

CHAPTER III

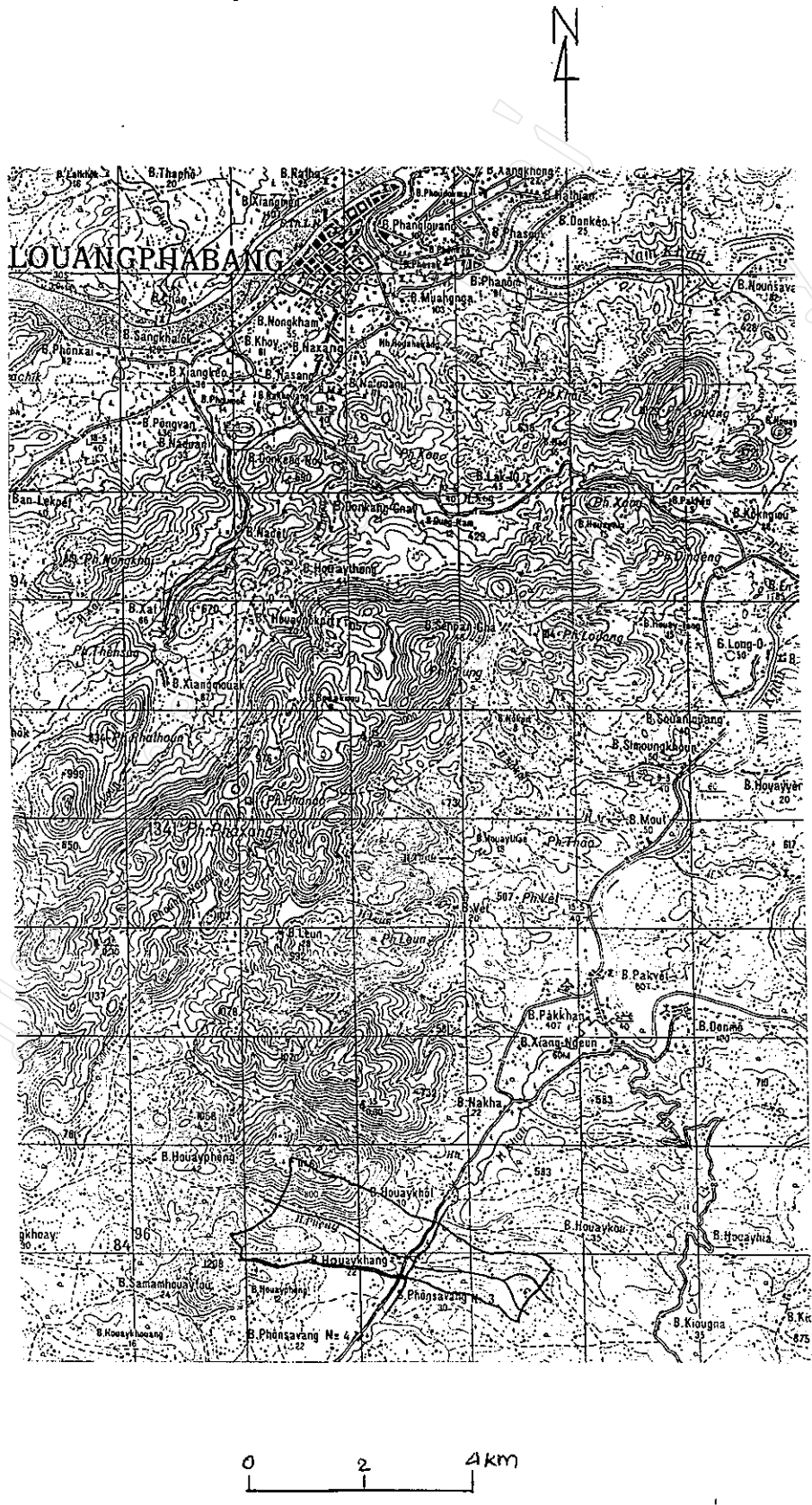
GEOGRAPHICAL CONDITIONS OF HUAY KHANG VILLAGE

Huay Khang Village (Ban Huay Khang) is located between 102°08'E and 102°11'E longitudes and between 19°42'N and 19°44'N latitudes, in the Nam Khan watershed area, Xieng Ngeun district, Luang-Prabang province (Figure 3.1). It is situated approximately 34 kilometers southwest of Luang-Prabang town. The village has a total area of 690.50 ha, out of which there are 10.15 ha of paddy field and 63.05 ha of plantations, 134.50 ha of cultivated upland area, current and potential forest of 463.30 ha and other use 19.50 ha (1999).

