

4.3.2 Villagers' Expectations

(1) Activities that People Want to Make Easy

In the household member survey made within the Socioeconomic Baseline Survey, adult members were asked which activity they want to lighten their work load among 50 daily activities. Table 4-3-13 summarizes the highest five activities which men and women want to make easy in the Model Area.

Table 4-3-13 Major Activities that People Want to Make Easy in the Model Area

Whole Model Area				
Work Item	Men's Priority		Women's Priority	
	Order	Score	Order	Score
Fetching of drinking water	1	35.9	1	54.5
Slashing in S&B	2	32.2	3	21.4
Plowing in lowland paddy	3	25.2	-	1.9
Collection of fuelwood	4	21.7	2	22.2
House repair	5	21.3	-	5.5
Child/ elderly care	-	11.2	3	21.4
Cooking	-	7.2	5	19.8

As in the whole Model Area, there are many people who want to lighten the work load in "fetching of drinking water", showing the highest score both in men and women. Below this activity, the order of score is different between men and women. For men, the second highest score is "slashing in slash and burn" followed by "plowing in lowland paddy" and "collection of fuelwood". For women, the second highest is "collection of fuelwood" followed by "slashing in slash and burn" and "child/ elderly care".

As a result of area-wise analysis as seen in Table 4-3-14, scores are higher for lowland paddy cultivation related activities in the Namon Area and slash and burn cultivation related activities in the Somboun Area both in men and women. Except for "fetching of drinking water" and "house repair", men generally want to lighten farming related activities and women want to alleviate home related activities in both areas.

Table 4-3-14 Major Activities that People Want to Make Easy by Areas

Namon Area					Somboun Area				
Activity	Men's Priority		Women's Priority		Activity	Men's Priority		Women's Priority	
	Order	Score	Order	Score		Order	Score	Order	Score
Plowing in lowland paddy	1	49.9	-	4.5	Slashing in S&B	1	45.1	2	28.0
Fetching of drinking water	2	36.3	1	55.8	Fetching of drinking water	2	35.6	1	53.8
Harvesting in lowland paddy	3	27.2	2	29.8	House repair	3	24.4	-	4.3
Collection of fuelwood	4	23.8	4	22.3	Collection of fuelwood	4	20.2	4	22.2
House repair	5	16.9	-	7.8	Weeding in S & B	5	18.2	-	17.3
Seeding/transplanting in L.P.	-	12.6	3	25.0	Child/ elderly care	-	16.2	3	25.2
Washing	-	11.1	5	21.9	Cooking	-	7.7	5	21.7

(2) People's Concerns

The overall results of analyses made on people's concerns show that the people in the Model Area are strongly concerned about food availability, drinking water availability, fuelwood availability, and cash income, and all these items are ranked within the highest fifth in both sexes. The items of people's concerns having large differences between men and women are security and sanitation. Security is ranked fourth in men (25th in women), and sanitation is ranked fifth in women (13th in men). For other items ranked from sixth to 10th, labor force availability, worship of religion, festival, dance party and education of children are listed in order of importance.

The items with lower scores which indicate less concern of people are flood, drought, land slide and soil erosion, degradation of soil fertility, and mailing system both for men and women. Drought may damage upland crops in the Model Area, but the people's concerns are low about it. Yields of upland crops are probably too low (e.g. about 1.0 ton/ha for upland paddy) for people to think about drought damage.

(3) Cash Income Sources that People Want to Improve or Develop

The intention of the sample household members regarding cash income sources which they want to improve or develop in the villages was asked in the questionnaire to the selected members who answered "concern" or "strongly concern" about cash income. The results are summarized as shown in Table 4-3-15 (respondents are 555 or 64% of the sample household members).

Table 4-3-15 Ranking of Income Sources to be Improved or Developed Based on Villagers' Intention

Unit: % of Answers

Items of Cash Income Sources to be Improved/Developed	Namon Area	Somboun Area	Model Area
1. Kao Na Production	61.7	20.7	39.6
2. Kao Hai Production	6.3	35.8	22.2
3. Livestock/poultry raising	13.7	9.4	11.4
4. Vegetables Production	6.3	10.4	8.5
5. Trading	3.5	7.4	5.6
6. Handicraft	2.3	4.0	3.2
7. Fruits Production	1.2	3.0	2.2
8. Others	5.1	9.4	7.4

The proportion of answers is high in the item of Kao Na production in the Namon Area, and in the items of Kao Hai and Kao Na production in the Somboun Area to improve or

develop their cash income sources. This result reveals that many people want to get cash income through improvement or development of their present paddy production system.

(4) Importance of Forest and Measures to Improve Forest Condition

1) Importance of forest

The sample household members were asked to prioritize the important functions of forest. The area-wise results are presented in Table 4-3-16.

Table 4-3-16 Important Functions of Forest Recognized by Villagers

Item	Namon Area		Somboun Area		Model Area	
	Order	Score	Order	Score	Order	Score
Source of Fuel Wood	3	(45.1)	2	(47.9)	1	(46.8)
Source of Forest Vege./ Crops	2	(45.7)	3	(42.5)	2	(43.8)
Function to Conserve Water	1	(46.3)	5	(39.3)	3	(42.0)
Source of Fodder/ Grazing	4	(40.5)	4	(38.8)	4	(39.5)
Source of Kao Hai	7	(20.5)	1	(49.6)	5	(38.3)
Source of Timber	6	(31.3)	6	(24.0)	6	(26.8)
Source of Medicinal Plants	5	(32.4)	7	(22.7)	7	(26.5)

In the Model Area, many people utilize forest for slash and burn cultivation, fuelwood harvest, and animal grazing. Accordingly, the high scores in the items related to Kao Hai, fuelwood and fodder/grazing are understandable. As an interesting result, "source of Kao Hai" is ranked top in the Somboun Area, but is seventh in the Namon Area. In addition, "source of medicinal plants" ranked the fifth in the Namon Area and seventh in the Somboun Area as the important functions of forest.

2) Measures to improve forest conditions

The survey asked the sample household members to prioritize the selected measures to improve the forest conditions. The results are summarized as shown in Table 4-3-17.

Table 4-3-17 Measures to Improve Forest Conditions Based on Villagers' Answers

Unit: % of Answer Nos.

Measures to Improve	Items for Importance of Forest			
	Kao Hai Source	Fuel Wood Source	Timber Source	Fodder/ Grazing
Tree planting in slash and burn areas	66.7	71.9	58.5	53.9
Tree planting in community forests	4.6	3.5	4.9	9.0
Determination of boundary for protection forests	1.8	0.5	3.7	0.0
Development of new paddy land	12.3	10.6	17.1	28.1
Increase of crops/livestock productivity	1.8	1.0	1.2	3.4
Creation of new income sources	10.9	2.5	1.2	2.3
Use of improved stove to reduce fuel wood	2.1	3.5	1.2	0.0
Use of other energy sources (gas, kerosene, etc.)	0.0	0.0	0.2	0.0
Others	0.0	2.0	6.1	0.0

Many sample household members selected the answer of "tree planting in slash and burn areas" for all the items of importance of forest. The development of new paddy land took the second place. For other measures, the percentages of villagers' answers are low in general.

4.3.3 Social Infrastructures

(1) Road

1) Existing road network

As reported in the previous Sub-section 3.3, the state roads R-13 and R-13B run through the Model Area. R-13 enters the Model Area at Km 110 (Milestone) in Taothan village and traverses the Somboun Area from south to northeast and turns north at Km 132.5 in Houaymo-Tai village, from where R-13B branches off. After turning north, R-13 further turns northwest in Phonsavang village and crosses the northern limit of the Model Area at Km 148. R-13B reaches the eastern limit of the Model Area at a bridge across the Nam Phao (11.6 km by road distance).

In the Namon Area, four villages (Namon-Tai, Phonsavang, Vanghua, Nampath-Nua) are located on R-13, five villages (Vangmiang, Namon-Nua, Phonkeo, Ngiou, Nakhom) are connected to R-13 through local roads, three villages (Nalao, Nanguen-Tai, Houaysan) are connected to R-13 through local roads and either cart road or footpath, while two villages (Phongnang and Nanguen-Nua) have no fixed road connecting to any of the existing local roads/ R-13 nor neighboring villages such as Nakhom or Nanguen-Tai.

The total length of the local roads is 9.96 km, of which 5 km is graveled, while the rest is not graveled yet. The locations of those local roads are shown in Figs. 4-3-2 and 4-3-3 and more detailed information of each local road is given in Table 4-3-18.

