transitional state of land use and cover in Sing district over the previous decades we used Satellite data of Landsat between 1973 and 2004 to examine the overall land cover change. By using the maximum likelihood classification of the supervised classification, each Landsat image was classified into five categories including water, forest, shrub, open land (swidden), and paddy field. Area of interest (AOI) of each land use and land cover type for image classification was defined based on GPS data collected in the field. All land use and land cover types were re-classed at the end of the processing and were reduced to two main categories: non-forest and forest. This was done so to capture the trend of forest cover in transition<sup>1</sup>. Furthermore, we selected three images from different time periods to assess land use change over the last decades. In order to understand the dynamic changes of forest cover, we investigate the patterns of forest fragmentation. This was done so by converting all land use and land cover map into vector form and calculating the mean size and number of forest patches.

With regards to the demographic data, we used statistic obtained from the National Statistical Centre and the District Planning Office. Statistic from 1995, 2001, 2003, and 2005 were spatially registered to create population density maps to understand distribution of population and ethnic groups across the district, as well as trend of population movement in Sing district.

We also conducted interviews at the district agriculture and forestry office<sup>2</sup>, and in four sub-districts (two sub-districts in the upland zone, one in high land zone, and another in lowland zone) to understand the history in Sing district and events that led to population movements in the district. At the village level, we also conducted household interviews in seven villages in three sub-districts to understand local farmers' own land use history, as well as their current land use practices. We interviewed members of village organizations in each of the seven villages to understand communal land use practices and local institutions for resource management, and how these were affected by government policies as well as the prevailing socio-economic environment. In addition to the spatial analysis, we incorporated socio-economic analysis by reviewing trends in agricultural production in Sing district, as well as household agricultural production in selected villages.

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<sup>1</sup> We focused on two main categories as it is difficult to detect changes over time series for many land use categories.

<sup>2</sup> In August 2005, District Agriculture and Forestry Office (DAFO) has become the District Agriculture and Forestry Extension Office (DAFEO). In this paper DAFO will be used as the name has only been changed recently following our fieldwork.

## RESULTS

### DEMOGRAPHIC CHANGES

#### *Demographic changes in Sing district: 1995-2005*

The population of Sing district today is 30,548 people. There are 94 villages or baan, which is the lowest administrative unit in Laos. Table 1 indicates population changes in Sing district between 1995 and 2005. According to Table 1, population increased during the course of a decade, while numbers of villages in the district have declined from 110 villages in 1995 to 94 villages in 2005. This is due to both government induced relocation and spontaneous resettlement of upland villagers to lowland villages. Table 2 particularly indicates 20 percent decline of Akha villages between 1995 and 2005.

**Table 1 Population change in Sing district 1995-2005**

Sub-districts	1995		2001		2003		2005	
	No. Villages	Population	No. Villages	Population	No. Villages	Population	No. Villages	Population
Mom	15	2,191	13	2,332	13	2,849	13	3,433
Nakham	18	3,708	18	4,212	17	4,700	18	5,183
Namkeoluang	12	3,247	12	4,452	10	4,405	12	5,065
Thongmai	18	3,789	17	5,042	16	6,553	17	6,792
Vieng (Xiangchai)*	22	5,179	21	6,007	21	6,841	22	7,791
Xay**	13	1,387	8	1,115	4	616		
Xiengkhang	12	2,939	11	2,876	11	2,080	12	2,284
Total	110	22,440	100	26,036	92	28,044	94	30,548

\* Vieng sub-district was changed to Xiengchai sub-district in 2005

\*\* Villages in Xay sub-district significantly decreased as villagers relocated to other sub-district. As a result, remaining Lu village was incorporated into Xiengkhang sub-district.

Source: National Statistic Office (1995, 2003), GTZ Meuang Sing (2001), District Planning Office (2005)

**Table 2 Numbers of villages in Sing district by ethnolinguistic origin**

1995		2005	
Akha	69	Akha	55
Lu, Dam, Nua, Phunoi	31	Lu, Dam, Nua, Phunoi	29
Hmong-Mien	9	Hmong-Mien	9
Mon-Khmer	1	Mon-Khmer	1
Total	110	Total	94

Source: National Census (1995), District Planning Office (2005)

Table 3 indicates population growth rate in Sing district in comparison with the national rate of population growth. While the national rate has been declining, population growth rate in Sing district is steadily on the rise. However, as has been indicated in Table 1, population growth rate at sub-district level is highly variable. Total population in Xiengkhang sub-district is also 30 percent lower than in 1995.