Topography and slope classes of Huay Khang village are derived from the slope class and shifting cultivation area in Nam Khan watershed. The topography of the area is characterized by a strict of narrow valley flatland to steep mountainous slopes with an elevation of about 400 meters above sea level (m.a.s.l) (Figure 3.1). Between these two described physiographic units, there are rolling and hilly land with slope ranging from 20-40% which is the major landform of the mentioned area, and where the shifting cultivation is widely practiced.

Based on the land use map of Xieng Ngeun district prepared by the 1990 Nam Khan Watershed project and the one prepared by NOFIP in 1996, the land use type of the site was described as fallow and/or unstocked forest area. The term unstocked forest as defined by MAF means area previously forested areas in which the crown density has been reduced to less than 20% because of logging or heavy disturbance. Abandoned *hai* and disturbed stands with a crown density less than 20% should be classified as "unstocked forest areas". Basing upon the land use map, the research site is considered as representative land use type for the vast extent of Xieng Ngeun district, as well as the whole Luang-Prabang Province. The forest type of the area was originally mixed deciduous forest. Later, this area was cleared up and used for agricultural purpose. The land-use conditions depend on the environmental, socio-economic and technological characteristics of the area, to be described below.

Figure 3.1 Location of Study Area



3.1 Environmental conditions

3.1.1 Geomorphology

The land is mountainous, consisting mostly of moderate and steep slopes, and some nearly vertical limestone escarpments. Gently sloping land represents less than 10 percent of the area and occurs at foot hills, at the bottom of river valleys and on the top of some limestone karsts. Research and extension on sloping land technology may therefore be highly relevant.

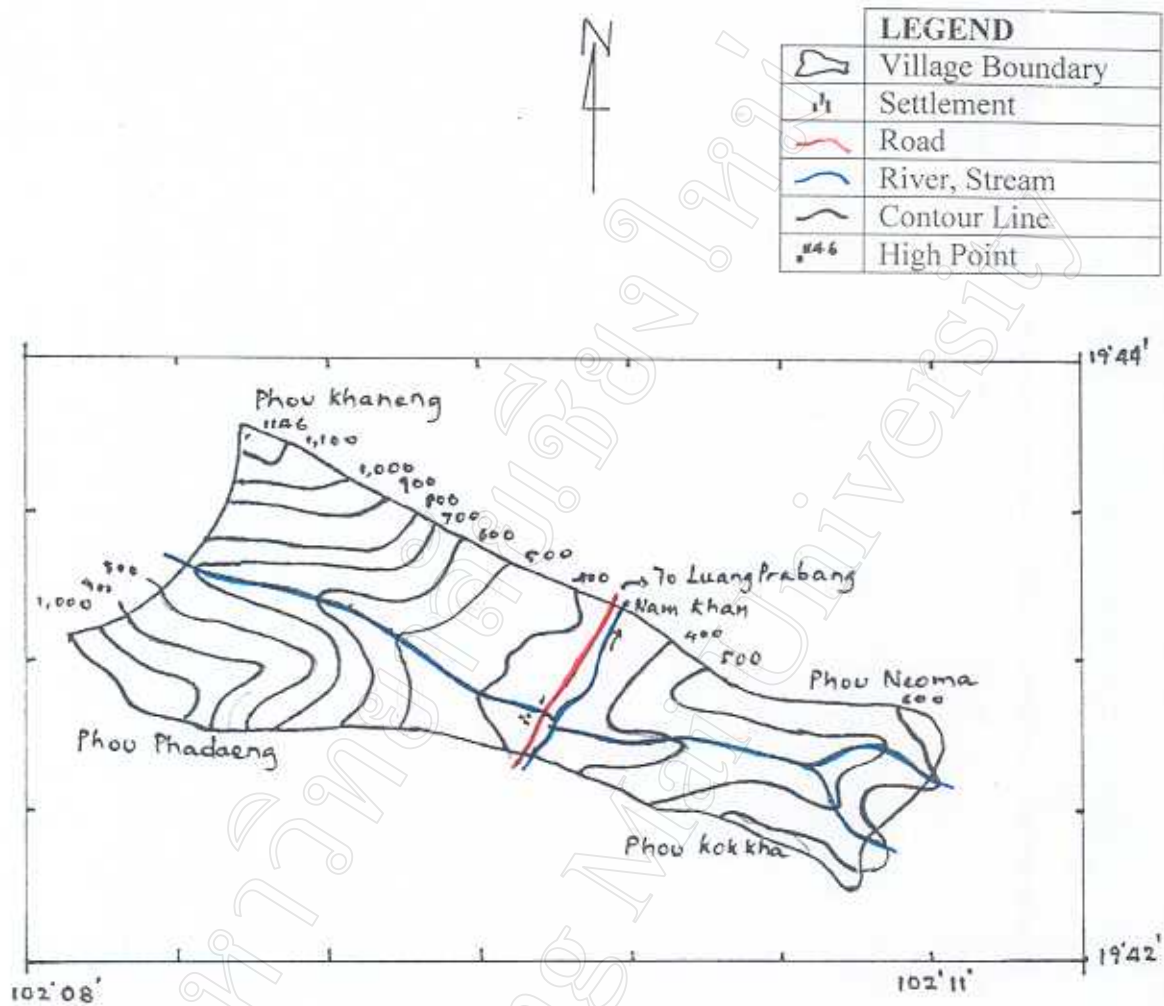
Elevations vary from 360 to 1,146 meters above sea level (Figure 3.2), but areas higher than 1,000 meters account for only about 7.50 percent of the total area (Table 3.1). Most of the agricultural production takes place at 360-700 m.a.s.l. and technologies suitable for this altitude range should therefore be the main focus. Areas above 1,000 m offer special opportunities, such as production of temperate zone crops and the use of longer cropping periods. However, such areas are relatively small and the local authorities are trying to allocate such land for reserve forest. Consequently, research and extension in such areas should not be prioritized.