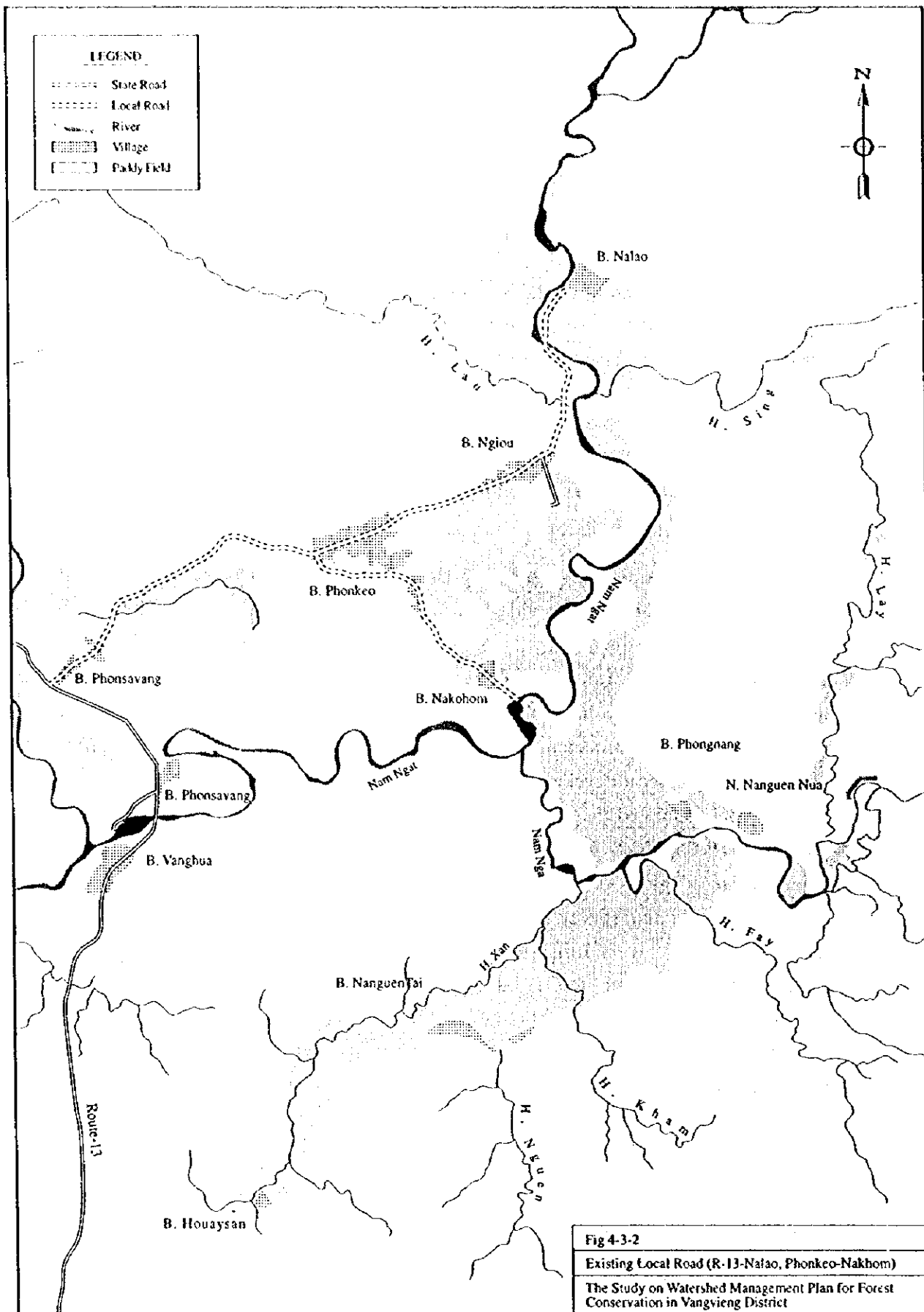
Out of 15 villages in the Somboun Area, 14 villages are located on either R-13 or R-13B, and one village (Phakoup) is situated in an island in the Nam Ngum reservoir.

2) Related structures

The local roads between R-13 and Vangmiang village (1.1 km) and R-13 and Namon-Nua village (3.66 km) have 5 and 11 crossing structures respectively and no new structures are needed. The local roads between R-13 and Phonkeo village (2.45 km), Phonkeo and Ngiou (1.45 km) and Phonkeo and Nakhom (1.3 km) have no crossing structures at 5 river or stream crossings. More detailed information is given in Table 4-3-18.

3) Feeder road for irrigation development plan

Since one of the members of Vangvieng District Development Committee committed his support to the chief of four villages of Nampath-Tai, Houaymo-Nua, Houaymo-Tai and Thahua-Nua, they jointly contracted construction of a feeder road of about 3.8 km between Houaymo-Tai village and expected new paddy land on the Nam Path at about 1.0 km downstream of the confluence with a small stream of Houay Na (according to the information of DAFO, Vangvieng) (see Fig. 4-3-4). After construction by a local developer with a contract amount of 6 million Kips in 1977, those villages requested the Vangvieng District Head Quarter to provide the fund for payment. The District Head Quarter held a Vangvieng District Development Committee meeting on October 2, 1997 and concluded that: i) relevant agencies would carry out a fact-finding survey (because none of the relevant agencies knew what had happened in the field); and ii) it would be decided based on the results of the fact-finding survey whether the Head Quarter would provide the fund or not. Specifically, the Vangvieng CTPC District Bureau would inspect the road, while DAFO, Vangvieng would investigate the possibility of constructing an irrigated paddy field on the area where those villages wished to do so.