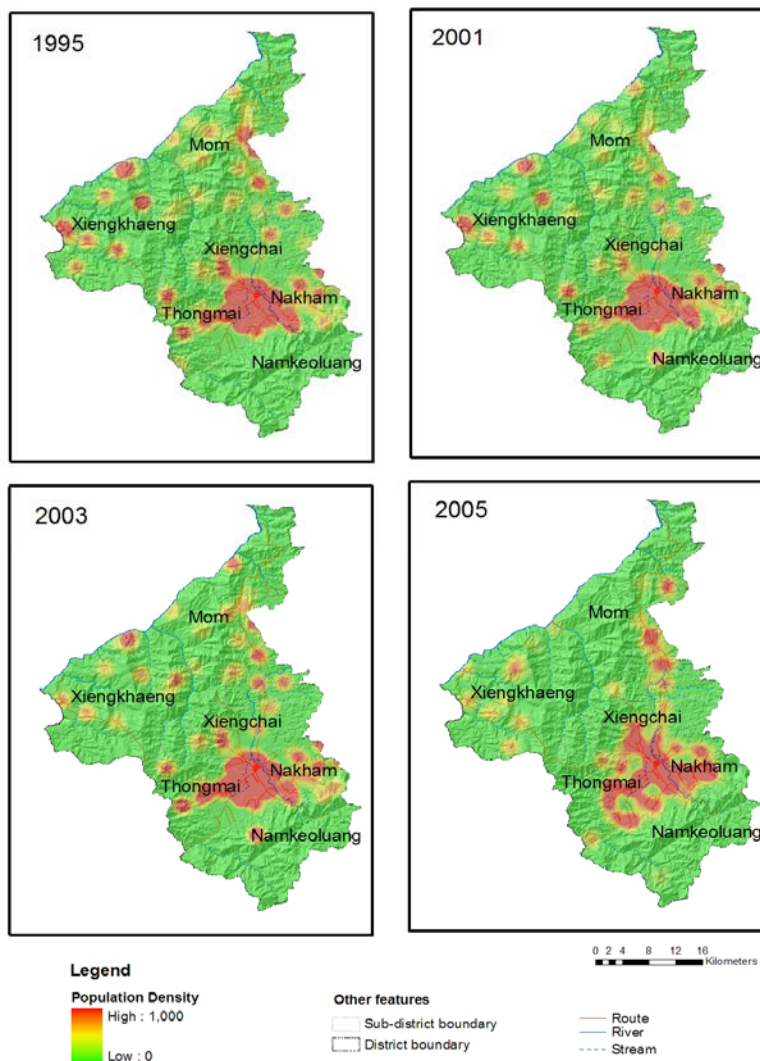
**Table 3 Average annual population growth rate in Sing district**

Years	1995-2000	2000-2003	2003-2005
National average	2.5%	2.5%	1.2%
Sing district average	2.7%	3.9%	4.5%

Source: National Census (1995), District Planning Office (2005)

As a result of the exodus of mountainous population to lower elevations, populations in other sub-districts in lower elevation have increased. These migrations are not temporary but more permanent, accompanied by ‘deterritorialisation’ and ‘reterritorialisation’ as noted by Goudineau (1997).

