
Chapter V

LAND USES AND THEIR CHANGES

It is essential to review the traditional land use pattern and to describe present land use pattern for identifying the changes on land use. Traditional and present land tenure and land uses including land classification and land use practice of three ethnic groups are presented and compared in this chapter.

5.1 Traditional Land Uses

With different history and development processes, traditional land uses among Dai, Hani and Jinuo were very different.

5.1.1 Traditional Land Use of The Dai

According to Cao (1988) and Jiang (1983), the Dai people originated from the ancient Baiyue race, which was widely scattered, even as early as in the Neolithic Age, in what are now Zhejiang, Fujian, Jiangxi, Guangdong, Guangxi and Yunnan Provinces of China, and in Vietnam, Laos, Myanmar, Northern Thailand and even in Assam of India (Gao, 1992, Huang et al., 1986 and Jiang, 1983). Dai in Xishuangbanna was recorded in history since one century B. C. Dai language belongs to Dai group, Zhuang-Dai branch of Han-Tibetan language family. Hinayana was disseminated into Xishuangbanna more than 1000 years ago, and was later developed as the religion of the Dai people there. Usually, each Dai village has a Buddhist temple. The population of Dai takes 1/3 of that in the whole Xishuangbanna. Dai people used to settle on flatland or valley with the elevation

range of 500 m to 1,000 m where it is comparatively favorable in terms of warm weather, fertile land, and convenient irrigation condition. Agricultural productivity of the Dai has been comparatively higher than that of other nationalities in Xishuangbanna. Before 1950, Xishuangbanna was divided into 30 *Meng* (the unit of administrative area, analogous to district), with 2,000 to 3,000 households (more than 10,000 people) in each *Meng*. The ruler of the *Meng* was called *Zhaomeng*.

Traditionally, there was a strict hierarchy of social class in Dai society as shown in Figure 5.1.

5.1.1.1 Traditional Land Tenure

Before 1950 when Chinese Communist Party liberated Xishuangbanna, Dai was the dominant nationality in the area and all the other nationalities were ruled by the Dai. *Zhaopianling* (means the owner of the land) was the highest ruler who owned all the territory in Xishuangbanna, the farmers of different nationalities should pay tax to him for most of production activities.

For Dai people, all the land, forest and rivers belonged to *Zhaopianling*. Therefore a part of all the products from them should be given to the ruler. The main tax was unhusked rice for paddy land, and the rate of the tax was formulated by *Zhaopianling* according to na (1 ha = 60 na). Usually, farmer should pay 10 buckets (1 bucket = 25 kg) per 30 na (500 kg/ha). Other production activities should also be subject to pay tax, for instance, half part of the animal which was hunted in the forest and the biggest fish from fishing should be given to the ruler.

The Dai mainly engaged in paddy cultivation. There was very detailed land tenure classification for paddy land which closely related with the social hierarchy (Figure 5.2).

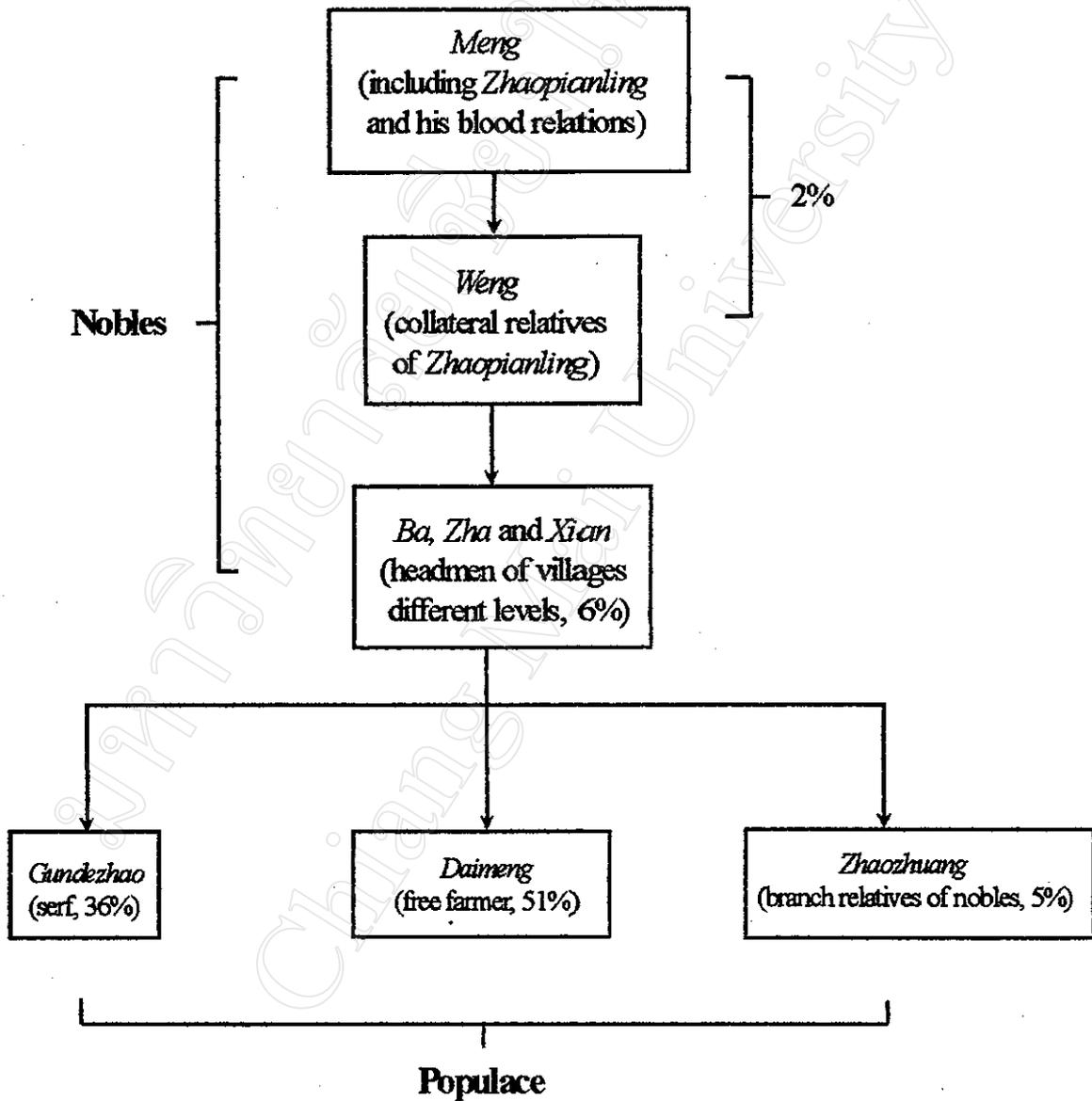


Figure 5.1 Social hierarchy of Dai society before 1950

Source: adapted from YIH, 1983.

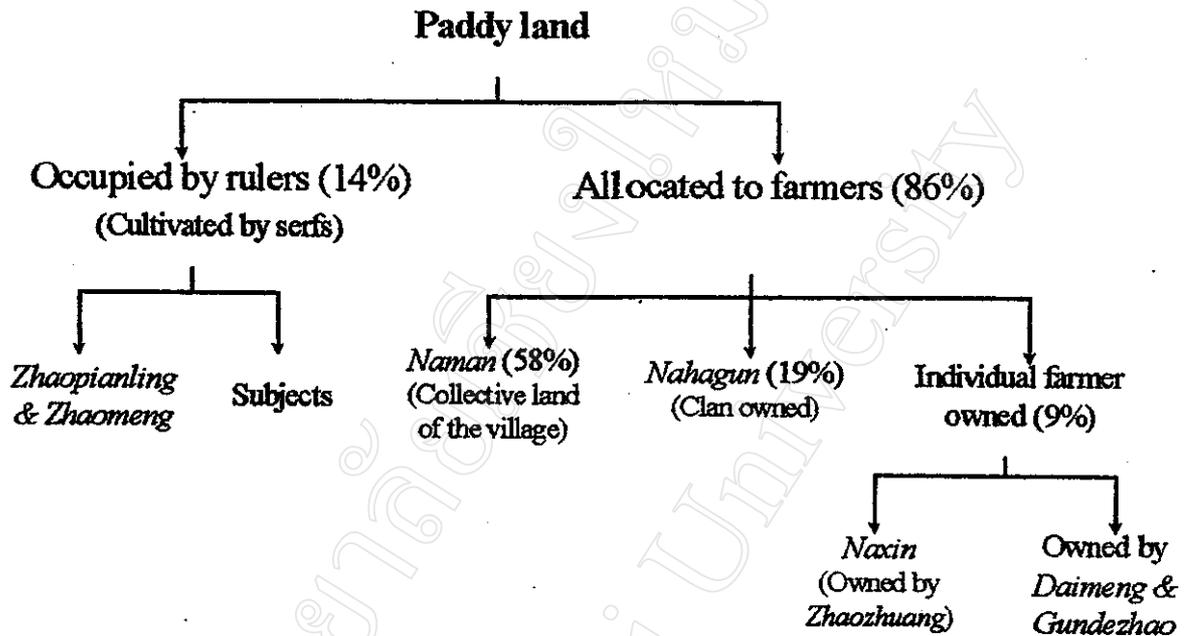


Figure 5.2 Traditional land tenure of paddy land in Dai society

Each Dai household owned some forest that could be used freely. The rest of forest land was common property, and timber cutting must be permitted by the village headman. In addition, there was a small part of land was allocated for religion activities.

5.1.1.2 Traditional Land Use

A. Land classification

Dai people had detailed classification of paddy land according to fertility and irrigation condition. Usually, paddy land was classified into 3 - 5 classes. Although Dai only plant a small area on upland for subsistence purpose, they still classified upland into 5 classes according to fertility and location:

Lingan: fertile land;

Linan: relatively fertile land;

Linleng: high and sloping land;

Lindan: fertile land around village and paddy land;

Linse: infertile land.

B. Land use

According to Cao (1988), before 1950, land use type in Dai area included residential land, arable land (including paddy land and upland), forest, water (including river and lake), land for religion and others. The biggest part of land was forest and arable land.

Traditionally, one season paddy rice was the dominant mode of production for Dai people in Xishuangbanna. Irrigated rice farming appeared in the Dai-inhabited areas more than two thousand years ago (Guo, 1996). In the whole Xishuangbanna, paddy land took about 60% of the total arable land, and in Dai area, it took 95% (Cao, 1986). Buffalo was the farm animal for tilling. One ploughing and two rakings or two ploughing and two rakings were practiced widely. There were 1,600 rice varieties in Xishuangbanna (Guo, 1996), and in Manzhong, there was 15 glutinous varieties and 3 non-glutinous varieties natively.

Dai people did not fertilize paddy land with manure since they believed that the rice from such field cannot be sacrificial offerings for Buddha. But during long fallow period for half of year, weeds can grow exuberantly, and the stubble left over the harvest as well as dropping of grazing animals all contribute to give each mu a supply of 1,000 - 2,000 kg of organic fertilizer. The productivity of the paddy rice in Xishuangbanna was around 150 kg/mu (2,350 kg/ha).

Irrigation system for paddy land was very well-developed by rulers in Dai area such as channel, ditch and dyke. There were special officials at different levels who were in charge of irrigation system, and strict irrigation regulation was also formulated.

In addition to paddy rice, Dai people also had some other production activities for subsistence purpose. They planted some other crops on upland such as vegetables, cotton, etc., gathered and hunted in the forest, and fished in the river and lake. Dai has the tradition to plant Heixinshu (*mesua nagssarium* (Burm. f.) kosterm) for firewood, and utilization of bamboo was very important for Dai people. They used it for housing parts, production tools and living utensils.