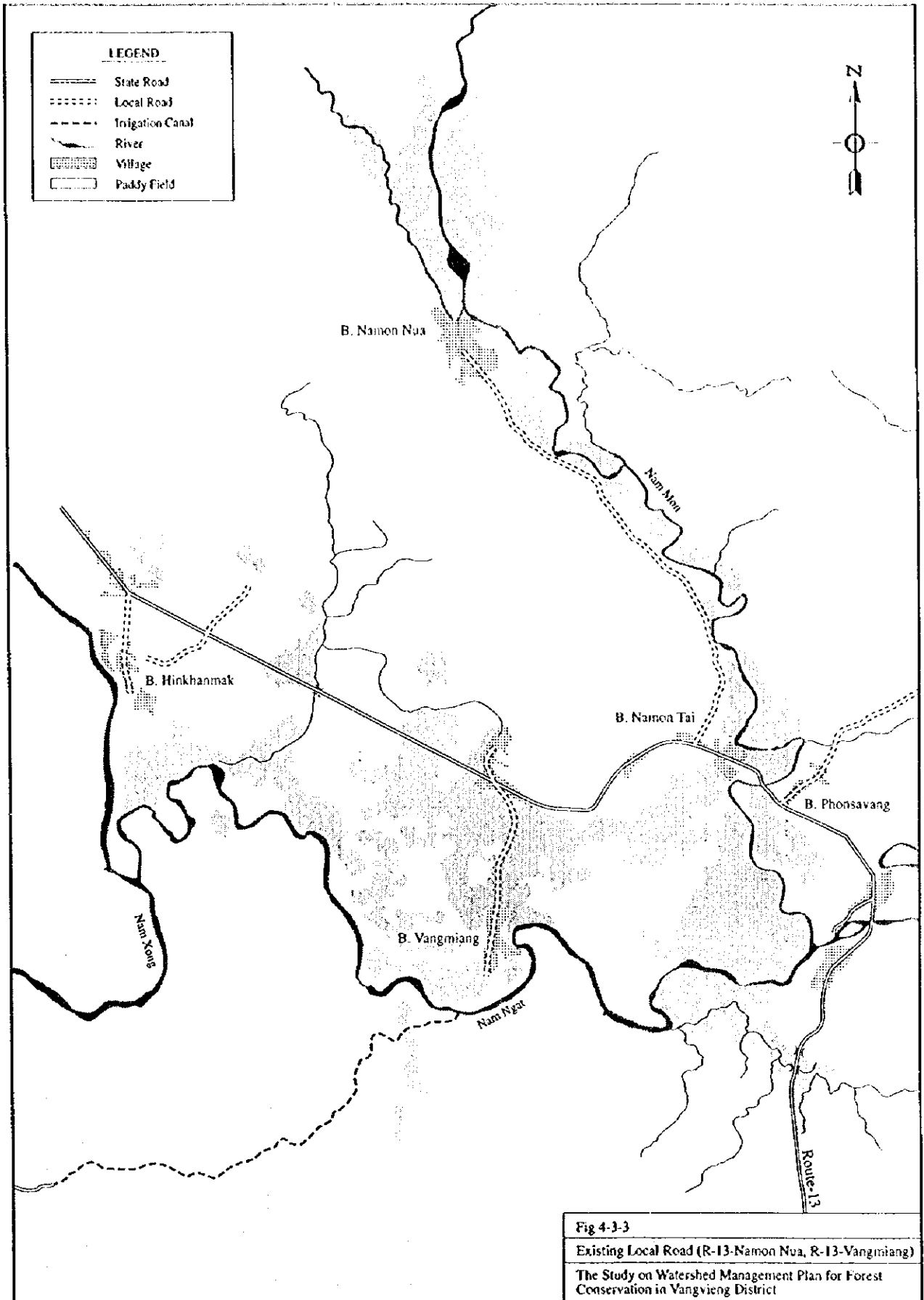


Table 4-3-18 Current Status of Local Roads in the Model Area

Village Name	Household Population in 1996 (nos.)	Location		Road				River/Stream Crossing structures				Priority Ranking at PRA	Remarks	
		Starting Point	End Point	Local Road		Cart Road (km)	Footpath (km)	Width (m)	Bridge (nos.)	Temporary Bridge (nos.)	Other Struct. (nos.)			No. Struct. (nos.)
				Paved (km)	Material Unpaved (km)									
Namon Area														
1 Vangmiang	100	598 R-13	Vangmiang	-	1.10	Gravel	-	3.0	0	0	5	0	1	
2 Namon-Tai	140	835	-	-	-	-	-	-	-	-	-	-	-	
3 Namon-Nua	113	757 R-13	Namon-Nua	3.66	-	-	6.0	0	0	11	0	-	-	
4 Phonsavang	110	640	-	-	-	-	-	-	-	-	-	-	-	
5 Phonkeo	130	996 R-13	Phonkeo	2.45	Gravel	-	3.0	0	0	2	2	3	3	
6 Ngjou	44	302 Phonkeo	Ngjou	1.45	Gravel	-	3.0	0	0	0	0	1	1	
7 Nalao	78	475 Ngjou	Nalao	-	-	-	1.33	2.5	0	0	0	3	2	
8 Nakhom	22	107 Phonkeo	Nakhom	1.30	-	-	-	3.0	0	0	0	2	2	No fixed road
9 Phonngang	26	186 Nakhom	Phonngang	-	-	-	-	-	-	-	-	-	1	
10 Nanguen-Nua	29	193 Phonngang	Nanguen-Nua	-	-	-	0.30	-	-	-	-	-	1	
11 Nanguen-Tai	62	453 R-13	Nanguen-Tai	-	-	-	2.43	-	-	-	-	-	-	
12 Vanghua	151	853	-	-	-	-	-	-	-	-	-	-	-	
13 Houaysan	31	198 R-13	Houaysan	-	-	-	1.30	2.5-3.5	0	0	0	1	-	
14 Nampath-Nua	33	186	-	-	-	-	-	-	-	-	-	-	-	
Total	1,069	6,779	0	5.00	4.96	2.93	2.43	0	0	18	9	0	0	
Somboun Area														
1 Houaymo-Nua	60	319	-	-	-	-	-	-	-	-	-	-	-	
2 Houaymo-Tai	84	550	-	-	-	-	-	-	-	-	-	-	-	
3 Thahua-Nua	165	1,058	-	-	-	-	-	-	-	-	-	-	-	
4 Thahua-Tai	142	829	-	-	-	-	-	-	-	-	-	-	-	
5 Houaypamom	195	1,156	-	-	-	-	-	-	-	-	-	-	-	
6 Somsanuk	177	946	-	-	-	-	-	-	-	-	-	-	-	
7 Nampat	49	314	-	-	-	-	-	-	-	-	-	-	-	
8 Vangkhi	158	891	-	-	-	-	-	-	-	-	-	-	-	
9 Phonhong	28	156	-	-	-	-	-	-	-	-	-	-	-	
10 Taotchan	71	445	-	-	-	-	-	-	-	-	-	-	-	
11 Nampath-Tai	36	230	-	-	-	-	-	-	-	-	-	-	-	
12 Houayxi	65	343	-	-	-	-	-	-	-	-	-	-	-	
13 Namphao	202	1,423	-	-	-	-	-	-	-	-	-	-	-	
14 Phakoup	76	500	-	-	-	-	-	-	-	-	-	-	-	
15 Sivilai	22	158	-	-	-	-	-	-	-	-	-	-	-	
Total	1,530	9,318	0	0.00	0.00	0.00	0.00	0.00	0	0	18	9	0	

* Included in a new district of Hinheup

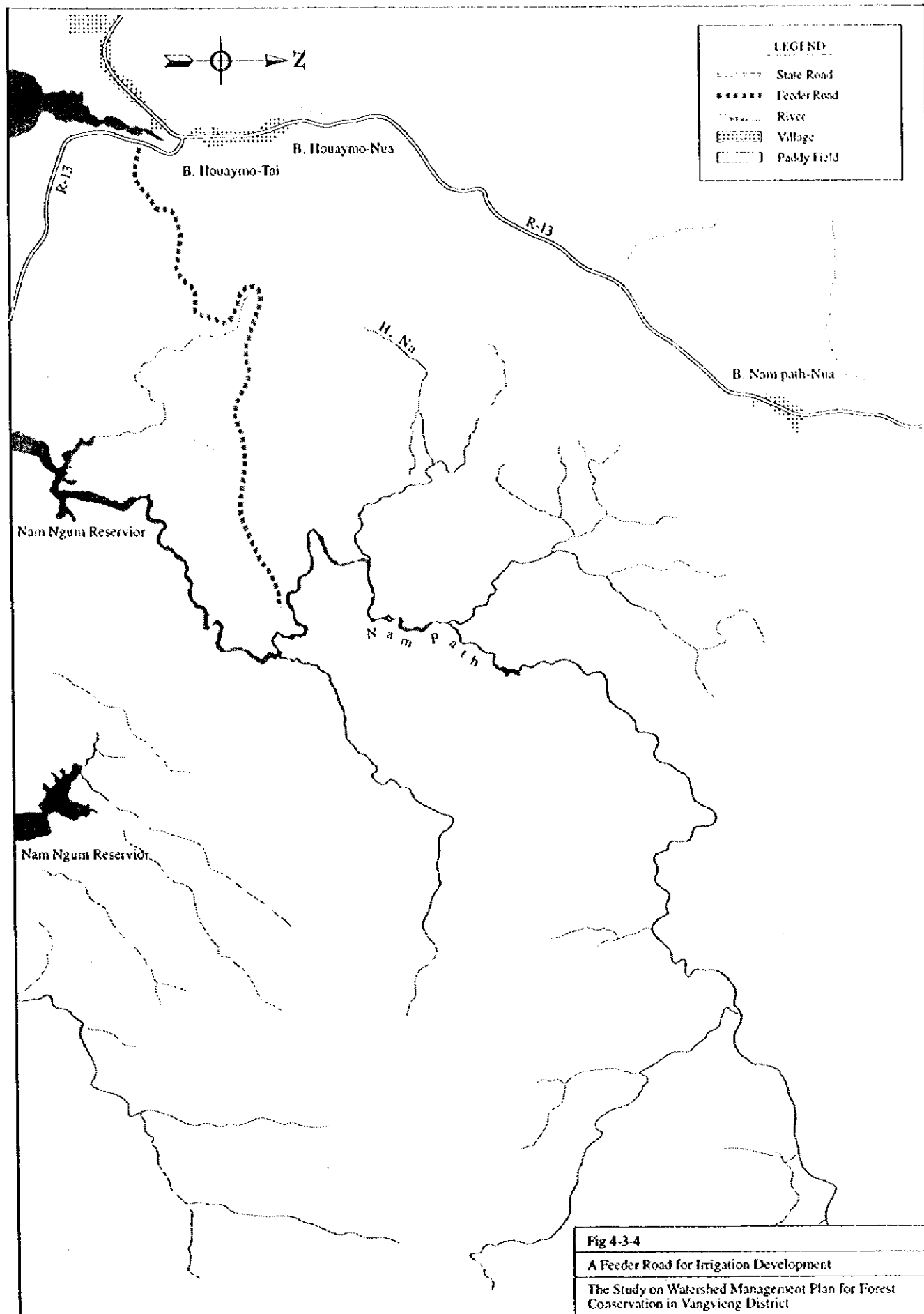


Fig 4-3-4
 A Feeder Road for Irrigation Development
 The Study on Watershed Management Plan for Forest Conservation in Vangvieng District

Prior to the construction of the road, according to DAFO, Vangvieng, neither survey nor design had been conducted and not even any technical specification for construction had been prepared.