**Figure 1 Population density map in Sing district: 1995-2005**

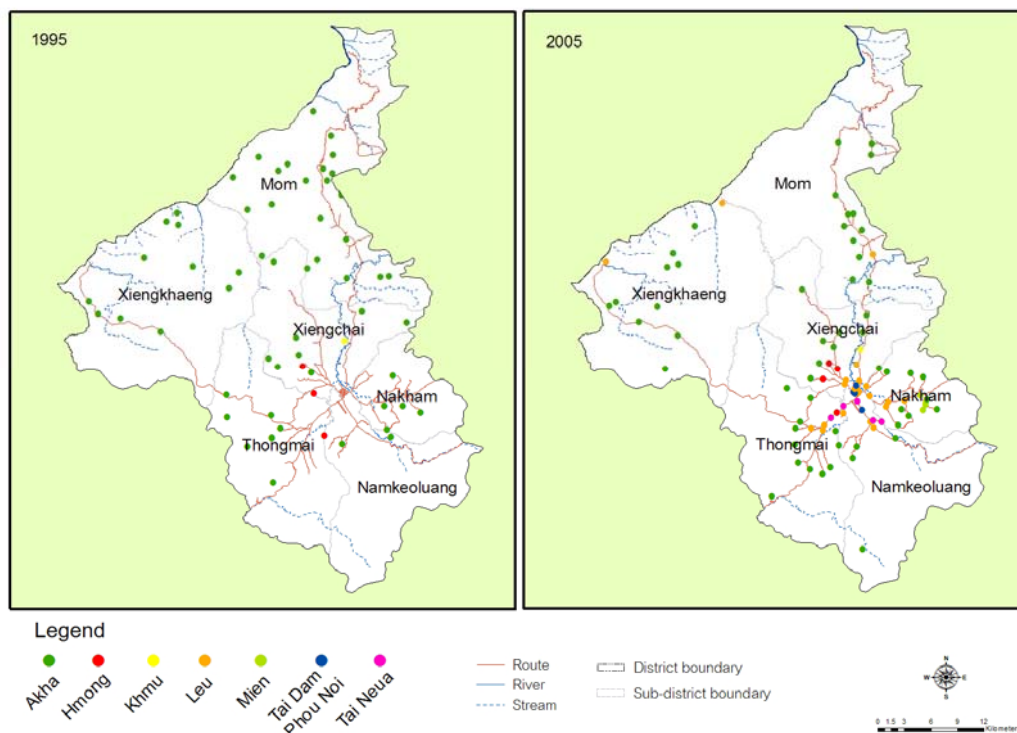


Unlike in the past, resettlement often meant shifting of residential area, but retaining access to vast agricultural land in the upland areas, the recent migration is more permanent as the villagers abandon their upland villages including residential and

agricultural lands. What this indicates is a trend of dramatic population decline in the upland areas and rapid concentration of population in lowland areas in three sub-districts including Thongmai, Namkeoluang and Vieng, as well as lowland valleys in Mom sub-district. Figure 1 indicates the depopulation of upland areas, and concentration of population in the district centre, and areas along the major roads.

Furthermore, we used information on ethnicity from 1995 and 2005 census data to understand the changes in ethnic distribution of villages in Sing district (Figure 2). This figure confirms the ethnic bias of population movement as noted earlier in Table 2. It also indicates that the upland Akha villages in 2005 are mostly concentrated in areas along the district roads, except for Xiengkhaeng sub-district.

**Figure 2 Ethnic distribution of Villages in 1995 and 2005**



### *Causes of demographic change*

While population movement in areas of Sing district has been historically dynamic, the demographic patterns during the last decade have been particularly volatile within the district. Changes are particularly significant for upland population who abandoned their old villages and moved to areas of lower elevation, establishing more permanent residence in those areas. Studies on internal resettlement and the involvement of international aid agencies in Laos suggest strong policy implications on internal resettlement (Baird and Shoemaker 2005). In particular, government policies that were implemented during the last decade, which focus on restricting expansion of shifting cultivation, opium eradication, security control, delivery of development services and

cultural integration as major catalyst of resettlement (Baird and Shoemaker 2005). Based on a literature review, as well as 75 interviews and people affiliated with 46 organisations in Laos, Baird and Shoemaker (2005) support the notion suggested by Goudineau (1997) that there is no such thing as voluntary resettlement in Laos, that all resettlement is directly or indirectly affected by the government policy.

Based on our field interviews in four sub-districts, villagers that we interviewed raised several reasons for their migration. War had been the initial reason of migration of villagers in Xiengkheng and Xay sub-districts during the period between 1960s and 1980s. Epidemic and security reasons were other causes of migration and relocation in border areas of northern Sing district. However, more recent resettlement was caused by access to development services. International organisations began to assist development of rural infrastructures such as road, water supply system, irrigation canals, and health clinics in the early 1990s. This began to attract upland villagers to areas near the road, which was often located in lower elevation. In addition, the government also encouraged small and scattered villages to merge into one administrative unit, village consolidation (Baird and Shoemaker 2005, p12-13) to integrate upland minority ethnic groups into mainstream Lao culture, and rural development. There have also been efforts to develop 'focal sites' and area perceived to have potential for development, which also induced migration and relocation of upland villagers incorporating approximately 16 villages with a population above 5,200 people (Baird and Shoemaker 2005).

In Sing district, relocation of upland villagers began in the 1990s as rural development projects reached the upland areas. GTZ in particular played a significant role in providing development services and rural infrastructures in remote villages of Mom, Xay, and Xiengkheng sub-districts. Rural infrastructure development gradually induced relocation of upland villagers into areas of lower elevation. It was during the mid 1990s that more pressures were exerted by the local authorities to relocate upland villages by merging small villages and delineating resource boundaries through the land and forest allocation policy. The central government policy to stop shifting cultivation was also prioritized in Sing district. On top of that, government campaigns to stop opium production largely affected the upland land use control in Sing district. Stringent enforcement to eradicate opium production began in 2003 and continued up to 2005. During this period, armed local officers frequented upland villages and burned opium poppies if they found them. Farmers that continued to produce opium were severely punished, and were 'reeducated' at the district centre.