Table 3.1 Area and Proportion of Land within Different Altitude Classes in Huay Khang Village

Altitude Class (m)	Area (ha)	Percent of Area
< 500	237.50	34.00
500 – 700	231.25	33.50
700 – 1,000	171.75	25.00
> 1,000	50.00	7.50
Range: 360 – 1,146	690.50	100.00

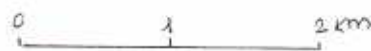
Based on 1:50,000 map

Figure 3.2 Topographic Map of Huay Khang Village



Altitude (m)	Area	
	(ha)	(%)
< 500	237.50	34.00
500 - 700	231.25	33.50
700 - 1,000	171.75	25.00
> 1,000	50.00	7.50
Total	690.50	100.00

Scale- 1:50,000



The relatively large range in altitude induces different climatic conditions, which in turn cause variations in soil properties, vegetation, crop suitability, etc., to be discussed later.

Casual observations indicate that the most common rock types are schist, limestone, phyllite, silt-stone and sandstone, with quartz inclusions occurring sporadically. Alluvial deposits cover less than one percent of the area. The soil fertility varies with the kinds of soil parent material, which may affect the suitability of crops, management requirements and fertilizer needs. However, these aspects are not fully investigated, but may justify research into these aspects.

The area is part of the Mekong river basin, with a sub-tributary to the Mekong River draining the area, i.e., the Nam Khan Stream flows into the Nam Khaan River. This river is important to the irrigation potentials at lower elevations in the two watershed areas. The main river arms are perennial, but the water flow is considerably lower in the dry season, when many of the smaller tributaries dry out. In most of the area this river system forms a dendritic pattern, but where limestone karst formations occur, underground drainage is prevalent. Protection of the water discharge from the area is a high priority for the authorities and calls for activities, such as land-use planning, sloping land technology and cropping intensification on the flatter slopes.

3.1.2 Climate

The climate in the study area is classified as tropical wet and dry (Aw) climate. It is characterized by two distinctive seasons as dry and rainy; the rainy season starts from May to October and the dry season starts from November to April. The annual rainfall is about 1,300-1,400 mm; of which more than 60% of rain falls between July and September.

Table 3.2 summarizes the climatic data from Luang-Prabang Weather Station.