5.1.2 Traditional Land Use of the Hani

The Hani people are found in considerable number (i.e. 1.27 million in 1993) in southern Yunnan. They are related to the Lahu and the Lisu as Yi branch of Tibeto-burman cultural group. Hani has many branches with different names, and the Hani in Xishuangbanna call themselves *Aini*. There is no native script for Hani people. The pattern of patronymic linkage in which the last one or two syllables of the father's became the first one or two syllables of his child's name can be traced to about 60 generations by every adult person (Xu, et al., 1995).

Hani in Xishuangbanna was governed by the Dai like all other upland ethnic groups were. *Zhaopianling* divided the area of all upland ethnic groups into *Kaxishuanghuoquan* (*Ka* means slave, *Xishuang* means twelve, *Huoquan* is the unit of area; i.e. twelve area of slave), each *Huoquan* included several to more than ten villages, and a knowledgeable and well-to-do headman of the clan was conferred on as *Daba* by *Zhaopianling*. In each village, *Ba*, *zha* and *Xian* were selected by Dai ruler to govern, but a knowledgeable and

well-to-do man was also selected as the village chief (*Longbatou*) by the villagers, and he should be in charge of choosing the village site. Hani people also had to pay tax for their production activities to Dai ruler as Dai populace did.

5.1.2.1 Traditional Land Tenure

Hani was an upland ethnic group which mainly engaged in subsistence-oriented pioneer shifting cultivation before 1950. Although all the land in Xishuangbanna belonged to *Zhaopianling* of Dai, Hani and other upland nationalities had their own land tenure for the land which were allocated to them. There were clear boundaries among villages, and the boundaries were delimited according to the discussion among headmen of the villages. The land and the forest within the village were collective property, once the village site was chosen, the villagers could occupy the land to cultivate freely.

Forest was considered as the common property of the village, and the use of the forest was usually controlled by the community. The village chief, after consulting the eldest in the clan, would make the decisions on where the forest could be opened for swiddening. Water source was considered as the most important for the village, so the water source forest was strictly protected.

5.1.2.2 Traditional Land Use

A. Land classification

Hani people classified cultivated land into three classes according to the slope and the quality of the soil.

Zheba: fertile and smooth land;

Zheka: fertile and sloping land;

Haodong: infertile and sloping land.

The forest also was classified into six classes according to the uses: water source forest, building material forest, economic forest, aesthetic forest, graveyard forest and fuelwood forest.

B. Land use

Selective cutting for land preparation was commonly practiced by the Hani in shifting cultivation to maintain forest succession. Fruiting and other useful trees were protected during clearing. Burning was always started in the upper part to control and manage the speed and direction of the fire. Construction of fire protection belts by cutting the grass in a strip for fire containment was commonly practiced by the Hani. Any damage to the forest caused by escaped fire from the burning field will require compensation.

Many crops were planted by the Hani for subsistence purpose throughout the year. And the diversity of variety was beneficial for productivity of the land with different conditions. Upland rice and maize were staple food for Hani people. There were more than twenty upland rice varieties traditionally. Hani arranged their cultivation according to different land type (Table 5.1).

Table 5.1 Cultivation arrangement of Hani

	first year	second year	third year	fourth year	
Zheba	cotton	upland rice	peanut and soybean	upland rice	5 - 6 years fallow period
Zheka	cotton	upland rice	upland rice	7 - 8 years fallow period	
Haodong	cotton or peanut and maize	upland rice	more than 10 years fallow period		

Sources: Ying, 1994; survey.

Hani people only planted one season crop on cultivated land, and there was not any manure application. Hani did not use farm animal, and their main cultivating tools were knife, hoe, stick of sow etc.

Some Hani communities in Xishuangbanna cultivated paddy land traditionally (Ying, 1994), but villagers in Medeng did not.

For forest land use, most of the production activities were conducted in building material forest, economic forest, and fuelwood forest.

The graveyard must be near but lower than village in Hani community. Each village has a sacred tree selected by *Longbatou* to delineate village and the graveyard. Hani people were also very concerned about their water source. Each village must have water source and a stand of water source forest. Strict regulations of forest use were well formulated for water source forest, aesthetic forest and graveyard forest in Hani community. Any cutting activity was not allowed in these forests, and the violators would be punished with the payment of money or goods. Hunting and gathering were also conducted in forest for subsistence purpose.

5.1.3 Traditional Land Use of Jinuo

Jinuo is one of the indigenous nationalities that practiced rotational shifting cultivation in Xishuangbanna. It is the 56th Chinese minority nationality officially identified by the State Council in 1979. It mainly inhabits in Jinuoshan which is also known as Youleshan, a mountainous region in Jinghong County with a total population of 17,600 in 1993 (YBS, 1994). Jinuo language is one branch of Tibeto-burman cultural group, Han-Tibetan language family. In Jinuo language, "Jinuo" means "the descendant of

mother's brother". Jinuo religion is polytheism as the people believe in all things which have been endowed with a soul and spirit and they worship their ancestors (YIH, 1980).

Jinuo was also governed by Dai before 1950. *Zhaopianling* divided Jinuoshan into two parts, and appointed a *Daba* as the headman of each part. Three head men -- *Ba*, *Zha* and *Xian* were also appointed by Dai ruler in each Jinuo village as in the villages of other ethnic groups. Also two eldest people were selected by the villagers as elders traditionally - *Zhuoba* and *Zhuosheng*. These five people comprised the committee of the village which was in charge of the village affairs. Some important affairs like tax distribution of each household should be decided by all villagers at village meeting (Du, 1985)

5.1.3.1 Traditional Land Tenure

As faced by all the ethnic groups in Xishuangbanna, land in Jinuoshan belonged to *Zhaopianling*, Jinuo people should pay tax for cultivation every year. Under this context, there were three kinds of land tenure existed in Jinuoshan before 1950:

A). Collective ownership. This was the basic land tenure in Jinuo community. Clear boundaries were delimited among villages. All the land within the boundary was community property. The cultivated land was allocated to each household year by year. When any household or clan migrated out of the village, the land should be handed back.

B). Clan management system. This was the most important land ownership for Jinuo people. On the basis of collective ownership, cultivated land was allocated regularly to each clan in the village. The clan head - "*Ashiu*" divided the land into several pieces for shifting cultivation, and coordinated the slash-and-burn activities within the clan. After slash-and-burn, land was reallocated to each household for cultivation.

C). Individual ownership. This kind of the ownership only took a small part of the land which included residential land, homegarden and some tea garden.

Land rent existed in Jinuoshan, but the rent was very low.

5.1.3.2 Traditional Land Use

A. Land classification

Jinuo people classified the cultivated land type according to elevation, slope, heat condition and soil fertility.

Zhexiao: low elevation, warm climate year round, flat or with a slight slope, with loose and deep soil, and rich fertility;

Dieta: high elevation, cold winters, steeper slope, shallow soil and poorer fertility;

Zhejiao: the land with the condition between *Dieta* and *Zhexiao*.

Traditionally, forest in Jinuoshan could be classified into four types according to different use: water source forest, aesthetic forest, sacred forest and tea garden.

B. Land Use

Jinuo people traditionally managed their land as swidden fields, watershed forests, residential land with aesthetic forest and sacred land. The traditional land use in Baka Administrative Village is shown in Table 5.2.

Table 5.2 Traditional land use in Baka Administrative Village in 1965

Water source forest	Swidden land	Settlement, aesthetic forest, sacred land
15.5%	74.5%	10%

Source: Long, et al., 1996

Upland rice was the staple food for Jinuo people, and they had more than 100 varieties of upland rice with different quality, seasonality and suitability to different soils (Ying, 1994). Jinuo also planted maize, Chinese sorghum, cotton, tea, tobacco, perilla, and some vegetables for subsistence purpose, but they did not use animal labor for cultivation. Land use practices for different classes of land were arranged differently in terms of crops, cultivated period and fallow period according to the fertility and location of the land (Table 5.3).

Table 5.3 Land use practices of Jinuo

	<i>Zhexiao</i>	<i>Zhejiao</i>	<i>Dieta</i>
Main crops	upland rice, soybean, maize, cotton	upland rice, soybean, maize	upland rice, soybean
Cultivated period	5-10 years	2-3 years	one year
Fallow period	20 years	15 years	13 years

Sources: Ying, 1994; Long et al., 1996; survey.

The Jinuo have managed traditional tea garden for more than one thousand years, and tea was their main cash income source. They cultivated tea seedlings under natural forests, and some of the trees would be preserved as shade for tea tree. The structure and function of Jinuo's traditional tea garden were similar to natural forest (Lu, et al., 1995).

Water source forest, aesthetic forest and sacred forest were also protected strictly by Jinuo people as the Hani did.

Traditionally, hunting by men and gathering by women were important production activities for Jinuo. There were various tools for hunting, and around 40 - 50 wild vegetables and fruits for gathering in Jinuoshan. In addition, Bamboo was very important plant for Jinuo people. Bambooware was widely used in production and daily life.

5.2 Present Land Use

The present land use patterns in these three villages includes cultivated land (including paddy land and upland), forest, bush/grass and other are shown in Table 5.4, Figure 5.3 and Figure 5.4. Some crops are commonly planted in the study area, and cropping pattern is illustrated in Figure 5.5.

Table 5.4 Present land use in study sites (1994)

	Paddy land		Upland		Forest		Bush/grass		Other	
	Area (mu)	%	Area (mu)	%	Area (mu)	%	Area (mu)	%	Area (mu)	%
Medeng	220	1.97	3,000	26.99	870	7.83	6,800	61.18	225	2.02
Manzhang	37	2.02	335	18.31	450	24.59	950	51.91	58	3.20
Baka	119	2.11	2,500	44.25	500	8.85	2,400	42.48	131	2.32

Source: Interview and village statistic data

After the application of land reform policy in 1982, almost all the cultivated land and some of the forest or bush/grass land in the three villages was allocated to individual household. Farmers could freely make their own land use decision.

5.2.1 Manzhang

Present land use of the Dai in Manzhang is shown in Figure 5.3 and Figure 5.6.

5.2.1.1 Cultivated land

A. Paddy land

There was 37 mu paddy land totally in Manzhang according to village statistics, which was along the bank of Mengkuan River (Figures 5.3 and 5.6). Farmers in Manzhang plant rice, water melon, chili and some vegetables in different season (Figure