Yet, the exodus of upland population to the lowland areas which occurred in the last five years was also facilitated by increased cash crop production and economic opportunities in the lowland areas. Cash crop production began in the mid 1980s as the government of Laos shifted from centrally planned to market economy. Opening of the regional border further facilitated commercial agricultural production in Sing district during the early

1990s as transborder trade flourished<sup>3</sup>. New crop varieties were introduced from China, which included high yielding non-glutinous rice, maize, sugarcane and other vegetables. Chinese merchants and investors also provided capital and technical support to farmers through contract farming, which further promoted expansion of cash crop production particularly in the lowland areas. Furthermore, increased cash crop production in the lowland areas began to attract more people from the upland. While wealthy Akha villagers purchased land in the lowland and mobilized labour to cultivate paddy rice and cash crops, economically less well off Akha villagers became agricultural wage labourers in lowland villages.

## **PATTERNS OF LAND USE INTENSIFICATION AND AGRICULTURAL LABOUR**

### *Land and forest land use change*

Spatial analysis was conducted using a series of satellite images between 1973 and 2004. Out of the total district area of 142,957 ha<sup>4</sup>, 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. According to Figure 3, forest area declined from 50 to 30 percent of total area calculated between 1973 and 2004. 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 factors that caused significant forest loss between 1974 and 1986. One cause is forest fire. Satellite image in 1986 particularly indicates a large tract of areas affected by fire in Xiengkheng and Xay sub-districts. While we were unable to confirm the frequency of forest fires in the past with the villagers, the district agriculture and forestry officer in Sing district noted high incidence of forest fire in Xiengkheng and Xay sub-districts every year due to local people's hunting practice. 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.

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<sup>3</sup> Transborder trade includes both formal and informal trade across the national boundaries. Private investors (both Han and non-Han Chinese) are often key agent in the formal trade, while ethnic (Akha-Akha, Lu-Lu) and cross-ethnic networks (Akha-Lu, Yao-Lu) facilitates informal trade.

<sup>4</sup> 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.

**Figure 3 Forest and non-forest land in Sing district**

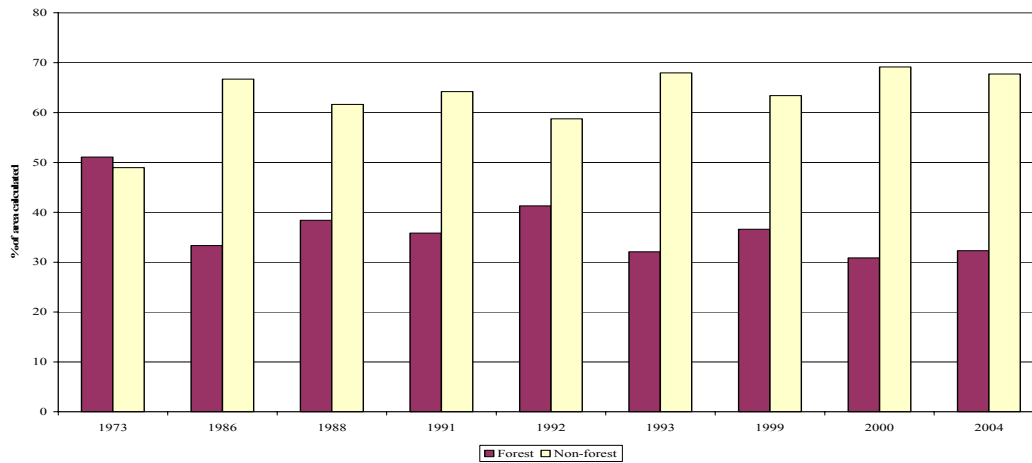


Table 4 indicates the degree of forest fragmentation during 1973 and 2000. Numbers of patches have increased by over 38 times during a quarter of century from 164 patches in 1973 to 6,306 patches in 2000. On the other hand, average size of forest patch declined by more than 98 percent during the same time period.

**Table 4 Forest fragmentation**

Years	1973	1988	2000
Numbers of patches	164	4,790	6,306
Average size of patch (ha)	446	12	7

*Agricultural production in Sing district*

Sing district has the largest tract of agricultural land in Luang Namtha. In particular, area of paddy field is the largest among five districts in the province (Table 5).

**Table 5 Agricultural land areas in Luang Namtha province, 2003**

District	No. HH	Agriculture (ha)	Paddy (ha)	Upland Rice (ha)
Namtha	5,976	4,998	2,684	1,078
Sing	4,775	5,666	3,296	1,416
Long	4,125	3,929	932	2,569
Viengphoukha	2,815	2,774	677	1,844
Nalae	3,749	4,480	141	3,953
Total	21,440	21,847	7,730	10,860

Source: District Agriculture and Forestry Office (2003)

Agricultural production in Sing district increased in the last five years. Notable increase can be observed on few key crops including lowland rice, sugarcane, maize and other vegetable products including chillies, watermelon, and pumpkin. Lowland rice