**Table 3.2 Climatic Data of Luang-Prabang Weather Station (305 m.a.s.l.)
Average of 1971 – 1999**

Month	Rainfall mm	Rainy days	Sun hours/day	Temperature °C	Relative Humidity %	Evapo- Transpiration mm
January	15.8	3	6.2	20.0	80	191.6
February	22.7	3	7.0	22.7	73	174.3
March	32.3	3	6.3	25.3	69	156.0
April	118.4	10	7.0	27.4	70	154.4
May	153.7	15	6.8	28.4	77	151.1
June	169.1	17	6.1	27.9	80	149.7
July	244.7	19	5.2	27.5	82	122.5
August	274.6	21	5.6	27.3	84	111.6
September	156.3	14	6.1	27.1	82	122.7
October	122.7	9	6.5	25.5	82	144.5
November	42.8	4	6.3	22.7	81	144.5
December	10.6	1	6.0	19.4	81	174.7
Year	1,363.5	119	2,284.2	25.1	78	1,785.4

The climate in Ban Huay Khang follows the similar pattern as at Luang-Prabang Weather Station (because the village is located only 34 kilometers from Luang-Prabang), although air temperatures are slightly lower due to the higher elevation.

The rainy season (May to October) accounts for 90 percent of the annual precipitation. In terms of rainfall and number of rainy days, August is the most humid month and December the driest. Large variations occur in the annual rainfall pattern. The range in annual precipitation in Luang-Prabang Town during 1970-1998 was 1,035 – 1,841 mm. The onset of the monsoon-rains also varies considerably; thus, April rain-fall figures vary between 0 and 267 mm, causing considerable risk to the early established crops.

May is the hottest month of the year, followed by a drop in mean monthly temperatures due to more rain and clouds in the rainy season. From November to February temperatures drop as a result of less insolation, less cloud cover and cooler winds brought by the north-east monsoon. December is the coolest month, but the average temperature remains above 18°C.

The relative relief in the study area of 900 m is likely to induce a difference in average air temperatures between the lowest and the highest areas of 4.5°C. Evapotranspiration is therefore lower at higher elevations, and rainfall may be expected to be higher, but no data are available. The cropping season lasts up to ten or eleven months at elevations above 1,000 m, whereas rainfed cropping at lower elevations is only about eight months. The diverse climatic conditions also affect the choice of crops and natural vegetation.

Crop damage due to unusual weather is mainly related to rainfall. As already mentioned, the onset of the monsoon rains is uncertain, and sometimes makes replanting necessary. In some years, dry spells in the early rainy season cause problems, particularly for upland rice, as happened in 1993 and in the early part of the rainy season of 1995.

3.1.3 Soils

Soil resource inventory of Luang-Prabang Province and Xieng Ngeun District was carried out by the soil survey team in 1995. Soil classification was originally based on the 1979 FAO/UNESCO system. Most soils of the area are classified as Typic Haplustults, Kanhaplic Haplustults and Typic Haplustults. Isohyperthermic regime, variation in soil textures and depths, and slopes depend on the landform position and parent materials which are derived from. In terms of soil capability and suitability, soils are classified as marginally suitable for crop production due to severe limitation factors such as erosion, slopes, rooting condition, etc.

3.1.4 Natural Vegetation

The climax vegetation in the area is mixed deciduous and bamboo forests. Shifting cultivation and, to a lesser extent, logging have eradicated most of the mature forest. Today, older, dense forest stands account for only about 10 percent of the total area, and are almost exclusively found on the steepest and most inaccessible hill sides.

Most of the land is under some succession stage of regeneration. Particularly where the land is relatively fertile, the younger stages are dominated by *Eupatorium*

odoratum, other herbs and bushes; whereas grass-lands of *Imparata cylindrica* are formed where longer or repeated cultivation periods are practiced. Bamboo groves are widespread, particularly on steeper slopes. Regeneration of forest is usually good, if not interrupted by cultivation. Dense, low-statured tree stands may establish in 6-10 years. However, as the average fallow period is nowadays down to 4-5 years, reversion to forest is uncommon. Much of the primary forest was probably dominated by evergreen tree species, specifically at higher elevations and in landscape depressions and other moist places. However, most of the evolving secondary forest is predominantly deciduous, and the latter seems frequently to be replacing the former. This may be due to change in both species and habit of the trees. The area and proportion of various vegetation types in the research area, based on air photo interpretation, are shown in Table 3.3.