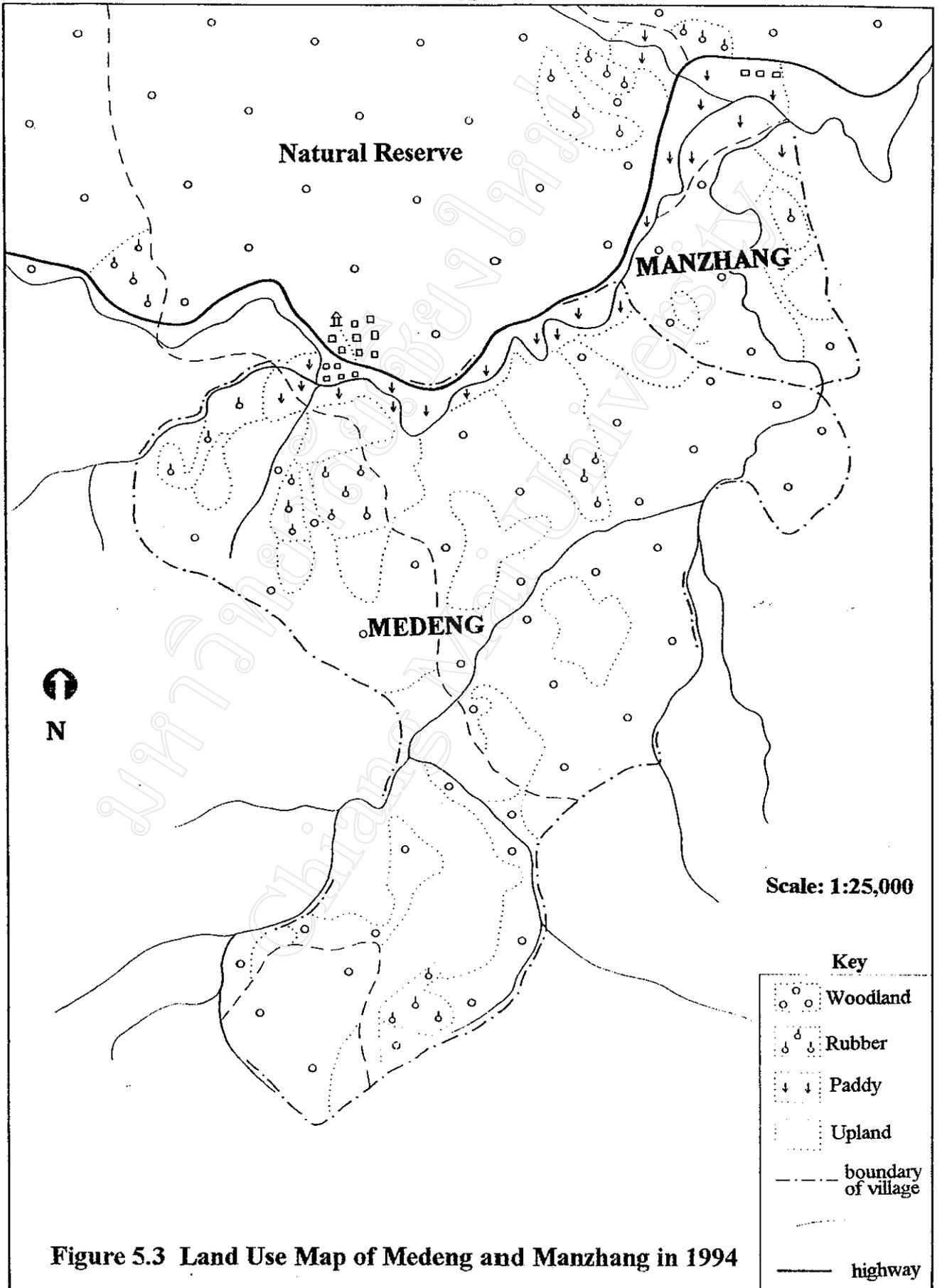


Figure 5.3 Land Use Map of Medeng and Manzhang in 1994

Figure 5.4 Land Use Map of Baka in 1992



- Baka land use in 1992
-  Forest land
 -  Bush and grass
 -  Swidden field
 -  Paddy field
 -  Other



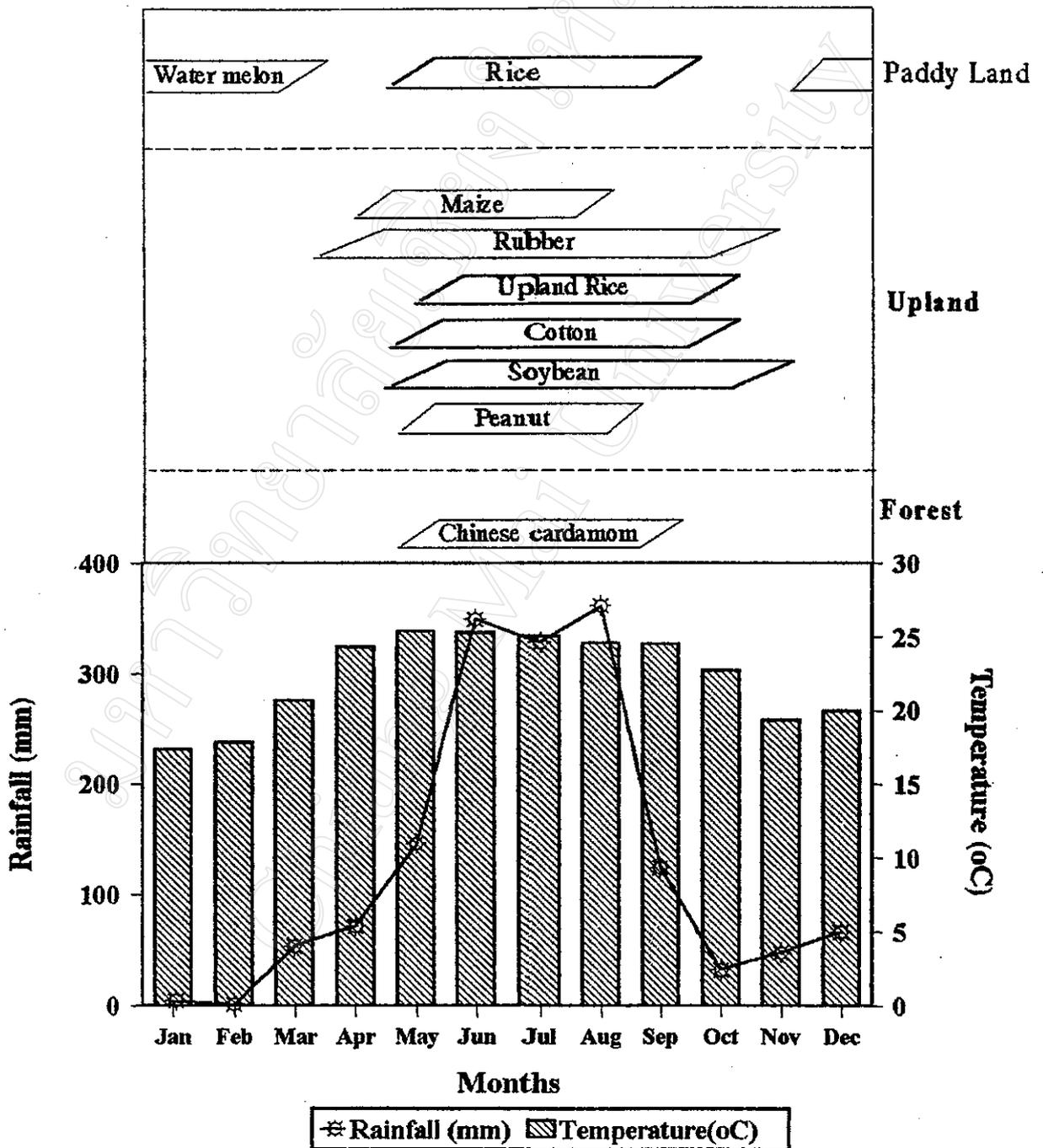
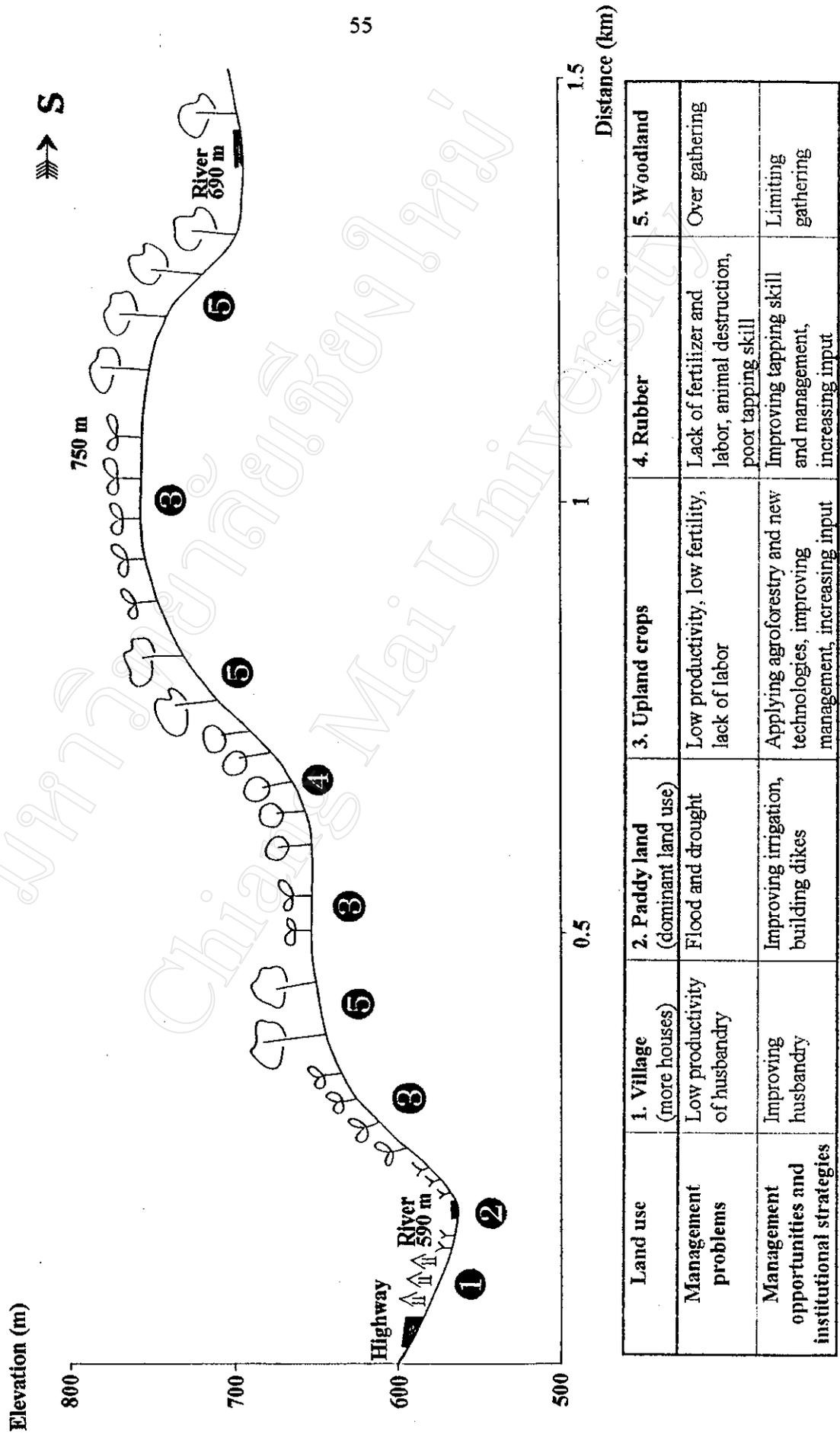


Figure 5.5 Cropping Pattern, Temperature and Rainfall in the Study Area

Figure 5.6 Transect of Manzhang



5.5). Crops calendar and farming system of paddy land in Manzhang were shown in Figure 5.5 and Table 5.5. According to statistics, cropping index of paddy land was 1.94 in 1994.

Table 5.5 Paddy land farming system in Manzhang

	Rice	Water melon	Chili
Percentage of planting HH* (%)	100	100	81.8
Percentage of planted area (%)	100	68.7	31.3
Average area per HH (mu/HH)	3.3	2.9	1.3
Average product (kg/mu)	545	800 - 1,000	522
Range of product (kg/mu)	500 - 1,600	500 - 2,500	125 - 1,000
Manure application (kg/mu)	490	0	0
Fertilizer application (kg/mu)	11	75	36
Planting purpose	Subsistence	Sale	Sale

Source: formal survey; *: household.

Rice is the staple food for the villagers. All households plant paddy rice in all of their paddy land. The traditional varieties are almost forsaken, all the sample households use hybrid rice. Manure and fertilizer are wildly applied in paddy rice production.

Water melon was introduced to Manzhang in 1989, and it is one of the main cash income sources for all the households now. Water melon occupies mainly the paddy land with good irrigation condition. Some households rent paddy land from neighboring village for planting water melon. In comparison, water melon needs higher fertilizer and labor inputs than other crops.