Those villages informed the JICA Study team that road construction had been finished. The field reconnaissance survey by the JICA Study team, however, revealed that actual conditions were too far from satisfactory level that no vehicle could pass through because: i) there are many steep slopes which are beyond the ascending performance of vehicles; ii) no compacting has been made at filling portions; iii) no land clearing has been made on the filling portions; iv) no slope protection has been made at both cut and fill slopes; and v) no crossing structures have been constructed at any stream crossings and depressions. To make matters worse, it was confirmed by a Soil expert of the JICA Study team that the expected paddy land area is basely suitable for irrigated paddy cultivation because of coarse soil texture.

(2) Rural Water Supply

1) Gravity fed pipe water supply system

Out of the 29 villages in the Model Area, 10 villages have a gravity fed pipe(s) water supply system for the rural community (a pipe system) and 7 villages out of the 10 depend entirely or mainly on the pipe system for their domestic water supply, while the other three mainly rely on wells. The current status of the pipe system in each village is summarized in Table 4-3-19.

In Namon-Nua village, one pipe system was constructed to improve sanitary conditions in particular for the toilet of a primary school by the Ministry of Health under the Water Supply & Environmental Health Programme (WSEHP) with technical and financial assistance from UNICEF in June 1997. Villagers installed a domestic water supply system consisting of elevated bamboo flume and three (3) outlets with drum tanks. According to the village chief, water from the system is available throughout the year.

In Phonkeo village, villagers share tap water from 2 pipe systems constructed with their own funds in 1994 and 1997, respectively. One system constructed in 1994, with a construction cost of 1.3 million Kips (62,000 Kips/HH), has one concrete distribution tank with three taps, while the other system constructed with a cost of 0.8 million Kips (50,000 Kips/HH) in 1997 has one tapstand only, which the villagers wish to change to a concrete distribution tank.

Table 4-3-19 Current Status of Rural Water Supply in the Model Area (2/2)

Village Name	Household in '97** (HH)	Population in '96** (person)	Current Status of Domestic Water Use							Current Status of Pipe System					Issues
			Pipe System (%)**	Well (%)**	River (%)**	Spring (%)**	Others (%)**	Well (nos.)**	HH/Well (nos.)	Water Source	Pipe		Tap	Constructed	
											Condition	Type			
			(%)**	(%)**	(%)**	(%)**	(%)**	(%)**	(%)**	Name	Material	Condition	Type	No. (year)	(by)
Somboun Area															
1 Houaymo-Nua	60	319	64	9	0	0	27	0	0	H. Phothao	ok	HDP	Stand	5	1997 W/SEHP
2 Houaymo-Tai	84	550	82	0	6	0	12	0	0	H. Na	ok	HDP	Stand	4	1984 W/SEHP
3 Thahua-Nua	165	1,058	100	0	0	0	0	0	0	H. Na	ok	HDP	Stand	2(3)	1984 W/SEHP
4 Thahua-Tai	142	829	93	0	0	0	7	0	0	H. Na	ok	HDP	Stand	1(4)	1984 W/SEHP
5 Houaypamom	195	1,156	0	0	78	0	22	0	0	H. Na	ok	-	Stand	1	Private
6 Somsanuk	177	946	0	0	96	0	4	0	0	-	-	-	-	-	-
7 Nampat	49	314	0	9	64	0	27	0	0	-	-	-	-	-	-
8 Vangkhi	158	891	0	3	68	0	29	1	158	-	-	-	-	-	-
9 Phonthong	28	156	0	14	86	0	0	0	0	-	-	-	-	-	-
10 Taothan	71	445	0	6	94	0	0	0	0	-	-	-	-	-	-
11 Nampath-Tai	36	230	0	0	50	0	50	0	0	-	-	-	-	-	-
12 Houayxi	65	343	0	0	64	0	36	0	0	-	-	-	-	-	-
13 Namphao	202	1,423	100	0	0	0	0	0	0	Nam Phao Noy	ok	HDP	Stand/Pipe	8	1992 W/SEHP
14 Phakoup	76	500	0	0	0	0	100	2	38	-	-	-	-	-	-
15 Sivilat	22	158	100	0	0	0	0	0	0	H. Namko uadin	ok	G. Iron	Stand	5	1997 UNHCR

@ Included in a new district of Hinheup

In Nanguen-Nua village, a temporary bamboo semi-circular flume is elevated by temporary bamboo supports. During the dry season no water is available, so villagers dig small holes in the dried up riverbed of the Nam Nga to get drinking water.

In Nampath-Nua village, one pipe system was constructed using development assistance grant from AusAID with technical assistance by an Australian NGO of Community Aid Abroad (CAA) in May 1997. The name of the stream of its water source is not identified. There are 4 tapstands in the village.

In Houaymo-Nua village, one pipe system with 5 tapstands was constructed by the Ministry of Health in 1997.

In Houaymo-Tai village, one pipe system whose water source is the H. Na river was constructed by the Ministry of Health in 1984 for the villages of Houaymo-Tai, Thahua-Nua and Thahua-Tai. Four taps, 3 taps and 4 taps were installed for Houaymo-Tai, Thahua-Nua, and Thahua-Tai villages, respectively. In addition, another pipe system has been constructed privately for selling water at Thahua-Nua and Thahua-Tai. Now it is being renovated to increase supply capacity.

In Thahua-Nua village, out of the 3 taps stated above, 2 taps are serving water but the remaining one is no longer usable because of deterioration of the distribution pipe. Due to an increase in water demand and deterioration of the system, recently water shortage has chronically taken places.

In Thahua-Tai village, out of the 4 taps stated above, 1 tap is serving water but the remaining 3 are no longer usable because of deterioration of pipes. Similar to Thahua-Nua village, water shortages have taken place due to increased water demand and deterioration of the system. To cope with the shortage of drinking water, villagers buy tapped water on R-13, which is conveyed by the private pipe water supply system having the same water source as the system constructed by the Ministry of Health in Houaymo-Tai. The charge for private water is 300 Kips per 200 liters in the rainy season, while it jumps to 500 - 600 Kips during the critical period.

In Namphao village, one pipe system for community use was constructed in 1992 by the Ministry of Health. The source of the system is about 0.5 km upstream of a diversion weir for irrigation on the Nam Phao Nyai. Seven tapstands had been installed at the construction of the system, then one tap was added recently. To

construct the system, 205 households of the villagers donated 6,300 Kips per household for construction and their labor force.

In Sivilai village, one pipe system was constructed in April 1997 under a UNHCR Project. The intake of the pipe system is located at about 1.5 km north of Sivilai village in the H. Namkouadin river, having perennial flow according to the village chief. The conveyance pipe is galvanized iron pipe, with a 1.7 km between the intake and R-13 and 300 m distribution pipes in the village with 5 tapstands consisting of 4 in the village and one at the primary school.

2) Dug wells

In the Namon Area, 10 villages have dug wells for community use. Out of the 10 villages, 8 villages mostly depend on the wells for domestic water use, and the remaining two villages rely for domestic water on both the pipe systems and the wells. In the Somboun Area, only 3 villages out of the 15 have wells, and use of those well is very limited. The number of wells in each of the villages in the Model Area is shown in Table 4-3-19.

(3) Rural Electrification

Electricity supply in the Model Area is still limited to those villages located on R-13. In the Namon Area distribution lines for the electricity supply have been provided for 3 villages (Namon-Tai, Phonsavang and Vanghua) and are being provided for one village (Vangmiang), while lines in the Somboun Area have been provided for 5 villages (Houaymo-Tai, Thahua-Nua, Thahua-Tai, Somsanuk and Vangkhi) and are under installation for 5 villages (Houaymo-Nua, Houaypamom, Nampat, Phontong and Taothan).

(4) Primary School

In the Model Area, 27 villages out of the 29 have either a complete 5-year primary school or an incomplete 4-, 3-, 2-year primary school. In the Namon Area, 6 villages have a 5-year primary school and in the Somboun Area 8 villages have the same. School children of villages which have incomplete primary schools, continue to go to the 5-year school in the neighboring village. Buildings of those primary schools can be classified into 9 types by materials used for the buildings, the breakdown of which is given in Table 4-3-20 and summarized in Table 4-3-21.