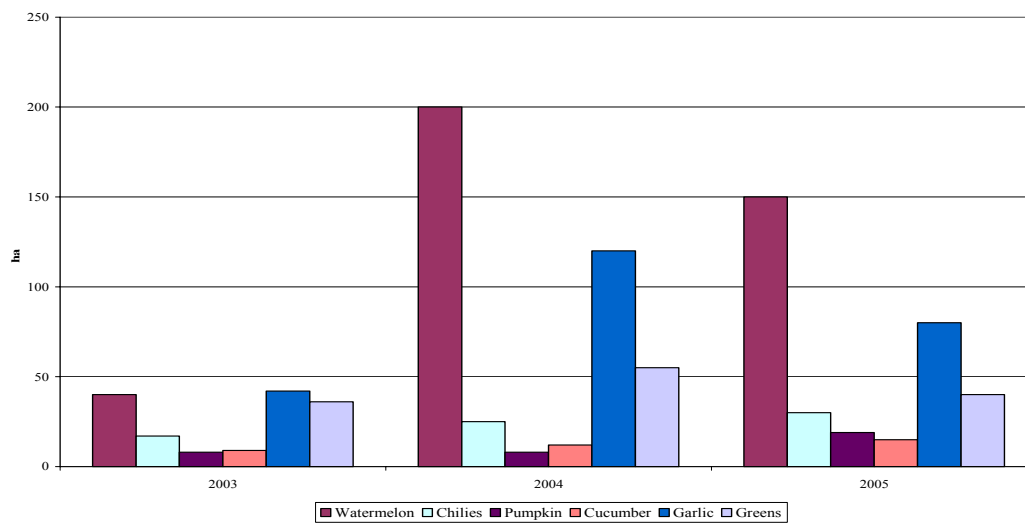
production increased by 57 percent between 1999 and 2004: from 13,747 ton to 21,626 ton (Table 6). The increase in production was accompanied by expansion of paddy rice field from 3,652 ha to 5,444 ha (49 percent). In addition, use of high yielding rice varieties (non-glutinous) from China and fertilizer input have also significantly increased the rice yields, and sales of rice to China.

**Table 6 Rice production in Sing district**

Year	Paddy		Swidden	
	ha	ton	ha	ton
1999	3,652	13,747	1,515	2,575
2000	3,829	14,219	1,379	2,506
2001	4,302	15,082	1,326	2,254
2002	4,511	16,290	1,326	2,259
2003	3,007	7,530	651	520
2004	5,444	21,626	530	901

Source: 1999 to 2002 are based on Lyttleton et al. (2004) while 2003 and 2004 are based on the statistic from the District Agriculture and Forestry Extension Office of Sing district (2005)

**Figure 4 Areas of lowland vegetable production (Unit: ha)**



Source: District Agriculture and Forestry Extension Office, Sing district (2005)

While irrigated field remains low at 3 percent of the total area for rain-fed paddy field, the dry-season paddy field is often used after the rice harvest to cultivate vegetables including chillies, watermelon, pumpkin, garlic, cucumber and so forth. Figure 4 and Table 7 indicates general increase of vegetable production in the lowland areas during the last three years.

**Table 7 Lowland vegetable production (Unit: ton)**

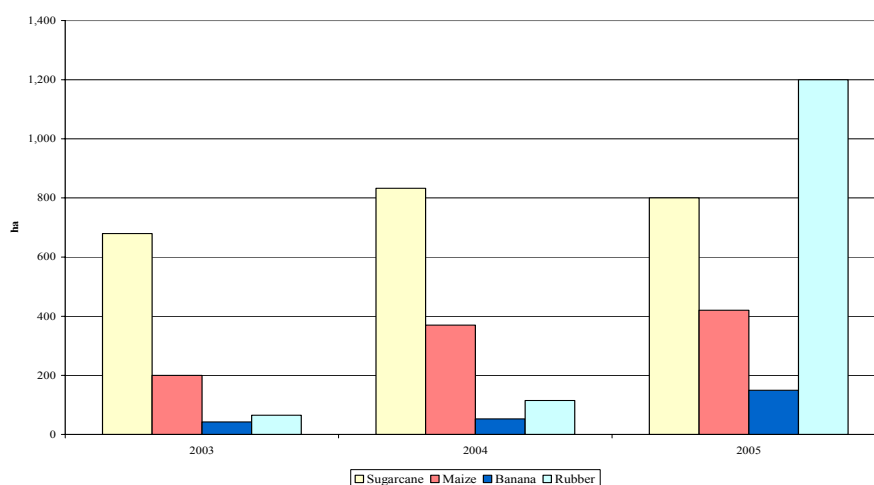
Year	Watermelon	Chillies	Pumpkin	Cucumber	Garlic	Greens
2003	1,200	85	240	127	126	180
2004	3,600	125	240	168	360	275
2005	4,500	150	380	75	560	200

Source: District Agriculture and Forestry Extension Office, Sing district (2005)

In the meantime, production patterns in the upland are also changing. As indicated in Table 6, the area under shifting cultivation has declined by 67 percent between 1999 and 2004. However, decline in the areas of shifting cultivation does not mean that upland swidden and fallow lands are abandoned by the farmers. Instead, we observe increased conversion of swidden and fallow lands to permanent agriculture, particularly in the areas of gradual slopes. Figure 4 indicates the increasing areas of sugarcane, maize, banana and rubber in Sing district during the last three years. As in the lowland agricultural production, the majority of the farmers cultivate sugarcane, maize and banana on contract basis, and export the products to China.