Chili is the new commercial crop for Manzhang. It was planted on paddy land with not so good irrigation condition in large area since 1994. Some households started to rent land from other village for chili planting in 1995. Chili needs relatively less labor input than water melon.

All the households in the village planted Chinese cabbage for both subsistence and commercial purposes. On the average, each household planted 0.5 mu.

B. Upland

According to village statistics, Manzhang has 335 mu upland for cultivation. Maize, peanut, cotton, some vegetables and some plantation trees particularly rubber are planted on the upland (Figure 5.5). Dai people traditionally practice shifting cultivation in small extent on the upland for subsistence purpose. Since 1982 when cultivated land was allocated to individual, area of some plantation trees increased rapidly, and land for annual crop cultivation was changed to permanent cultivation gradually. Farming system on the upland in Manzhang is shown in Table 5.6.

Table 5.6 Upland farming system in Manzhang

	Maize	Peanut	Cotton	Rubber
Percentage of planting HH* (%)	100	100	63.6	100
Percentage of planted area (%)	13.3	3.0	4.2	-
Average area per HH (mu/HH)	2.23	0.5	0.7	18.5
Average product (kg/mu)	130.9	50	40	422.2**
Range of product (kg/mu)	83 - 330	15 - 100	20 - 100	60 - 900
Variety	hybrid	Traditional	Traditional	
Intercropping crop(s)	Peanut	Maize	Vegetable	Maize
Planting purpose	Sale & feed	Subsistence & sale	Subsistence	Sale

Source: formal survey; *: household; **: raw rubber.

Farmers arranged their cultivation according to elevation and soil fertility. Maize was planted on the shady upland with low elevation while half of peanut was intercropped with maize. Two third of the households plant cotton on infertile, newly opened upland for subsistence purpose with traditional variety. Neither fertilizer nor manure is used for upland crops.

Since 1985 when rubber was introduced to the village, rubber plantation has expanded rapidly and occupied remarkable area on both upland and bush/grass land allocated to individual in 1982. It became one of the main cash income sources for villagers since 1994. In 1994, there were 370 mu rubber in the village, and some of the farmers still continued planting more rubber trees in 1995. In the beginning three years when rubber was just planted, villagers intercropped with some other crops like maize. Rubber is also a labor and fertilizer intensive crop for farmers. In addition, The villagers had to planted 50 mu passiflora on upland in 1995 according to the order of the township government. Because the villagers did not like this crop, they planted passiflora on infertile land without good management.

5.2.1.2. Bush/grass Land

Apart from rubber, farmers also planted some fruit trees on bush land in Manzhang which included banana, mango, orange and pomelo. And some of them will be important cash income source in the future such as mango and pomelo.

5.2.1.3 Forest

Villagers in Manzhang have comparatively less production activities in the forest. Apart from gathering wild vegetables and fruits mainly for subsistence, some households planted 50 mu Chinese cardamon under big trees with clearance of small trees and bush mainly in community forest and Natural Reserve for cash. Logging can be permitted only by administrative village for villagers to build houses. With the development of tourism, demand for butterfly souvenir has increased rapidly in the area because it is one of the

typical souvenirs in Xishuangbanna. Therefore the gathering of butterfly has become one of the cash income sources in the area. In Manzhang, this was conducted mainly by children.

5.2.1.4 Others

There is one holy tree in the village, but there is not any temple in the village because the village is too small. Villagers have to go to the temple in another village for religious activities.

5.2.2 Medeng

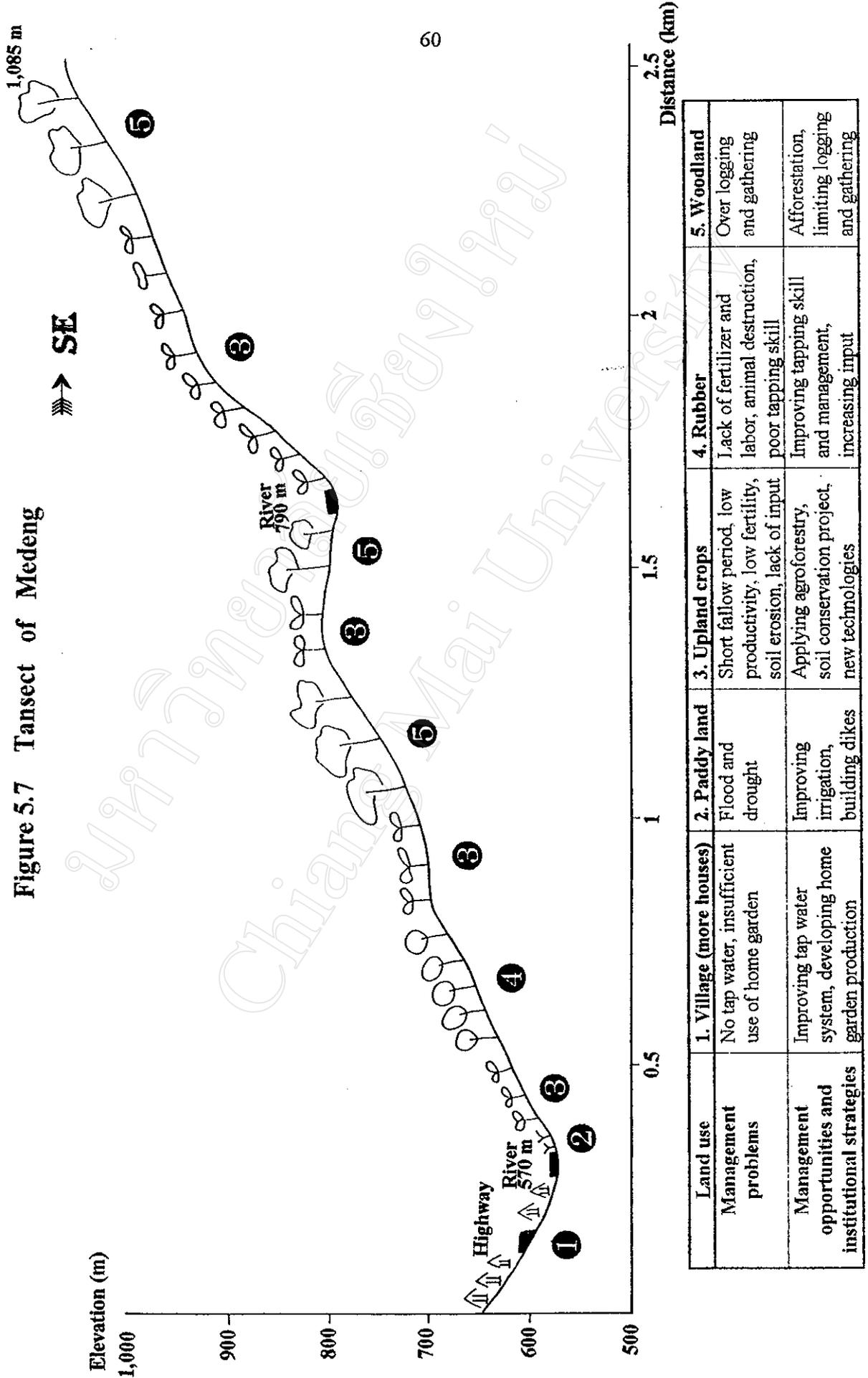
The present land use characteristics in Medeng is shown in Figure 5.3 and Figure 5.7.

5.2.2.1 Cultivated Land

A. Paddy land

With the encouragement of the government, the Hani in Medeng who traditionally practiced shifting cultivation on upland started to plant paddy rice on paddy land in 1952. The present paddy land was opened up in 1967 when the villagers moved the village to the present site. Now, the farmers in Medeng have experienced of paddy rice planting for more than 40 years, and there was 220 mu paddy land in the village, in which 40 mu was not with good irrigation condition. All the paddy land lies along the banks of Mengkuan

Figure 5.7 Tansect of Medeng



River (Figure 5.3 and Figure 5.7). All the farmers planted one season paddy rice with hybrid variety (Figure 5.5), only 21.9% of households applied manure for paddy rice, but almost all of them use fertilizer (on the average 7.4 kg/mu) for improvement of production. The average yield per mu of paddy rice in Medeng was 300 kg in 1994. In winter season, only few households plant some water melon and vegetables while more than half of paddy land area is put to be fallow. The cropping intensity index in 1994 was 0.88.

B. Upland

There is a totally 3,000 mu of upland area in Medeng. Hani people in Medeng still practice their traditional shifting cultivation on some of their upland area with upland rice, maize, soybean, peanut, cotton and some vegetables while doing some permanent cultivation like rubber production (Figure 5.5). The farming system on upland is presented in Table 5.7.

Every year, 850 mu to 900 mu upland was cultivated under traditional shifting cultivation which was described in section 5.1.2.

In the preparation for opening up new land, almost all the trees were cut with only few trees left when the household thought they would be useful later. Burning was supervised by forestry station of the government to prevent escaped fire.

There are many crops with different suitabilities were planted on the upland throughout the year. Upland rice is still the important staple food for Hani people while maize now is only used for feed; but only 4 to 5 traditional upland rice varieties are popularly used at present.

Almost all the land of *Zheba* with the elevation lower than 800 m is occupied by rubber. There was 1182.5 mu rubber at the village in the end of 1994 according to the

village statistics. Shifting cultivation is arranged as in Table 5.8. In addition, on fertile grass land, peanut is planted for one season before 1-2 years fallow period.

Table 5.7 Upland farming system in Medeng

	Upland rice	Maize	Soybean	Peanut	Cotton	Rubber
Percentage of planting HH* (%)	100	100	71.9	93.8	62.5	100
Percentage of planted area (%)	32.4	7.6	7.2	1.4	2.2	39.4
Average area per HH (mu/HH)	16.2	3.8	3.6	0.7	1.1	19.7
Average product (kg/mu)	120	160	71.8	60	22.5	280**
Range of product (kg/mu)	47 - 500	87 - 1,000	20 - 233	50 - 250	12 - 150	100 - 1,050
Variety	Traditional	Hybrid & traditional	Traditional	Traditional	Traditional	
Intercropping crop(s)	Rubber	Vegetable	White gourd, cucumber and sorghum	White gourd & cucumber	Sesame & sorghum	Upland rice
Planting purpose	Subsistence	Feed & sale	Subsistence & sale	Subsistence & sale	Subsistence	sale

Source: formal survey; *: household; **: fresh rubber.

Table 5.8 Shifting cultivation arrangement in Medeng

Land type	Crops	Cultivated period	Fallow period
Lower than 200 m above gullies	Maize	2 - 3 years	7 - 8 years
Other land			
Best	Soybean & upland rice	2 years	2 - 3 years
Moderate	Upland rice	3 - 5 years	8 - 9 years
Infertile	cotton	-	-

Source: Survey

Neither manure nor fertilizer is applied on the upland area under shifting cultivation. However half of the households applied herbicides 3.1 kg/mu averagely for upland rice because of the serious weed problem caused by short fallow period. Some of the households burned the residual of the crops to fertilize the land.

5.2.2.2 Forest

Forest regulation by community was no longer effective, and illegal logging for sale was very serious in the village. From the village statistics, logging in 1992 was 820 m³. There was 65.6% of the village households growing Chinese cardamon along gullies in community forest and Natural Reserve for cash income, and total area of it was 138 mu in 1994. However, the productivity of Chinese cardamon in Medeng was very low (1.8 kg/mu). There was 17 mu tea in the village, and it used to be an important cash income source for the villagers. Nonetheless, with low price, farmers now do not pay much attention on it, and the production was only 88.2 kg/mu in 1994. The villagers also collect some wild fruits and vegetables for subsistence purpose. Some people still keep the tradition of hunting, and some of the animals are sold to the tourist beside the highway.