Table 4-3-20 Current Status of Primary Schools in the Model Area (1/2)

Village Name	Household in '96** (nos.)	Population in '96**			Existing Primary School				School to complete 5-year (km)	Distance to 5-year P. School (km)	Remarks		
		Total (person)	6-15 yrs (person)	School children (person)	Grade (year)	Class room (nos.)	Office	Status of Primary School Building					
								Floor				Walls	Roof
Namon Area													
1 Vangmiang	100	598	173	179	5	6		Concrete	Brick	Zinc roof	-	-	Building has newly been constructed.
2 Namon-Tai	140	835	388	248	5	4		Concrete	Bamboo	Zinc roof	-	-	
					2	2		Concrete	Wooden board	Zinc roof	-	-	
					3	3		Concrete	Bamboo	Zinc roof	-	-	
					1	1		Concrete	Brick	Zinc roof	-	-	
3 Namon-Nua	113	757	174	190	5	4		Concrete	Bamboo	Zinc roof	-	-	
					2	2		none	Bamboo	Bamboo	-	-	
4 Phonsavang	110	640	167	130	3	3		Concrete	Bamboo	Zinc roof	Namon-Tai	0.8	
5 Phonkeo	130	996	259	213	5	3		Concrete	Bamboo	Zinc roof	-	-	
					3	3		Earth	Bamboo	Bamboo	-	-	
					1	1		Earth	Bamboo	Bamboo	-	-	
6 Ngiou	44	302	113	146	5	4		Concrete	Bamboo	Zinc roof	-	-	
					3	3		Concrete	Bamboo	Zinc roof	-	-	
					1	1		Concrete	Bamboo	Zinc roof	-	-	
7 Nalao	78	475	133	79	3	3		Concrete	Bamboo	Zinc roof	Ngiou	1.3	
8 Nakhom	22	107	65	16	2	2		Earth	Bamboo	Zinc roof	Phonkeo	1.3	
9 Phonngang	26	186	46	49	3	2		Earth	Bamboo	Bamboo	Phonkeo	2.1	New building (3-year) is planned in 1998.
10 Nanguen-Nua	29	193	32	40	-	-		-	-	-	Phonngang	2.5	To the primary school in Phonngang for the first 3 years, then go to Phonkeo for 4 and 5 years.
11 Nanguen-Tai													
	62	453	142	35	2	2		Earth	Bamboo	Bamboo	Vanghua	2.4	
12 Vanghua													
	151	853	235	323	5	3		Concrete	Bamboo	Zinc roof	-	-	
					4	4		Concrete	Bamboo	Zinc roof	-	-	
					6	6		Earth	Bamboo	Zinc roof	-	-	Under construction
					1	1		Earth	Bamboo	Zinc roof	-	-	
13 Houaysan													
	31	198	40	24	2	1		Earth	Bamboo	Bamboo	Vanghua	3.8	
14 Nampath-Nua													
	33	186	30	34	2	1		Earth	Bamboo	Zinc roof	Vanghua	3.4	

** : Village profiles, WTMAP Progress Report

Table 4-3-20 Current Status of Primary Schools in the Model Area (2/2)

Village Name	Household in '96**		Population in '96**		School children (person)	Grade (year)	Class (nos.)	Existing Primary School		School to complete 5-year	Distance to 5-year P. School (km)	Remarks
	Total (nos.)	6-15 yrs (person)	Total (person)	6-15 yrs (person)				Status of Primary School Building	Office			
								Floor	Wall	Roof		
Somboun Area												
1 Houaymo-Nua	60	319	92	72						Houaymo-Tai	1.0	
2 Houaymo-Tai	84	550	170	158	5	6		Concrete	none yet	Zinc roof	-	Aged. Renovation seems to be needed.
3 Thahua-Nua	165	1,058	301	260	5	8		Concrete	Bamboo	Zinc roof	-	
4 Thahua-Tai	142	829	282	218	5	4		Concrete	none yet	Zinc roof	0.8	Walls have not been completed yet. New building is under construction.
5 Houaypamom	195	1,156	342	202	5	5		Earth	Wooden board	Zinc roof	-	Removing school buildings is planned.
6 Somsanuk	177	946	259	210	5	1		Concrete	Wooden board	Zinc roof	-	New buildings are under construction.
7 Nampat	49	314	111	100	2	2		Earth	Bamboo	Bamboo	2.2	
8 Vangkhi	158	891	215	267	5	4		Concrete	Brick	Zinc roof	-	Standard Type
9 Phonthong	28	156	42	18	2	1		Concrete	Brick	Zinc roof	-	Standard Type
10 Taothan	71	445	143	147	4	4		Earth	Bamboo	Zinc roof	3.4	
11 Nampath-Tai	36	230	81	36	2	1		Earth	Bamboo	Zinc roof	2.6	Wall is very temporary. Very poor in conditions.
12 Houayxi	65	343	96	84	4	3		Earth	Wooden board	Zinc roof	5.2	
13 Namphao	202	1,423	387	393	5	6		Earth	Wooden board	Zinc roof	-	
14 Phakoup	76	500	106	107	5?	3		Earth	Wooden board	Zinc / thatched	-	Wall is very temporary. Aged.
15 Sivilai	22	158	51	68	3	3		Concrete	Brick	Zinc roof	1.5	

* Included in a new district of Hinheup

** Village profiles, WTMAP Progress Report

Table 4-3-21 Classification of Primary School Building

Floor	Walls	Roof	Nos. of Villages
Concrete/bricks	Concrete/bricks	Zinc	4
Concrete/bricks	Wooden board	Zinc	1
Concrete/bricks	not yet	Zinc	2
Concrete/bricks	Bamboo weave	Zinc	7
Earth	Concrete/bricks	Zinc	1
Earth	Wooden board	Zinc	4
Earth	Bamboo weave	Zinc	4
Earth	Bamboo weave	Cleft bamboo	4
No school			2

The primary school consists of more than one building and different type of buildings in many villages. However, the above table presents the representative type of building for classification purposes.

(5) Village Office, Community Hall, Temples and Churches

There are 12 villages having a temple, 2 villages having church(s), one village having a village office and one village having a community hall. However, there are 13 villages having none of those facilities which could be used as a community center for each of the villages. More information is given in Table 4-3-22.

(6) Health Center and Health Post

A clinic for Hansen's disease was constructed at Somsanuk village in 1984 under a UNHCR Project and it was renovated in 1996. This clinic has its own piped water supply system being served by an electric ally driven water pump and rain water.

In the Model Area, one health center is located in each of Phonsavang and Houaymo-Nua villages.

During the First Stage Field survey, it was informed at the Health Center that most of the villages in the Study area have a medical post as a working station for medical and obstetrician volunteers. However, the field reconnaissance survey during the Third Stage Field Survey during September/October 1997 revealed that no such health posts have been provided in any of the villages and the volunteers' residence is used for the station in the Model Area.

Table 4-3-22 Current Status of Electricity Supply, Temple, Health Post and Community Hall
in the Model Area

Village	Electricity Supply	Temple	Church Catholic	Church Protestant	Health Post	Village Office	Community Hall
1 Vangmiang (3-1)	Under installation	One	-	-			
2 Namon Tai (3-2)	Installed	One	-	-			
3 Namon Nua (3-3)	-	-	-	-			
4 Phonsavang (3-4)	Installed	One	-	-			One
5 Phonkeo (3-5)	-	-	-	-			
6 Ngrou (3-6)	-	One	-	-			
7 Nalao (3-7)	-	One	-	-			
8 Nakhom (3-8)	-	One	-	-			
9 Phongnang (3-9)	-	-	-	-	Health Center		
10 Nanguen-Nua (3-10)	-	-	-	-			
11 Nanguen Tai (3-11)	-	-	-	-			
12 Vanghua (3-12)	Installed	One	-	-			
13 Houaysan (3-13)	-	-	-	-			
14 Nampath-Nua (3-14)	-	-	-	-			
15 Houaymo-Nua (5-1)	Under installation	-	One	-	Health Center		
16 Houaymo-Tai (5-2)	-	One	-	-			
17 Thahua-Nua (5-3)	-	-	-	-			
18 Thahua-Tai (5-4)	-	One	-	-			
19 Houaypanom (5-5)	Under installation	One	-	-			
20 Somsanuk (5-6)	Installed	-	-	-	Medical Clinic		
21 Nampat(5-7)	Under installation	-	-	-			
22 Vangkhi (5-8)	Installed	One	-	-			
23 Phonthong (5-9)	Under installation	-	-	-			
24 Taathan (5-10)	Under installation	-	One	One			
25 Nampath-Tai (5-11)	-	-	-	-			
26 Houayxi (5-12)	-	-	-	-			
27 Namphao (5-13)	-	One	-	-			
28 Phakoup (5-14)	-	-	-	-			
29 Sivilai (5-15)	-	-	-	-		Constructed under UNHCR	

4.3.4 Irrigation Facilities

(1) Existing Facilities

Based on the land use map (scale 1:20,000) and printed aerial photographs with the aid of the field reconnaissance survey, existing lowland paddy field in the Model Area was estimated to be 726 ha, accounting for 623 ha in the Namon area and 103 ha in the Somboun area (which is assumed to be 70 % of the area measured with planimeter on the land use map on a scale of 1:20,000). In those areas, paddy is generally grown one time a year during the wet season. Paddy is generally transplanted between the second half of July and the second half of August and harvested during October/November. After harvesting the paddy such upland crops as water melon, cucumber, cabbage, long beans, soybean, groundnuts, etc. are grown in a very limited area.