Rubber is among the newest boom crop in Sing district, which is rapidly spreading throughout the district. During our interview with the district agriculture and forestry extension office in Sing district, we were told that 53 villages planted rubber in 2004, while the number increased up to 73 villages in 2005, expanding the total area of rubber dramatically in the last two years as shown in Figure 5. While several private companies are starting to contract with local farmers to cultivate rubber, the expansion in the last few years owes significantly to the self-investment, and farmer-farmer investment, which differs from other upland cash crops such as sugarcane, maize and banana.

**Figure 5 Areas of upland cash crop productions (Unit: ha)**



Source: District Agriculture and Forestry Extension Office, Sing district (2005)

### *Household agricultural production*

We conducted in-depth household surveys in seven upland and lowland villages of different ethnic origin including Tai Lu (Tai-Kadai ethnolinguistic group), Akha (Sino-Tibetan ethnolinguistic group), and Yao (Hmong-Mien ethnolinguistic group) in the three sub-districts (Xienkheng, Mom, and Nakham) to understand the differences in household agricultural production, and their use of land, capital and other inputs. In each village we asked the village leaders to cluster households into three groups according to their economic status in the village, access to land and livelihood characteristic (Table 8). All together, we interviewed 61 households in seven villages.

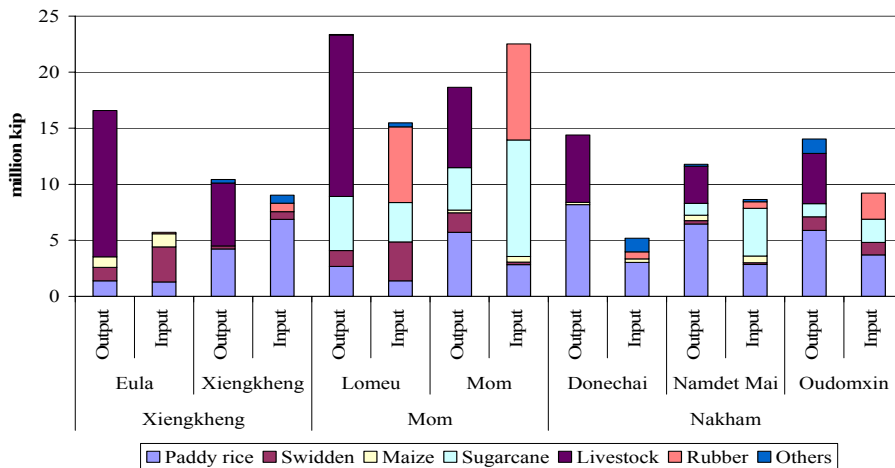
**Table 8 Classes of households**

Class	Average land holdings (plots)	Farming and livelihood characteristics
Well-off	5-6	Paddy, swidden, sugarcane, rubber, and livestock
Middle	3-4	Paddy, swidden, sugarcane, rubber and livestock
Poor	≤ 3	Swidden, NTFP collection and hunting, some livestock, wage labour

Although each village has a distinct settlement history, war and epidemics have been the main causes of migration historically in all three sub-district. Recent relocation was instigated by villagers' demand for lowland paddy field (Namdet Mai), and the influence of government policy that restricted expansion of shifting cultivation (Lomeu). Oudomxin is the only newly established village in our research site which was established to house repatriating Yao refugees from Thailand. When the village was established, Yao repatriates purchased agricultural land (esp. paddy fields) as they were only allocated residential area.

Based on household interviews, we understand that in all three sub-districts farmers are involved in a variety of agricultural production other than paddy and swidden rice. Figure 6 indicates average household agricultural production and inputs in seven villages during the period between 2004 and 2005. Output includes gross agricultural production including livestock. Meanwhile, input includes labour, as well as fertilizer, pesticides and other costs incurred in the agricultural production. Total labour inputs for each crop are calculated in terms of monetary unit *kip* (1 USD = 10,800 kip, 2005 price). In the Figure, number in parenthesis beneath village names indicates total numbers of households interviewed during the fieldwork.