Table 3.3 Area and Major Vegetation Types in Huay Khang Village, 1999

Vegetation Type	Extent	
	Hectare	Percent
Mixed Decid ious Forest	210.05	30.40
Bamboo Forest	115.75	16.75
Plantations (Teak, Porsa, Banana, Fruit Tree)	63.05	9.15
Paddy Fields	10.15	1.45
Swidden Fields	134.50	19.45
Others	19.50	2.80
Total:	690.50	100.00

The central and local authorities prioritize the regeneration of the forest highly. This could increase income opportunities, possibly improve the irrigation potential, provide the population with access to construction materials and other products, and would reestablish some of the natural biotopes. In 1996, land-use rights were allocated to the individual households in the area. An average area of 3.23 hectares per household was allocated, an equivalent of about 120 hectares for the whole village. This village was also given reserve land for future expansion of the population (especially the bamboo forest), amounting to about 115.75 hectares. Consequently, of the total area of 690.50 hectares, about 210.05 hectares (or 30.40 %) could be considered current forest. To ensure that the forest land is protected from

future encroachment. A number of development activities could be undertaken, including: effective liaison with the village regarding land occupation, improving the criteria used in land allocation, assisting villagers in land-use planning, providing villagers with income from sustainable forestry, and improving the land use to eliminate the need of forest encroachment. Research and extension activities in land-use intensification are consequently highly relevant to ensure the livelihood of people under increasing land constraints and to help protect the remaining and regenerating forest.

3.1.5 Wildlife

No formal surveys of mammals, birds and reptiles have been carried out, but casual observation in the field and interviews with villagers give us an idea of the species living in the area.

Destruction of habitat and intense hunting are severely affecting the wildlife situation. Animals generally found include rats, mice, squirrels, and wild pigs, which live in or from agricultural fields and fallow regrowth. Other species, such as tiger and leopard have disappeared about 30-40 years ago.

The following larger mammals are known to exist: rhesus macaque, gibbon, slow loris, Asiatic bear, wild pig, Malayan pangolin, porcupine, squirrels, flying squirrels, bats, large bamboo rat, ferrets, wild dog, hog badger, otter, mongoose, small Indian civet, large Indian civet, leopard cat, jungle cat, barking deer, sambar deer, and serow (or goral). A large number of birds, reptiles, and amphibians still occur in great diversity (despite heavily hunted by man).

Increasing the forest area as discussed above will improve the conditions for wildlife, but the hunting pressure is likely to remain high considering the traditions and poverty of people, the great number of fire arms and the inability of the authorities to implement the current hunting laws. In the long run, a limited hunting season could be introduced in agreement with the villagers.

3.1.6 Agro-ecological Conditions

The agro-ecological conditions vary within the study area, particularly due to the range in relief. Although the environmental variation is gradual and modified by other factors than elevation, some general changes can be expected as one ascends to higher elevations:

- a) The air temperature drops with elevation. This has a direct impact on, e.g., the distribution of wild flora and the suitability of various crops. Some temperate zone crops can therefore be cultivated at elevations above 1,000 m, while many tropical species are unsuitable for this altitude. The drop in air temperature also affects other environmental characteristics, as described below.
- b) With the drop in air temperatures, rainfall tends to increase whereas evapotranspiration decreases. The water supply to crops and natural vegetation is therefore better and more secure, and ensures a longer cropping season at higher elevations.
- c) The accumulation of organic material in the soils tends to increase with elevation. This is presumably induced by a higher production of organic material, slower decomposition rate owing to lower air temperatures, and a lower frequency of forest fires. Thus, under otherwise similar conditions, soils at higher elevations are usually more fertile than at lower elevations.

To assess the applicability of the development activities carried out by the researcher, the environmental characteristics of the study area have been compared with other upland areas in Laos. Some important characteristics are:

- a) The average rainfall of about 1,300 mm per year is relatively low compared to many other mountainous areas in Laos, where annual rainfall exceeding 2,000 mm is common, with some areas receiving more than 3,000 mm.
- b) Upland soils in Huay Khang area are relatively fertile, usually having moderate levels of exchange capacity and base saturation. Thus, they are different from many soils developed on less base-rich parent material or on old, stable land surfaces.