Despite the fact that the monthly rainfall of the area amounts to 715, 779, 657, 400 and 136 mm in June, July, August, September and October, respectively, most of the lowland paddy is irrigated through a number of medium to very small scale irrigation systems. Upland crops in the paddy field are grown with remedial moisture and are partly irrigated along the irrigation canals.

There are 4 types of weir, i.e., concrete weir, gabion weir, wooden weir, and cobble weir. The concrete weir is a permanent one. The gabion weir, semi-permanent, is made by piling box gabion. The wooden weir, semi-permanent, is made of logs crossing each other and bamboo weave placed upstream of the fixed logs to dam up part of the river run-off. Both gabion and wooden weirs need frequent maintenance. The cobble weir is just a heap of cobble and pebble stones and is a very temporary one that is usually washed away with every flood.

The current situation of these weirs identified during the field reconnaissance survey is summarized in Table 4-3-23 and the location of the weirs and their command areas are shown in Figs. 4-3-5 to 4-3-8.

Paddy field extending between R-13 and the Nam Ngat, all paddy field in Namon-Tai village and most of the paddy field included in Vangmiang village are in the command area of the Namon Irrigation System, which is the largest command area of one irrigation system among those in the Model Area (see Fig. 4-3-5). It consists of a permanent type headworks across the Nam Mon and left and right main canals. The irrigation system was completed by mid-1996 under the Upland Agriculture Development Project, but

Table 4-3-23 Existing Headworks for Irrigation in the Model Area (1/2)

Village	Name River	Weir			Intake			Canal		Remarks
		Length (m)	Height (m)	Type (material)	B (m)	H (m)	Gate	Canal Type	Service Area	
1 Vangmiang										
2 Namon-Tai	Nam Mon			Concrete			Steel	Open channel	Earth	Left/Right banks Upland Agriculture Development Project
3 Namon-Nua	Nammon	42.0	2.0	Gabion	1.0	2.0	none	Open channel	Earth	Right bank
4 Phonsavang	H.Pungkua	12.0	1.0	Gabion	0.8	0.6	Steel	Open channel	Earth	Left bank
5 Phonkeo										
6 Ngiou	Nam Ngat	50.0	1.4	Wood	7.0		none	Open channel	Earth	Right bank
	Nam Ngat	50.0	1.4	Wood	6.0		none	Open channel	Earth	Right bank
7 Nalao	Nam Ngat	47.0	2.0	Wood	2.5		none	Open channel	Earth	Right bank
	Canal	9.6	1.0	Wood	1.0		none	Open channel	Earth	Left bank
	H. Lao	5.7	1.0	Wood	1.2		none	Open channel	Earth	Right bank
	Canal	1.9	1.2	Wood	1.5		none	Open channel	Earth	Right bank
	H. Lao	5.5	0.9	Wood	0.5		none	Open channel	Earth	Left bank
	H. Sing	32.7	1.5	Wood			none	Open channel	Earth	Right bank
	H. Sing	2+12	2.0	Wood	1.0		none	Open channel	Earth	Right bank
8 Nakhom										
9 Phongngiang	Nam Nga	31.0	3.0	Wood	0.8	0.8	none	Closed conduit	Concrete	Right bank
	Nam Nga	34.7	0.5	Wood	1.0	0.5	none	Open channel	Earth	Left bank
	Fai	12.8	1.0	Wood	1.3		none	Open channel	Earth	Right bank
	Fai	8.8	1.6	Wood			none	Open channel	Earth	Left bank
10 Nanguen-Nua										
11 Nanguen-Tai	H. Ngun	19.0	2.2	Wood	0.8		none	Open channel	Earth	Right bank
	H. Kham	23.3	2.5	Wood	1.2		none	Open channel	Earth	Right bank
	H. Xan (U/S)	3.8	1.6	Wood	0.8		none	Open channel	Earth	Left bank
	H. Xan (D/S)	9.5	1.8	Wood	0.9	0.6	none	Open channel	Earth	Right bank
12 Vanghua	H. Leck Phay (US)	12.8	1.8	Wood	1.7		none	Open channel	Earth	Right bank
	H. Leck Phay (D/S)	19.0	1.2	Wood	1.9		none	Open channel	Earth	Right bank
13 Houaysan		3.0	1.5	Wood	1.0		none	Open channel	Earth	Left bank
14 Nampath-Nua	Nam Pao Noy	9.8+6.8+14.5	5.1	Gabion	1.8	0.5	none	Open channel	Earth	Right bank

Table 4-3-23 Existing Headworks for Irrigation in the Model Area (2/2)

Village	Name River	Weir			Intake			Canal			Remarks
		Length (m)	Height (m)	Type (material)	B (m)	H (m)	Gate	Canal Type	Service Area		
15	Houaymo-Nua										
16	Houaymo-Tai										
17	Tabua-Nua										
18	Tabua-Tai										
19	Houaypamom										
20	Somsanuk										
21	Nampat										
22	Vangkhi		19.0	2.6 Concrete	1.9		none	Open channel	Earth	Right bank	
	H. Earm		100.0	2.0 Earth fill dam			none	Open channel	Earth	Right bank	
23	Phonthong										
24	Taothan							none	Open channel	Earth	Right bank
25	Nampath-Tai			Earth fill dam							
26	Houayxi										
27	Namphao										
28	Phakoup										
29	Sivilai										

modification of the system was commenced in March 1997 and was scheduled to be completed by January 1998. The modification works include: i) weir modification (raising closure dikes, providing an opening for discharging flood flow, protection works) to meet the revised 100-year design flood of 360 m³/sec from the originally estimated 125 m³/sec; ii) construction of a new gated intake with a side spillway on the right bank; iii) increasing canal capacity; iv) reconstruction of diversion structures; and v) construction of additional related structures.

The designed service area of the Namon Irrigation system is 410 ha on the right bank of the Nam Mon and 12 ha on the left bank. However, existing paddy field estimated on the present land use map on a scale of 1:20,000 is about 195 ha and 15 ha on the right and left banks, respectively.

Year-round water supply is not realized yet because there is little water in January and February; no water between March and May; plenty of water between June and September; and enough water between October and December. Therefore irrigation is currently commenced in June for paddy. After harvesting of paddy, nuts, cucumber, corn, etc. are grown for selling mainly at a local market at Namon-Tai village and partly in the Vangvieng area. The village chief of Vangmiang is pessimistic on double cropping of the paddy a year because of the rainfall distribution pattern and shortage of irrigation water from the Namon Irrigation System.

One diversion weir made of box gabion 42 m long exists across the Nam Mon at the northern part of Namon-Nua village (See Fig. 4-3-5). One concrete intake with an inlet ($b=1.0 \times h=2.0$) exists on the right bank at the diversion.

There are 4 free intakes with very temporary cobble weirs on the Nam Mon upstream of Namon-Nua village.

To serve paddy field in Phonsavang village, one gabion weir with one intake on the left bank is under construction on the H. Pung river (see Fig. 4-3-5) by the same contractor as the one working on modifying the Namon headworks.

Paddy land in Phonkeo village is irrigated by a canal system with a wooden diversion weir across the H. Lao river, for which return flow from an irrigation system for the paddy field in the Nalao village is supplemented (see Fig. 4-3-6). Irrigation water for the said paddy land in Phonkeo is also taken from very small streams whose names were not identified.

There are two wooden weirs across the Nam Ngat east of Ngiou village, which are serving existing paddy fields in Ngiou, Phonkeo and Nakhom villages (see Fig. 4-3-6). According to the village chief of Ngiou, those weirs must be restored more than 10 times every rainy season. Since the paddy field of Nakhom village is also served partly by that weir, Nakhom villagers used to help restore the fragile wooden weir.