5.2.2.3 Bush/grass Land

Bush/grass land is used only for grazing. All the households raise and keep buffalo for home consumption, marketing and farming. Every day children will be the main labor taking the animal for grazing on bush/grass land.

5.2.2.4 Others

A holy tree is still existing in the village for protection, and graveyard is located down the residential area.

5.2.3 Baka

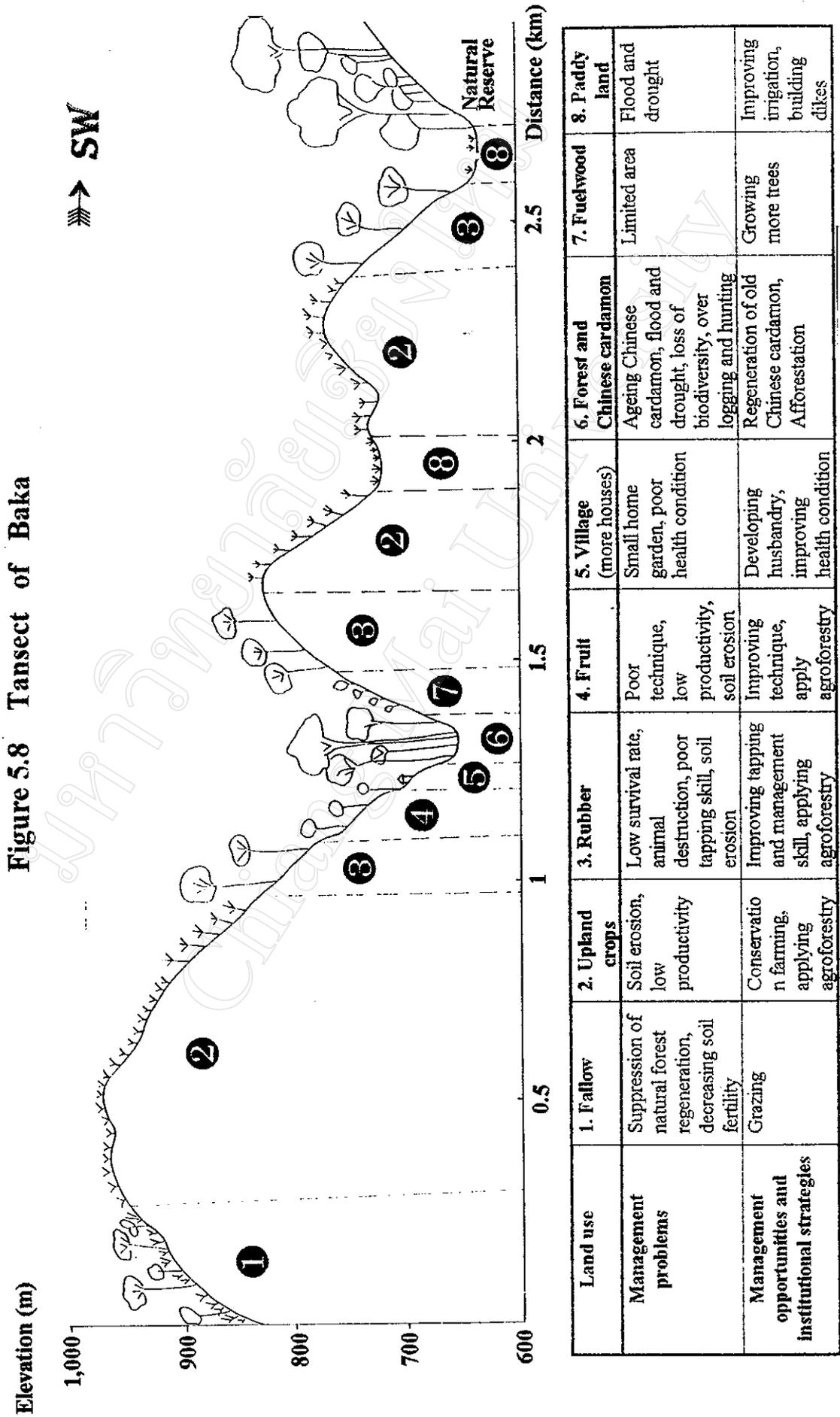
5.2.3.1 Cultivated Land

A. Paddy land

Baka was the first village which started to cultivate paddy land in Jinuoshan Township. Soon after the Jinuo in Baka who traditionally practiced shifting cultivation on upland moved to the present residential place in 1971, they opened up paddy land along the bank of Manka River with the help and encouragement of government. The location of the paddy land was shown in Figure 5.4 and Figure 5.8. There was 119 mu paddy land in 1995, and farmers mainly planted one season paddy rice (Figure 5.5). All the farmers used hybrid rice, but only 22.7% of the households used manure to fertilize paddy rice while no one applied fertilizer. In winter, some of the households grew vegetables and water melon on a small part of the paddy land. Cropping intensity index of paddy land was 1.19 in 1994.

B. Upland land

Baka has about 2,500 mu upland totally, in which, a large part is cultivated permanently now. In the past recent years, more than 700 mu was under traditional



shifting cultivation each year. Cropping pattern and farming system on the upland are shown in Figure 5.5 and Table 5.9.

Table 5.9 Upland farming system in Baka

	Upland rice	Maize	Soybean	Peanut	Cotton	Rubber
Percentage of planting HH*(%)	100	100	10.7	89.3	82.1	73.9
Percentage of planted area (%)	25.1	12.3	2.2	1.1	1.3	12.3
Average area per HH (mu/HH)	11.2	5.5	1	0.5	0.6	5.5
Average product (kg/mu)	109	144.2	30	92.2	40.1	236.8**
Range of product (kg/mu)	48 - 445	75 - 500	20 - 50	30 - 300	10 - 100	90 - 780
Variety	Traditional	Hybrid	Traditional	Traditional	Traditional	
Intercropping crop(s)	Soybean & peanut	Passiflora & vegetables	Passiflora	Cotton	Rubber, maize and vegetable	Upland rice & passiflora
Planting purpose	Subsistence	Feed & sale	Subsistence	Subsistence	Subsistence	Sale

Source: formal survey; *: household; **: fresh rubber.

a). shifting cultivation

Farmers in Baka still cultivate upland rice, maize, peanut, cotton and some vegetables on some of upland for different purposes in traditional way. Like in Medeng, upland rice is still the staple food for the villagers in Baka, but only around five traditional varieties were used frequently in the village while some of the households started to try hybrid variety. Soybean is almost given up.

Farmers classify the swidden land into fertile land and infertile land. Cultivation arrangement of the upland is shown in Table 5.10.

Farmers only need digging and choveling in land preparation in the first three years of cultivated period. Since the fourth year of cultivated period onward, farmers have to

Table 5.10 Cultivation arrangement of upland in Baka

	Fertile land	Infertile land
1st year	Upland rice	Upland rice
2nd year	Upland rice	Upland rice
3rd year	Upland rice	Maize
4th year	Maize	3 - 4 years fallow period
5th year	Upland rice	
6th year	Maize	
7th year	Upland rice	
	7 - 10 years fallow period	

Source: formal survey.

plough for land preparation. Because of the short fallow period, 0.7 kg/mu herbicides has to be applied since the second year of cultivated period onward.

Neither manure nor fertilizer was applied for shifting cultivation, but all the households burn crop residues on the land after harvest.

b). Permanent cultivation

Apart from the upland for shifting cultivation, some upland already changed to permanent cultivated land with plantation tree. A big part of sunny upland which is lower than 800 m is occupied by rubber. In 1994, rubber area in Baka was 413 mu, and more than 100 mu was additionally planted in 1995. Now, about 25% of the households have been tapping rubber already. Rubber will become an important cash income source in a near future.

Fruit tree plantation has improved quickly in recent years. Passiflora was introduced to the village in 1993. Farmers planted it on the upland which was used to be occupied by upland rice. Because of the long harvestable period, farmers prefer to use the land near residential place for passiflora to make transportation convenient. Because passiflora can bring economic return only one year after planted, the planted area of passiflora was expanded rapidly to 113 mu in 1995. Pomelo was another important fruit which expanded very fast in recent years.

For both meeting subsistence and increasing cash income purposes, farmers developed some new agroforestry arrangement which include:

- rubber + upland rice
- rubber + passiflora + upland rice or maize
- rubber + pomelo or mango + upland rice
- passiflora or pomelo + upland rice or maize + passiflora or pomelo
- rubber + tea

Tea of Jinuoshan used to be very famous, but there was only 7 mu tea in Baka for many years. Farmers did not put much attention on it due to low price.

5.2.3.2 Forest

The present forest in Baka is mainly distributed along the gullies. Apart from gathering and hunting in the forest, villagers are mainly engaged in Chinese cardamon plantation there. Chinese cardamon is the most important cash income source for all the households and it provides more than half of the total cash income in the village. According to the survey, each household owned 7 mu Chinese cardamon, in which, 47.9% was planted in Natural Reserve. In 1982 when land reform policy was applied, one mu fuelwood land was allocated to each household for fuelwood plantation, all the households planted *Heixinshu* (*mesua nagssarium* (Burm. f.) *kosterm*) on it. In recent years, butterfly collection in the forest area becomes another important income source for the villagers.

5.2.3.3 Bush/grass Land

Bush/grass land is mainly used for grazing especially for buffaloes, the main farming animal in the village.

5.3 Land Use Changes in Each village

From sections 5.1 and 5.2, we can see that there is great difference between traditional land use and present land use characteristics in each village, i.e. land use in each village has changed greatly in the last 45 years. These changes can be divided into two stages, the first is the change from shifting cultivation to permanent cultivation which started from 1950s; and the second is the change from subsistence to market-oriented which started from 1980s. Some detailed changes can be directly seen from the land use maps in Figures 5.3, 5.4, 5.9, 5.10, 5.11.

5.3.1 Manzhang

Dai people in Manzhang still mainly cultivated paddy land following their tradition. By comparing the land use maps in 1968 and 1994, a notable increase of paddy land area in the village can be seen. However, the area of paddy land remains constant in the last ten years. Comparing with the traditional practice, the important changes on paddy land use are use of chemical inputs such as fertilizer, and the use of hybrid rice variety with loss of many local rice varieties. Figure 5.13 shows that two season paddy rice was practiced sometime before adding of new crop, water melon, on paddy land since 1989. Chili has also expanded rapidly on paddy land since 1994. Figure 5.12 indicated an increasing trend of cropping intensity index on paddy land in the last ten years. All of these displayed that the use of paddy land tends towards increasingly intensive in the last ten years.