3.2 Socio-Economic Conditions

3.2.1 Village History

About two generations ago the first seven Khamu families arrived in the area of Ban Huay Khang and settled there. All of them came from Huay Fa village, about 100 km north of Ban Huay Khang.

Since then the population increased continuously. With the exception of 4 families which moved to Ban Huay Khang in 1993, the increase in the number of residents was due to the population growth within the village more than 3 %. In 1995 there were 15 families moved out of the village to Xaiyabouly Province, and from that time to now only 36 households remain in Huay Khang village.

3.2.2 Demography

In May 1998 the population of Ban Huay Khang counted 196 people, living in 32 households (36 families). The average number of people per household is around 6. The percentage of male is 52.60% (103 persons), slightly higher than the one of females 47.40% (93 persons). With the exception of four Lao Loum residents, all village inhabitants belong to the Khamu ethnic group (Lao Theung).

Table 3.4 shows the population divided into age groups, absolute numbers and proportions.

Table 3.4 Groups of Population Divided by Age Groups

Age group	Numbers	Percent
0-6	45	22.96
7-15	64	32.65
16-50	69	35.20
>50	18	9.19
Total	196	100.00

Table 3.5 Socio-Economic Data of Huay Khang Village, 1999

No	Name of family head	Person	Labor	Rice insufficiency in a year (month)	Cash income (kip)*	Ethnicity
01	Mr. Inh	9	2	6	550,000	Khamu
02	Mr. Phout	10	6	6	350,000	Khamu
03	Mr. Louang	8	3	6	700,000	Khamu
04	Mr. Phouang	3	3	6	350,000	Khamu
05	Mr. Thiang	6	2	0	380,000	Lao
06	Mr. My	6	2	6	350,000	Khamu
07	Mr. Lom	4	2	6	200,000	Khamu
08	Mr. Linh	5	2	6	540,000	Khamu
09	Mr. Chanh	3	2	0	(NA)	Khamu
10	Mr. Oun (A)	3	2	6	(NA)	Khamu
11	Mr. Pheth	4	1	6	948,000	Khamu
12	Mr. Seum	2	1	6	500,000	Khamu
13	Mr. Oun (B)	7	2	8	660,000	Khamu
14	Mr. Mao	3	2	6	593,000	Khamu
15	Mr. Khamsing	6	2	8	360,000	Khamu
16	Mr. Hack	4	2	0	1,420,000	Khamu
17	Mr. Mot	8	2	6	620,000	Khamu
18	Mr. King	4	2	0	1,500,000	Khamu
19	Mr. Khamsaeng	7	3	0	1,300,000	Khamu
20	Mr. Houmphanh	8	2	0	1,300,000	Lao
21	Mr. Khammy	9	2	8	50,000	Khamu
22	Mr. Khamphane	8	2	8	650,000	Khamu
23	Mr. Amphay	6	2	0	1,560,000	Lao
24	Mr. Phet	2	2	8	(NA)	Khamu
25	Mr. Kham Ouan	8	1	8	490,000	Khamu
26	Mr. Xeu	3	2	0	1,084,000	Khamu
27	Mr. Lay	4	2	6	520,000	Khamu
28	Mr. Xiang Tan	7	2	6	700,000	Khamu
29	Mr. Sivone	7	1	0	2,380,000	Khamu
30	Mr. Xay	4	2	6	175,000	Khamu
31	Mr. Somchine	4	1	6	564,200	Khamu
32	Mr. Khamphaeng	7	3	8	726,000	Khamu
33	Mr. Phoumy	3	1	6	(NA)	Khamu
34	Mr. Onechanh	6	3	6	500,000	Khamu
35	Mr. Chanthavone	6	1	8	599,600	Khamu
36	Mr. Xieng Phaeng	5	2	0	1,120,000	Lao
	Total	196	75		23,773,800	
					0	

* In 1999 the exchange rate is 8,600 kip per 1 US dollar

Due to the high number of children, the percentage of active labor force¹ is low: 38.260% (75 persons). This can be considered as a limiting factor for the area which can be cultivated per family. However older children and elder people still contribute their labor to the family work. More than 35.20% of the population are fifteen years old or younger, which indicates a high natural population growth. This will have consequences on the future natural resource management. It can be expected that cultivating land is going to be more scarce in the village area.

Only 9.19% of the population are over fifty years. The reason for it is not known. It could be higher birth rates, lower child mortality or high adult death rates.