There are one wooden weir across the Nam Ngat, one wooden weir across the canal from the Nam Ngat weir, 2 wooden weirs across the H. Lao river, and 2 wooden weirs across the H. Sing river for paddy field in Nalao village (see Fig. 4-3-6). Water shortages occurred in the canal of the downstream weir across the H. Sing river, while most of the river discharge flows down in the river through the wooden weir.

Paddy land on the right bank of the Nam Ngat is served by one wooden weir across each of the Nam Ngat and the H. Lao river at Ngiou village, while the paddy land on the left bank (main farm land of the village) is served by an irrigation system from Phongnang village and other unidentified streams (see Fig. 4-3-6).

About 600 m upstream of Phongnang village, there exists one wooden diversion weir of some 3 m high across the Nam Nga which is 30 m wide. A closed conduit intake 38 m long is on the left bank. The size of the intake is 0.8×0.8 m. According to the village chief, the logs utilized for the weir have to be partly replaced every year. The canal system is well aligned and maintained. About 300 m downstream of the weir, a 0.5 m high wooden weir and a free intake serves a few hectares on the right bank of the Nam Nga. This weir is not maintained well.

Across the H. Fay river there is a wooden weir which serves both banks of the river. There is another wooden weir on the H. Kham river which serves the paddy land on the right bank (see Fig. 4-3-6). During the dry season, water melons are grown in the paddy field; wholesalers come to the paddy land by vehicle to buy them although no road or bridge has been constructed yet between Nakhom and Phongnang villages.

Some 15 ha of paddy field for 55 households in Nanguen-Tai village, according to the village chief, are being fed by 2 wooden weirs across the H. Xan river, one wooden weir across the H. Nguen river and one wooden weir across the H. Kham river (see Fig. 4-3-6). During the dry season, river discharges decrease to half those of the rainy season.

For very small paddy field in Vanghua village, there are one each stone weir (very small) and one wooden weir on a stream near R-13, and two wooden weirs on H. Lek Phoy (see Fig. 4-3-6).

In Vangkhi village, there is one concrete weir (19 m long and 2.6 m high) with wooden planks across the H. Fay river, which is supported by a number of logs on the downstream side, probably to prevent turning over of the weir, which needs renovation. One earth fill bank (too small to be called a dam) of 100 long and 2 m high on average has been constructed across the H. Earm stream to divert all the run-off to an irrigation canal. (see Fig. 4-3-7). The weir across the H. Fay river is serving 14 ha for 33 families in Vangkhi village, while the earth fill bank is serving irrigation water for 7 ha of paddy land for 25 families in the same village according to the village chief.

Paddy field of 11 ha, owned by 22 households in Taothan village, is irrigated during the wet season with 5 small intakes on unidentified streams. Closing a small stream south of Taothan village on the left bank of the Nam Xong, one small earth fill dam with a maximum height of about 3 m and one canal starting at the dam were constructed in 1995 by a local contractor of a cost of 2,000,000 Kips (see Fig. 4-3-7), funds for which were collected from villagers in the same village. And in 1996 another 2,000,000 Kips were spent for rehabilitation and maintenance, according to the villagers. The dam has no spillway and the canal dimensions are irregular. Because of no spillway at the dam nor in the canal, all the flood flow coming into the dam flows into the canal, exceeding the canal capacity and resulting in breaching of the canal bank.

One gabion weir across the Nam Phao Noi was constructed urgently to serve paddy field in the northern part of Namphao village in 1995 under the technical guidance of the Vangvieng District Irrigation Service. The highest part of the weir is 3.7 m. An intake consists only of open channel with a canal bed of 1.8 m wide and a water depth of 0.35 m on the left bank. One temporary heap of stones exists across the Nam Phao Nyai to take irrigation water and a small open channel starts at the site on the right bank (see Fig. 4-3-8). Current irrigated paddy field being served by these weirs is reported to total 30-40 ha owned by 40-50 families, which seems to be an overestimate. And land suitable for new paddy field is reported to total more than 20 ha, which seems on the contrary to be an underestimate.

(2) Existing Irrigation Development Plan

1) Village oriented paddy land development plan

As stated in the previous Sub-section 4.3.3, four villages contracted a feeder road construction aiming at the new paddy land development. According to the Head of the Vangvieng District Bureau of Agriculture and Forestry, those villages intend to open irrigated paddy land for 100 families in Nampat-Tai, Houaymo-Nua, Houaymo-Tai and Thahua-Nua villages. However, according to the Head, no one knows the

possible land area for lowland paddy development because no surveys have been carried out yet on any of the topographic, hydrological and soil aspects. The Head intends to carry out surveys for the development in the next fiscal year because in FY 1997/98 no budgets for the survey are available.

2) Construction of gabion weirs in Namon Nua

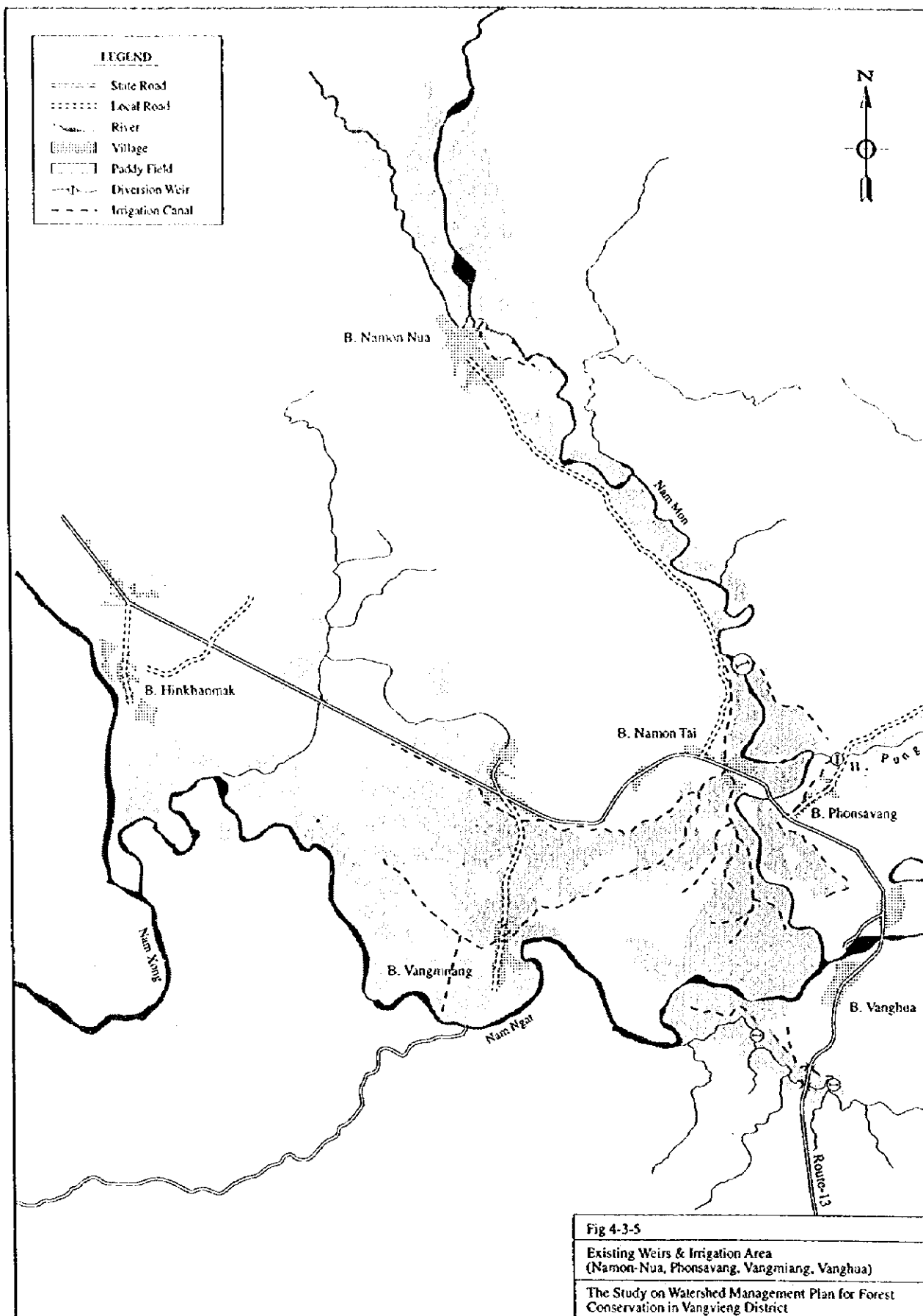
The Vangvieng District Bureau of Agriculture and Forestry has requested budgets amounting to 20 million Kips for constructing two gabion weirs across the Nam Mon river. The sites of the weirs have not been decided yet according the District Bureau.