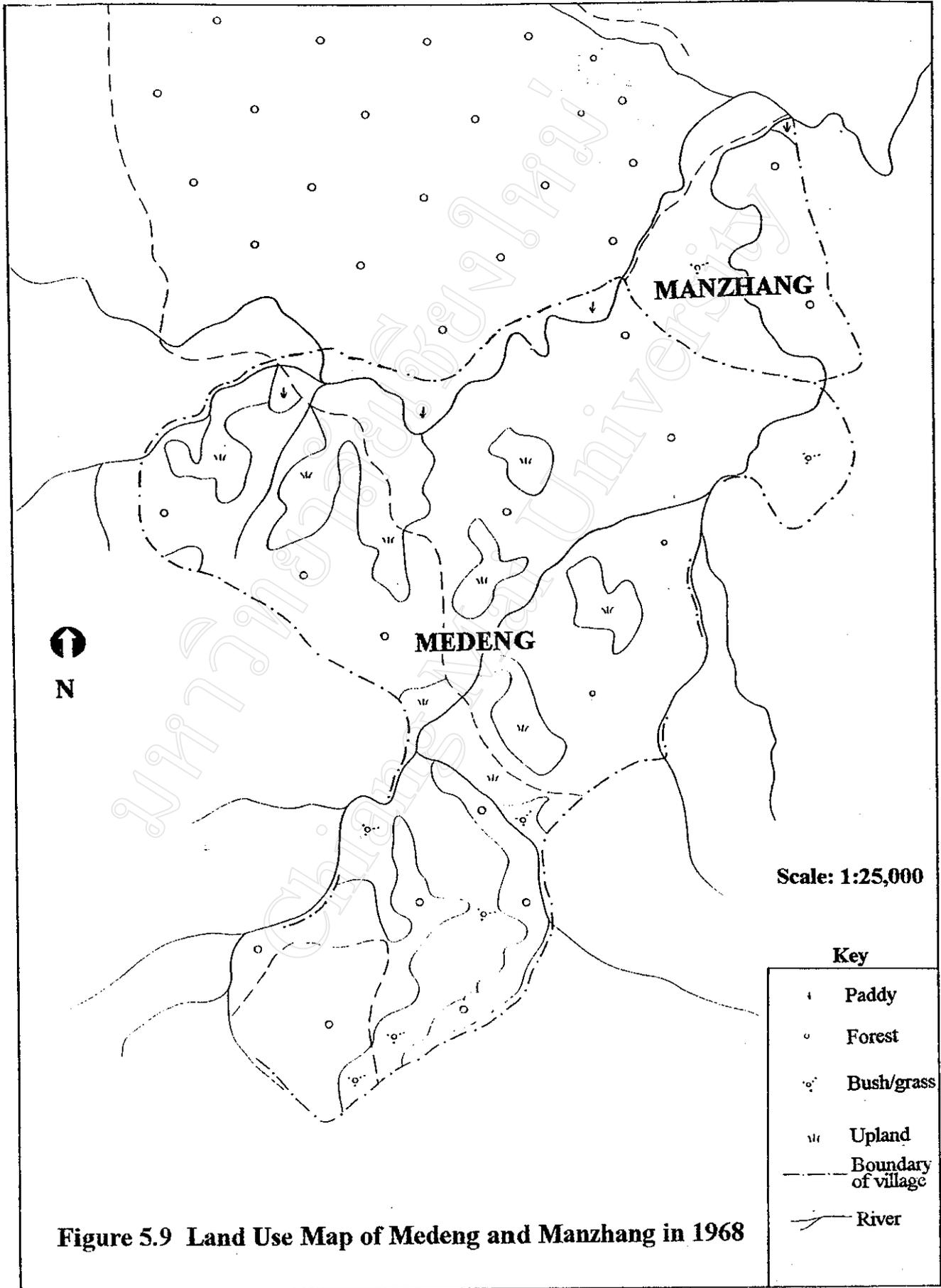
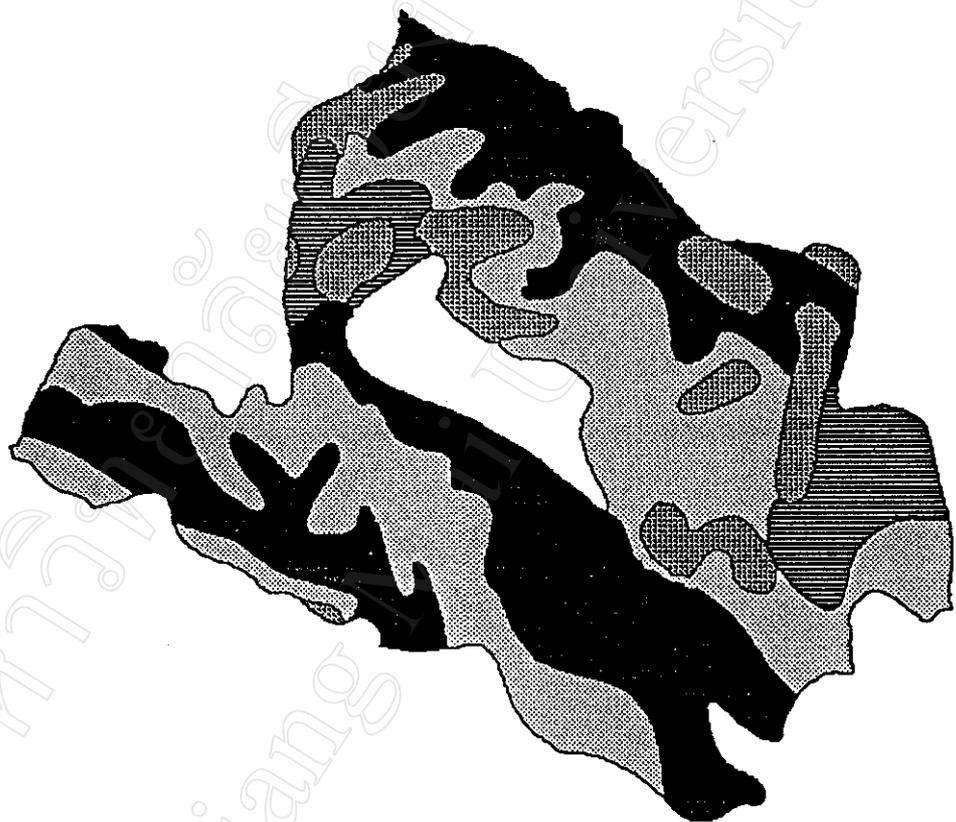


Figure 5.9 Land Use Map of Medeng and Manzhang in 1968

Figure 5.10 Land Use Map of Baka in 1965



1 0 1 2 Kilometers

Baka Land Use in 1965

-  Dense forest
-  Secondary forest
-  Bush and grass
-  Swidden field
-  Terrace

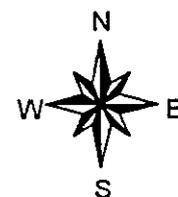
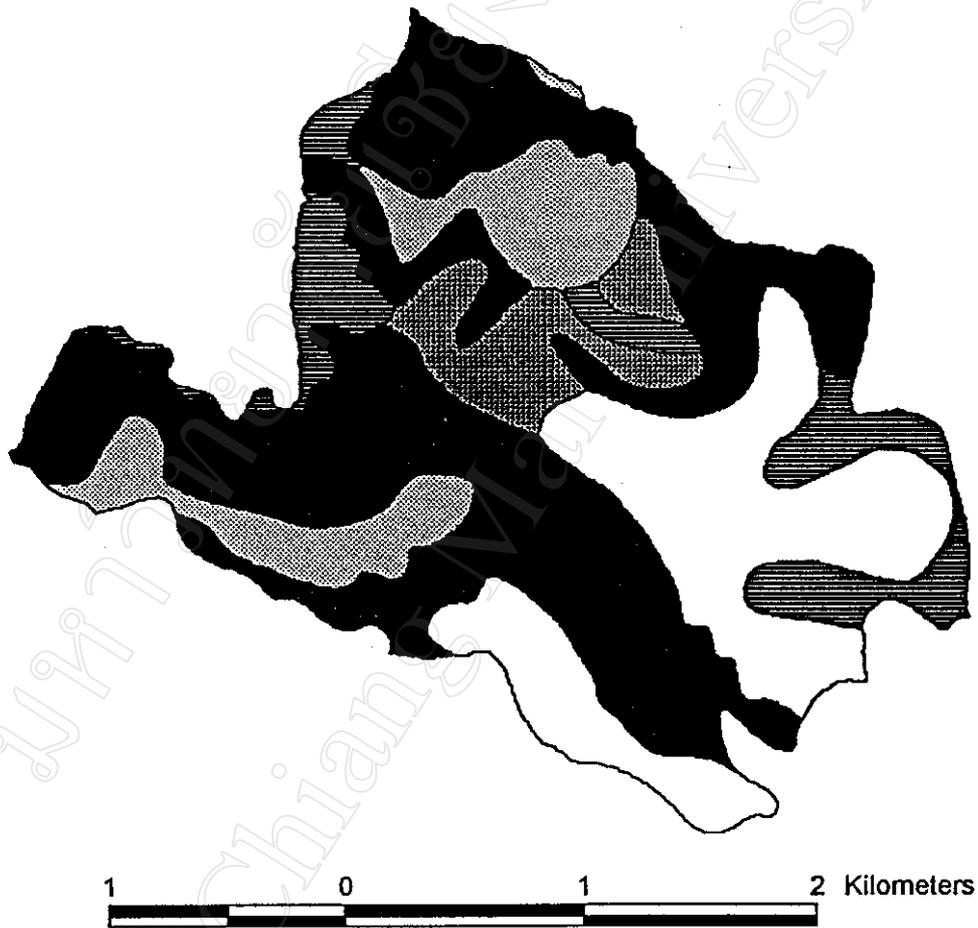
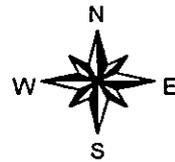


Figure 5.11 Land Use Map of Baka in 1981



Baka Land Use in 1981

-  Dense forest
-  Secondary Forest
-  Bush and grass
-  Swidden field
-  Terrace



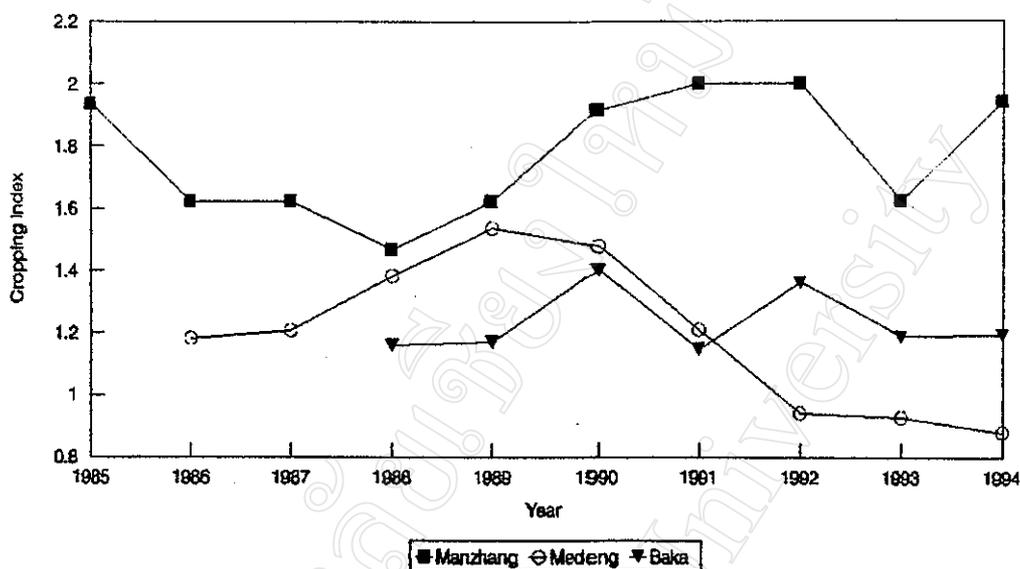


Figure 5.12 Trend of Cropping Intensity Index of Paddy Land

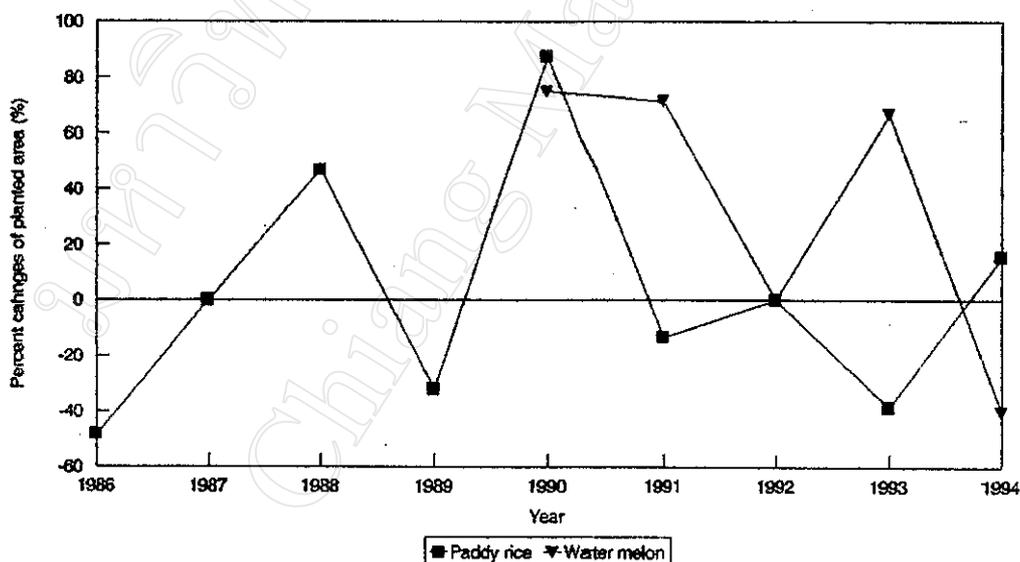


Figure 5.13 Percent changes of planted area of the crops on paddy land in Manzhong

The Dai in Manzhong traditionally planted more annual crops on upland than they do now. Upland rice has almost been abandoned since 1991, cotton and peanut are planted in very small area, and only maize keeps a comparatively big planted area for both feed and cash income purposes. The most marked change on upland use is rapid

expansion of rubber plantation since 1985, occupying more than 90% of the upland in Manzhang now (Figure 5.14).