**Figure 6 Average household agricultural production and input**



Source: Fieldwork (2005)

Figure 6 shows importance of livestock in rural livelihoods. In Xiengkheng and Xay sub-districts, farmers trade cattle and buffalo to Thailand, China and Burma, while in Mom sub-districts farmer trade large livestock to China as well as domestic market in Sing district. Livestock production is also part of the agricultural production system in lowland Nakham sub-district. However, many farmers in the lowland area stopped raising large livestock due to declining areas for grazing, and increased incidences of theft as population concentrated in the lowland area. Instead, farmers in the lowland villages raise pigs and domestic fowl (e.g. chicken, duck) for income. From Figure 6, we can also discern that livestock production is particularly important part of agricultural production in Akha villages such as Eula and Lomeu. Figure 6 indicates a high degree of commercialisation of agricultural production in Mom sub-district focusing on sugarcane and rubber. In both villages, agricultural investment is heavily concentrated on rubber and sugarcane. On average farmers in Lomeu and Mom invested over 5 million kip for rubber, and 5 million and 10 million kip for sugarcane. While sugarcane is cultivated on contract basis with sugarcane processing factory based in Meng Peng in China, rubber was mostly self-financed by the farmers.

During the interview, we learnt that several households started to plant rubber almost 14 years ago in Lomeu, and 8 years ago in Mom village by farmers' own initiative. These were farmers that visited their relatives in China, and observed how they accumulated wealth first-hand. The majority of the rubber trees however, were damaged by the frost in 2000. Only a few numbers of trees are currently ready for tapping in both villages. In the last two years, farmers in two villages are beginning to replant rubber due to numbers of reasons. First is the increasing price of rubber in China, followed by the proximity to collection points and processing factories in Meuang Yuan and Meng Peng in China. Lastly, accumulation of wealth through sugarcane production has also helped farmers to make decisions to plant rubber in their former swidden and fallow lands. Concurrently, farmers' access to capital has increased as more Chinese companies and private individuals are investing in rubber under a range of sharecrop arrangements.

Figure 6 also indicates commercialisation of agriculture in other sub-districts. In Nakham sub-district, rice production accounts more than 50 percent of total agricultural production in all three villages. While farmers in Donechai village withdrew from sugarcane production due to its low return to investment and heavy demand on labour, farmers in Namdet Mai and Oudomxin continue to cultivate sugarcane. However, farmers in Namdet Mai and Oudomxin are also beginning to diversify their agricultural production by cultivating maize, other vegetables, and rubber due to low productivity of sugarcane production.

Meanwhile, Donechai village farmers appear to narrow their agricultural production focusing on livestock and rice production. This is due to farmers' intensification of lowland paddy fields to cultivate high yield rice varieties, and vegetable production in the dry-season. In addition, increasing numbers of farmers are becoming involved in agricultural trade. Not only do they collect and sell rice produced in their own village, but also collect a variety of agricultural products from other local farmers in Sing district and sell them through their relatives in China, who come to pick up the products regularly in their village (Figure 6). These farmer-traders play a significant role in facilitating the transboundary agricultural trade as they do not have to pay business and export taxes.

Figure 6 indicates relatively low rice production in mountainous villages of Xiengkheng sub-district. Low rice production in Eula and Xiengkheng is only off-set by livestock production. While it is not indicated in Figure 6, trade of non-timber forest products is also an important part of rural livelihood system in this area. Key products include *peuak meuak* and cardamom which are sold to traders from China.

Until recently, commercialization of agricultural production in Xienkheng sub-district has been limited. While development projects tried to promote varieties of activities as an alternative to shifting cultivation and opium production (i.e. livestock production, fruit tree and pine-apple production, and cultivation of non-timber forest products), only a few successes have been achieved. Road network has improved in the last few years, yet use of Mekong River continues to be the dominant trade route in these Xiengkheng sub-district. However, despite its seeming remoteness, farmers in Xiengkheng are also beginning to plant rubber on their own initiative. Farmers in Xiengkheng and Eula are purchasing rubber seedlings from a Chinese Akha trader residing in Xiengkheng village, who is frequently in contact with her family members in Jihong located in Xishuangbanna. While cash crop production in these upland villages remains limited, it does not mean that farmers are isolated and cut off from the market. Expansion of rubber will inevitably change household agricultural production and livelihood basis in the next decade to come.

#### *Allocation of labour*

Integration to the market economy not only increased commercialisation of agricultural production in Sing district but also increased demand for agricultural labour.

Increased investment in rubber in recent years has increased the demand for cheap agricultural labour. While some farmers in villages along the Chinese border began

planting rubber more than 10 years go, rubber is still a new and expanding crop. New planting of rubber requires burning and clearing of old swidden and fallow lands. In all three sub-districts, we found that Akha people who have traditionally cultivated upland rice were often hired for the clearing of rubber field during April and May.