Ban Huay Khang has six drug addicts. One of the main constraints for them is to have enough labor force available for the cultivation on their land. Furthermore, they are all middle aged, five men and one woman. The men became addicts while they were soldier during the war. The addiction of a family member is a serious burden to the family economy.

3.2.3 Village Organization

As usual in Laos, the village is represented by the village-chief. He is elected by the villagers. The village is subdivided into two sub-groups, each headed by a group leader. Besides these representatives, the village has a council of elders with three members. Both groups should not be regarded as competing structures to rule a village. Co-operation between both is the rule. Representatives of mass-organizations like Lao Women's Union or Youth Union are also present in Ban Huay Khang.

3.2.4 Education

Ban Huay Khang has a primary school since 1973. It was established through the initiative of the villagers themselves by building it and starting teaching activities. In 1999 there are five teachers living in the neighboring villages. In addition to a basic government salary, they receive additional support from the village. As for higher

¹ Age of active labor force: 16-60 years

education (secondary level) the children have to go to the schools in the district capital which is 9 km away.

In late 1999 thirty-five children from Ban Huay Khang attend school. Twenty-six pupils attend the primary school and nine in the secondary school. In total, 13 girls go to school. Just one pupil attends the senior secondary school in Xieng Ngeun Town. Presumably that children from the age 6 up to 15 could theoretically attend school within the district area (in Ban Huay Khang), just 32% do now. The main reasons are i) costs of sending children to school; ii) the labor force of elder children is needed within the family.

3.2.5 Health

The most common diseases in Ban Huay Khang are diarrhoea, malaria and common colds. From June until August the expenses for medicine are significantly higher than during the rest of the year. This is the rainy season period when malaria spreads out. Illness is a major problem since the nearest health station is nine kilometers away from Huay Khang village.

3.2.6 Infrastructure

1) Roads and Market

Considering the normal situation in Northern Laos, Ban Huay Khang is well accessible. It is directly situated on the main road leading from Luang-Prabang town to Xayaboury province. This road is one of the major trade routes leading from China southwards to central and eastern Laos.

The distance to the district capital Xieng Ngeun town is 9 km (500 kip by Pick-up truck), and to Luang-Prabang 34 km (1,000 kip). The closest market is Ban Pak Khan (center of Xieng Ngeun town), which forms the intersection on the way from Luang-Prabang to Vientiane and Xayaboury and further to Thailand. The most important market is Luang-Prabang. The second one in importance is Xieng Ngeun town.

2) Water

Ban Huay Khang has three good water sources namely Nam Khan, Huay Khang and Huay Lek which can supply for the whole year. The rivers are in good conditions for 2 seasonal cultivation in paddy fields, however, these rivers can not provide water for upland fields. The water from these streams are used only for drinking and home using purposes.

3.3 Land Tenure and Land Ownership

A case of Laos, according to the land law, land is under the ownership of the national community, of which the state is the representative in charge of unified administration throughout the country, in protecting and distributing land to multi-ethnic people efficiently use and giving land to aliens, stateless people and foreigners on lease or concession but land can not be bought or sold.

Table 3.6 Land Tenure System

Holder of land use rights	Land use class	Form of land use rights	Procurement of land use rights
State	Forest land	Law on Forestry	
Communities	<ul style="list-style-type: none"> • Conservation forest • Protection forest • Utilization forest 	Rights and Duties at village level in management of the natural resources, File No.129/PM 1992	Agreement with district authorities
Families/Individuals	Tree plantation	Land use certificate	Inheritance, transfer
Families/Individuals	Permanent agricultural land	Land title	Inheritance, transfer, lease
Families/Individuals	Temporary agricultural land	Land use certificate	Inheritance
Communities	Spare land	Agricultural land law	Agreement with district authorities
Communities/ Families/Individuals	Settlement area	Land title	Inheritance, transfer, lease

Land allocation was carried out in Ban Huay Khang in 1996 and rechecked in 1998. According to the government regulations, every family received not more than four rotated plots for cultivation.

Several areas which are traditionally used and cultivated were distributed and allocated to all families. That results frequently in a situation in which the farmers after land allocation have less land available for cultivation than before because it is clear for each land owner. About 50 percent of upland agricultural land is still unclear who are the owners and more than 60 percent of plantations and paddy fields are belong to outsiders.

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