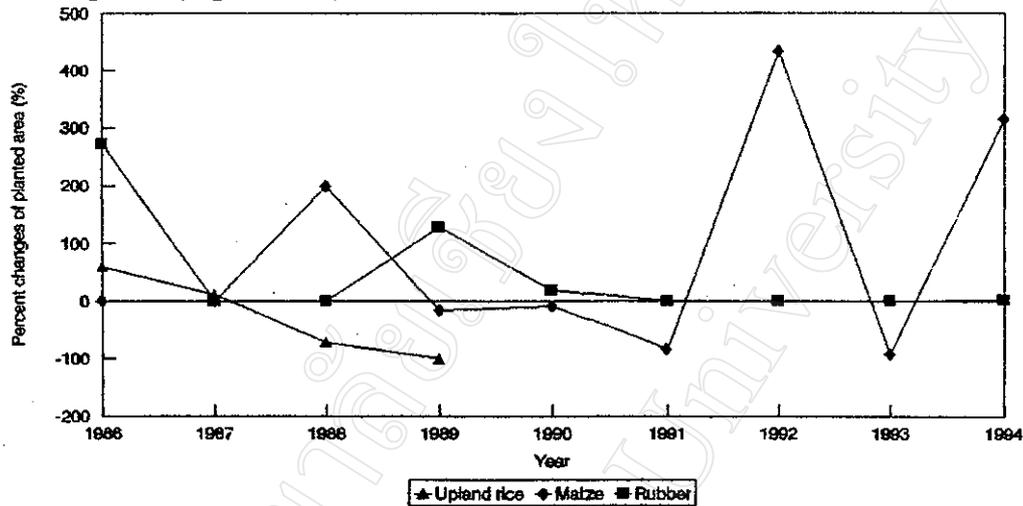


Figure 5.14 Percent changes of planted area of the crops on upland in Manzhang

Apart from the traditional gathering activities, Chinese cardamon was introduced to plant in forest in 1970s and villagers have continued to plant it as the cash crop till now. In the last ten years, there is not too much change in forest land use except the decrease in hunting and the increase in gathering of some forest products such as red bean, wild vegetables, fruits etc. (Figure 5.15).

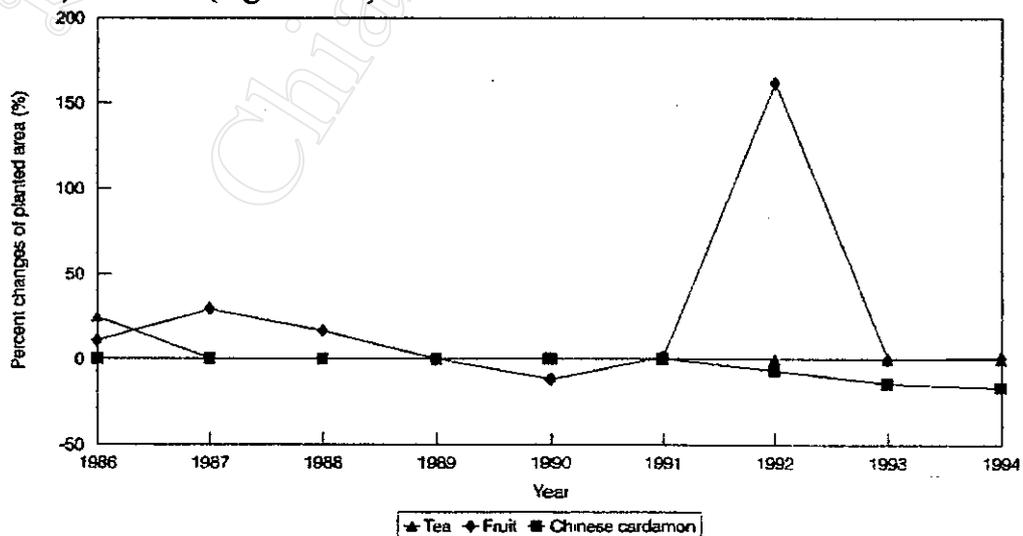


Figure 5.15 Percent changes of planted area of other crops in Manzhang

Bush/grass land was less utilized ten years ago, but now some of it is covered by rubber and fruit trees.

5.3.2 Medeng

The greatest change in land use among Hani people in Medeng is the adoption of paddy land cultivation in the beginning of 1950s which is different from the traditional shifting cultivation, and paddy rice becomes the staple food for the villagers together with upland rice. In the last ten years, there was not too much change on paddy land use except the utilization of hybrid rice variety. Farmers mainly planted paddy rice with insignificant other crops in winter season (Figure 5.16). The cropping intensity index of paddy land approximates to 1 in the last ten years (Figure 5.12).

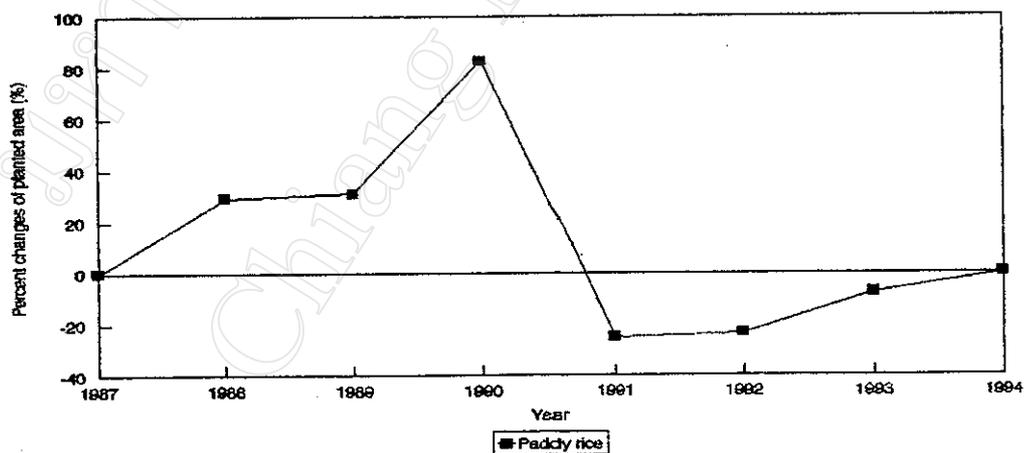


Figure 5.16 Percent changes of planted area of the crop on paddy land in Medeng

Villagers in Medeng still partially practice traditional shifting cultivation on upland with upland rice, maize, cotton, etc. Like in Manzhang, the great change happened on the upland in the last ten years is rapid extension of rubber plantation, and it takes almost 40% of the total upland area now (Figure 5.17). The other notable changes on upland

cultivation are the extension of cultivated period and shortening of fallow period, and the application of chemical inputs like herbicides.

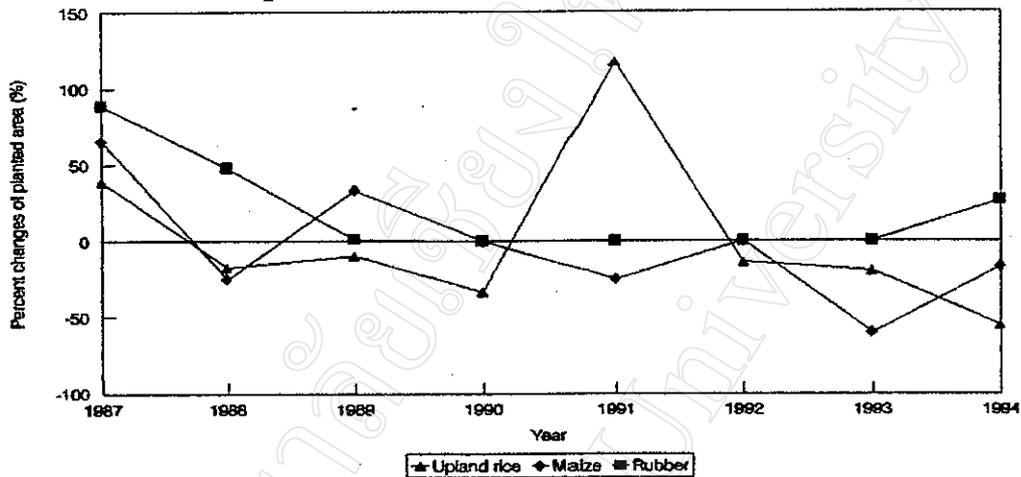


Figure 5.17 Percent changes of planted area of the crops on upland in Medeng

Land use maps of Medeng in 1968 and 1994 show a remarkable decrease of forest happened in the last 40 years, and this decrease was very serious in last ten years due to timber harvest for marketing. Chinese cardamon was introduced to the village in 1976, and farmers have planted it till now for cash purpose, but it is not very economically important for this village (Figure 5.18). Traditional gathering and hunting are still practiced and increased in the last ten years.

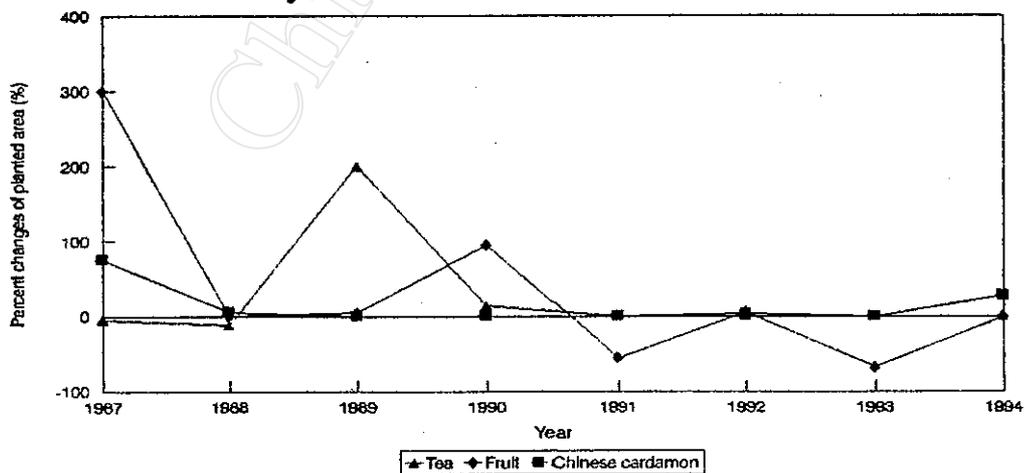


Figure 5.18 Percent changes of planted area of other crops in Medeng

Some of the grass/bush land was formed by over-cultivated upland in Medeng. There is no notable change on grass/bush land use.