Thus, we observe increased demand for agricultural labour as a result of commercialisation of agricultural production. In particular, there is a seasonally high labour demands for sugarcane during the harvest season and for rubber during the land preparation and planting. The shortage of labour is currently met by the use of upland Akha and Chinese labour. It is often the upland Akha people that have resettled in new villages that are becoming dependent on agricultural wage labour as they do not have access to land.

### **DRIVERS OF CHANGE**

As we have seen in the last two sections, we observe a trend of decreasing forest area while increasing land use intensification in both upland and lowland areas facilitated by commercialisation of agricultural production. This is also changing how upland and lowland people allocate their labour in agricultural production, and changing their livelihood basis. What then are the driving forces behind the last decade of land use and socio-economic transformation in Sing district?

#### *Government policies*

A numbers of government policies have influenced demographic distribution and people's access to resources in Sing district. While there has always been a dynamic movement of population in Sing district, the recent demographic movement as we have explained in the previous sections was instigated by combinations of government policies. Among these is the restriction on shifting cultivation and opium eradication in the upland areas. While the government restriction on shifting cultivation has been called forth since the 1980s, efforts to zone and re-territorialize forest areas during the 1990s begin to constrain upland farmers' access to forest land and their customary land use practices. Relocation and de-territorialisation of upland villagers, removing them from their original villages and confining them under new administrative space also began in the 1990s as part of the government effort to consolidate remote villages with numbers of households smaller than 50. Concurringly, upland villages themselves gradually began to relocate to areas of lower elevation and near the roads during the early 1990s as rural development projects provided public services in the new areas. However, the movement from uplands to lowlands was particularly induced between 2003 and 2005 as the local government used stringent measures to enforce the central government policy to eradicate opium production. Spontaneous migration increased population pressure in the lowland areas and increased competition over land.

#### *Trade and investment*

While government policies had definite impacts on upland people's relationship with their environment and space, other factors also contributed in the transformation of land use and socioeconomic environment in Sing district. Road development and opening of the regional border in Pangthong in 1992 had significant impact on local agricultural

production as this not only opened market for local farmers in Sing district, but also brought in new crop varieties, technology, investments and labour from China. Introduction of new crop varieties and agricultural inputs significantly improved agricultural production for lowland farmers.

Agricultural investment was boosted particularly by the Chinese companies which began operating in the late 1990s. In addition to rice, these companies contracted with local farmers to produce maize, sugarcane, pumpkin, banana, bell peppers and watermelon. All of these products are exported to China. Under the contract arrangement, companies provide crop varieties, and chemical inputs to local farmers on credit. The companies also offer to purchase the final product from the farmers at an agreed price.

Rubber is among the newest list of crop that is being promoted by the companies. There are approximately 10 nurseries operating in Sing district today and are selling rubber seedlings to local farmers.

#### **INCREASING COMPETITION FOR LAND AND QUESTIONS ON SOCIAL EQUITY**

While our study has shown increased population density in the lowlands, and increased commercialisation of agricultural production, what are the consequences of these changes on community land and resource use practices?

One of the obvious consequences is the increased pressure on land use in the lowland areas. Over the years, agricultural land in the lowland has become scarce due to increased population and their needs for productive land. In order to ease the pressure, a transition towards more intensive and productive use of land is necessary. However, this may be achieved by socially marginalizing the migrant population as they become entrenched in agricultural wage labour relationships.

Increased competition over land is also raising conflicts between villages over access to communal resources. While villages shared resource use in the past, increased commercialisation of agricultural production and the population pressure has induced competition over land. Communal resources which allowed members of different villages to share in the past are particularly subject of conflict as resource users began to claim their legitimate rights. The problem was particularly pertinent in Oudomxin and Namdet Mai which used to share land and forest in the past with other neighbouring villages. While village boundary delineated village boundary of Oudomxin in 1997, Namdet Mai continues to encroach into the forest area in Oudomxin, which is now a village commons under the management of Oudomxin village. However, people of Namdet Mai also claim their customary rights to the land, and have been clearing fallow lands into sugarcane and rubber production.

The expansion of rubber production is also affecting land tenure in the villages. Areas which were reserved by families are increasingly converted into rubber fields. While in the past, resource access on reserved land was unrestricted, conversion of such land into permanent rubber field strengthens private ownership of land. Furthermore, conversion into rubber field resulted in extermination of a range of food and other items collected in the forest. This particularly affects poor households in the village whose livelihood basis depended on the use of such natural products.

While government policies such as the land and forest allocation was intended to improve the sustainable use and management of resources in each village, the rapid demographic and economic changes in the last decade is overwriting the local resource management plans. This relates to the lack of continuous process to plan and manage resources at the village level following the land and forest allocation. The lack of systematic follow up by the district agriculture and forestry officers after the implementation of the land and forest allocation further leaves little motivation for the local villagers to continue resource management.

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