5.3.3 Baka

Similar to the Hani in Medeng, Jinuo people in Baka have been planting one season paddy rice which is a different practice from their traditionally shifting cultivation on upland for more than 30 years. Since then, paddy rice gradually becomes one of the most important crops for the villagers. Trend of cropping intensity index of paddy land shows that paddy land use did not change too much in last ten years (Figure 5.12), i.e. one season paddy rice has been the main characteristic of paddy land throughout 30 years (Figure 5.19).

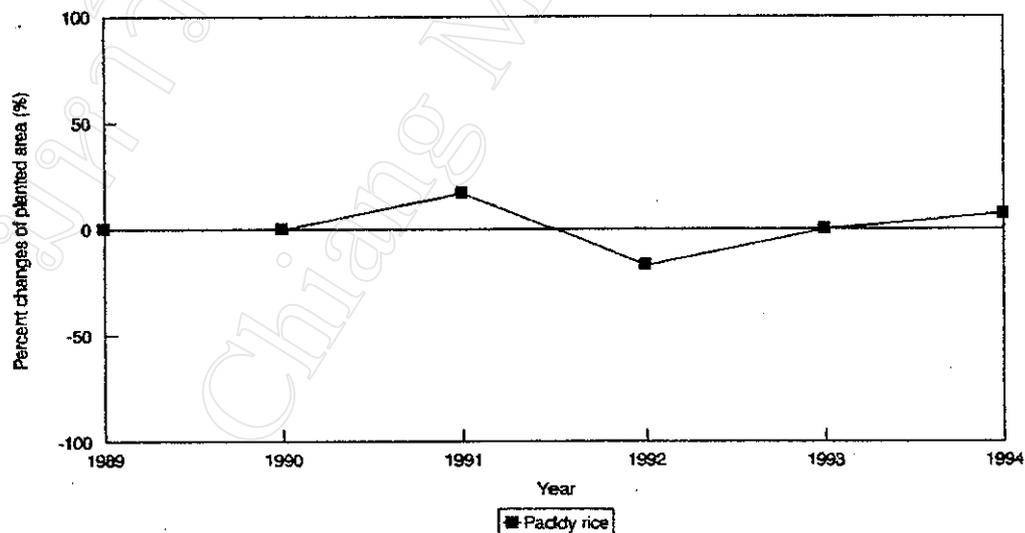


Figure 5.19 Percent changes of planted area of the crop on paddy land in Baka

Traditional shifting cultivation is still practiced on upland by villagers with mainly upland rice, maize. Similar to Manzhang and Medeng, rubber was expanded very fast, and it takes about 20% of the total upland area now (Figure 5.20). Shortening fallow period with extending cultivated period, and application of chemical inputs are also the main

changes on upland land use. Furthermore, other important changes happened on upland cultivation are introduction of new varieties such as passiflora, pomelon, etc. and adoption of agroforestry system such as rubber interplanting with upland rice and/or maize in the last ten years.

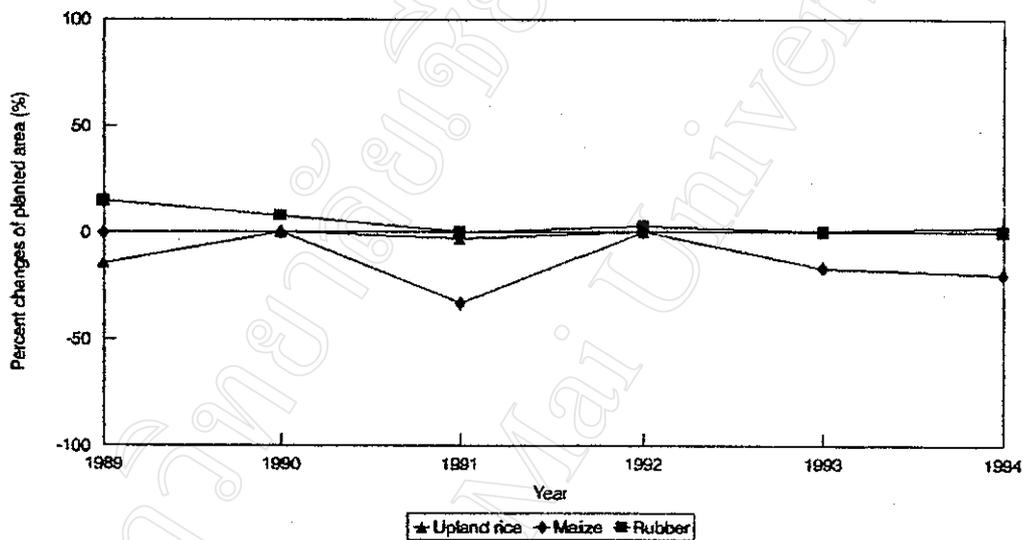


Figure 5.20 Percent changes of planted area of the crops on upland in Baka

The greatest changes in forest land use which is different from Baka tradition is plantation of Chinese cardamon. It was introduced to the village in 1970s, and now it occupies almost all the suitable land not only in community forest of Baka but also in Natural Reserve (Figure 5.21). It was developed as the main income source for the whole township, and this township is very famous for Chinese cardamon production now. Traditional gathering and hunting increased in the last ten years due to increase of demand in the market. Learned from Dai people, the Jinuo in Baka started to plant firewood more than ten years ago, and every household has 1 mu firewood for self consumption now.

Since 1990, some fruit trees have also been planted on the grass/bush land which was formed by over-cultivated upland.

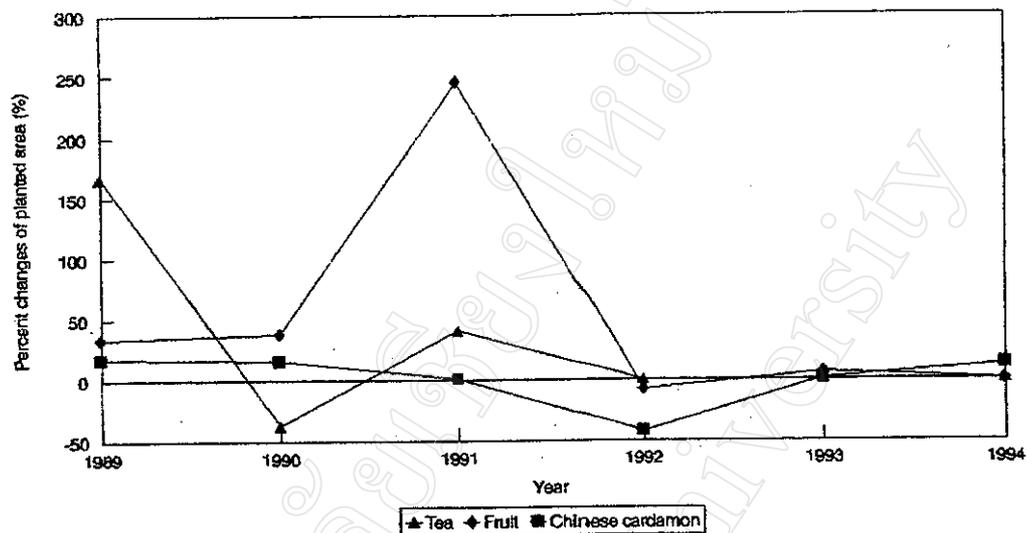


Figure 5.21 Percent changes of planted area of other crops in Baka

5.4 Comparison of Present Land Use Among the Three Villages

Three villagers with different ethnic groups had different traditional cultivation patterns as described in section 5.1. Meanwhile, land use patterns in the three villages greatly changed in last 45 years as depicted in section 5.3.

5.4.1 Cultivated land

5.4.1.1 Paddy land

All three villages plant paddy rice as staple food. As their traditional cultivation, Dai people in Manzhang cultivated paddy land more intensively than those in other two villages. They planted other cash crops after paddy rice, but most of the households in other two villages did not plant anything after paddy rice. Cropping intensity index of paddy land in Manzhang was always higher than in other two villages (Figure 5.12).

Meanwhile, input on paddy land is comparatively higher in Manzhang too, for example, villagers in Manzhang apply fertilizer for paddy rice while the villagers in Medeng applied less and in Baka did not. Baka and Medeng have quite similar land use pattern on paddy land.

5.4.1.2 Upland

With the tradition of shifting cultivation on the upland, the Jinuo in Baka and the Hani in Medeng cultivated relatively more upland area (45 mu/household in Baka, 50 mu in Medeng) than the Dai in Manzhang (17 mu/household), and they also plant relatively more main crop varieties (7 in each village) on upland than the Dai (6 varieties). Annual crops are planted less comparatively in Manzhang. Dai people only plant some crops on the upland for supplement of both subsistence like cotton and cash income like maize. However, some annual crops like upland rice are still very important for subsistence in Medeng and Baka. In perennial crop production, Dai people focus on rubber and fruit, Hani mainly plant rubber, and Jinuo are more interested in rubber, Chinese cardamon and passiflora. The rubber has different degree of importance for each village. It is comparatively more important in Medeng and less important in Baka (3.35 mu/household in Baka, 9.82 mu in Manzhang and 21.1 mu in Medeng). Farmers in all three villages apply chemical inputs on the upland to increase productivity especially the fertilizer for rubber, but those in Manzhang on the average apply more and yield more than in other villages.

5.4.2 Forest

Comparing with Manzhang, forest area in Medeng and Baka almost decreases to minimum. In forest, relatively more production activities are conducted in Medeng and Baka than in Manzhang. The villagers in Medeng and Baka still practiced traditional hunting and gathering in forest, and these activities have increased in the last ten years; but they decreased in Manzhang in the same period. Chinese cardamon is planted in all three villages, but it is planted more in Baka than in other two villages. Logging is practiced more greatly in Medeng than in the other two villages, so the speed of deforestation is relatively higher in this village. The common phenomenon in forest land use among the three villages is in tea plantation. Tea, once important, now only took a small part in all of three villages, and it receives little attention from farmers.

5.4.3 Bush/grass land

Bush/grass land is not used too much in all three villages, but villagers in Medeng and Baka grazed farming animal on bush/grass land while people in Manzhang graze on paddy land in fallow period.

5.5 Highlights

The chapter highlights on description and comparison land use changes of three ethnic groups in Xishuangbanna. These three ethnic groups had very different traditional land use patterns which formed within different physical and social conditions. As the dominant ethnic group in Xishuangbanna, Dai occupied all lowland and mainly engaged in paddy rice production traditionally while other 13 indigenous ethnic groups were governed by Dai and practiced traditional shifting cultivation on upland in different ways. Under the

government of Dai, Hani and Jinou had their own land tenure within the group. However, collective ownership was the common character of land tenure in the two ethnic groups, and forest, especially water source forest was strictly protected in the community. Nevertheless, they had different land classifications and cultivation practices in their territory.

The significant changes on land use were found in all three ethnic groups after comparing traditional and present land use patterns. In the present, all the three villages have paddy land which totally occupied by hybrid paddy rice in summer, and some new crops such as water melon and chili were introduced to paddy land in winter season, and they are planted on all paddy land in Manzhang. A big area of shifting cultivation in all three villages already changed to permanent cultivation mostly with plantation tree, and shifting cultivation takes less and less area on upland. With the introduction of new varieties to cultivated land, some traditional crop varieties were abandoned. Chemical inputs are commonly adopted in all three villages accompanying new varieties and land degradation problem. Forest area decreased greatly especially in Medeng and Baka, and traditional regulation of forest protection was no longer effective.

Some differences still can be seen among villages. Dai people cultivated paddy land more tensively than Hani and Jinuo, and they practice less shifting cultivation on upland than other two ethnic groups.