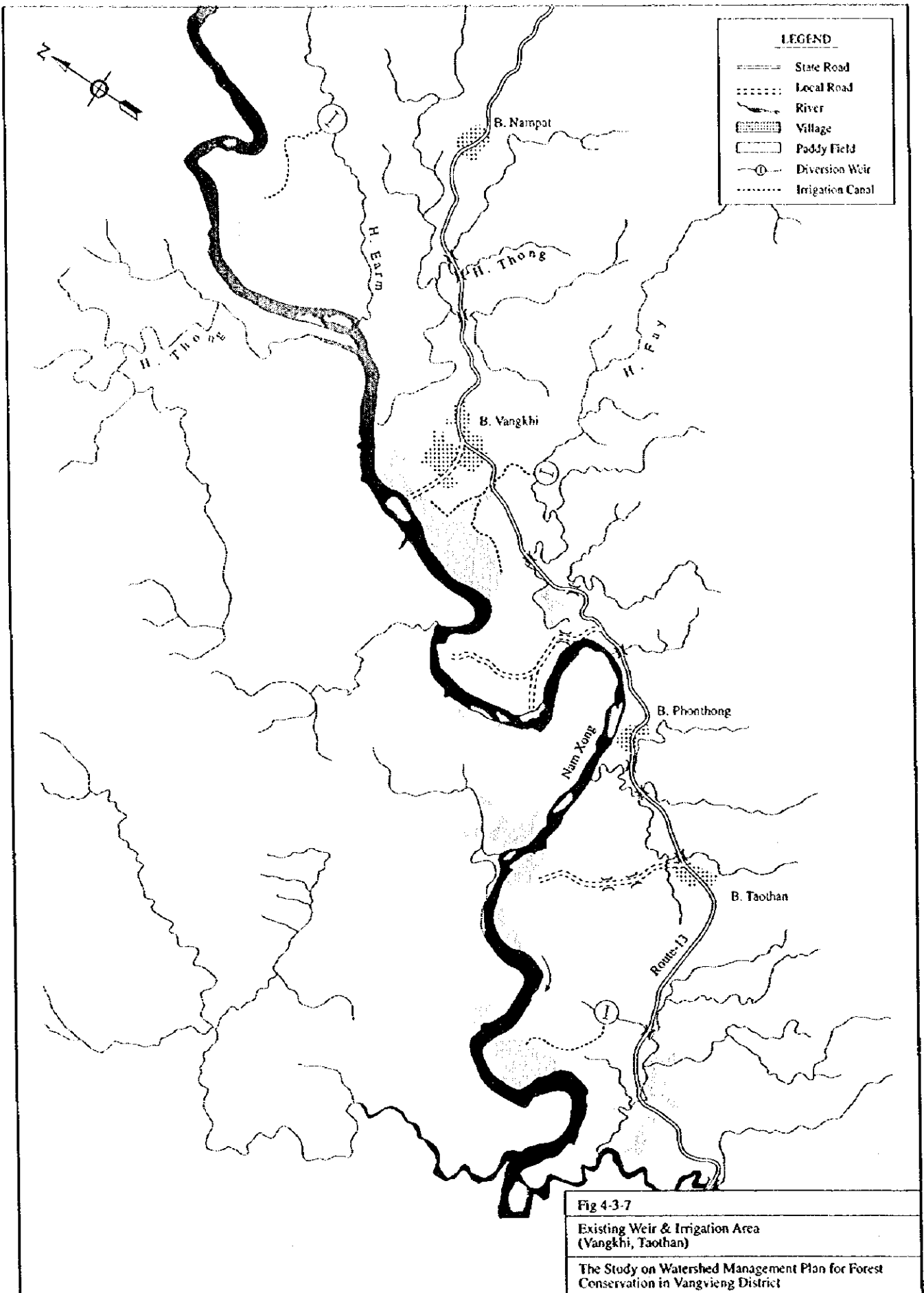
3) Community irrigation development project

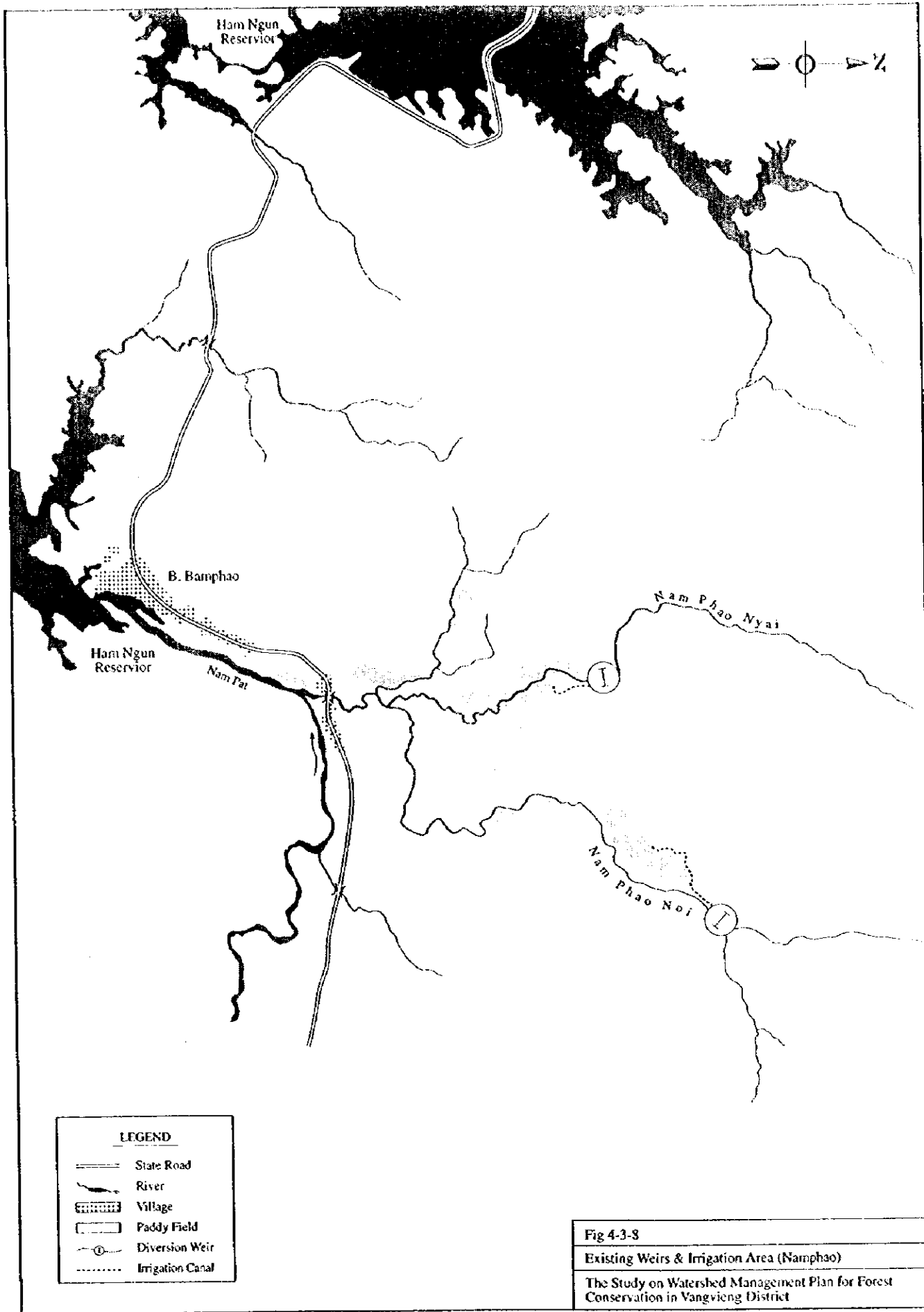
The Vangvieng District Bureau of Agriculture and Forestry, according to the Head, made an application for incorporating two irrigation schemes, i.e. Nalao Irrigation Scheme and Nam Nga Irrigation Scheme into the Community Irrigation Development Project, which was scheduled to be commenced in November 1997 with ADB funds.

The development concept of the Namon Irrigation Scheme is to integrate the current irrigation systems in Nalao, Ngiou and Phonkeo villages (see Sub-section 4.3.3) into one system by constructing a permanent diversion weir across the Nam Ngat river and to attain year-round irrigation.

The Nam Nga Irrigation Scheme has also a similar development concept to the Nalao Irrigation Scheme in that several existing irrigation systems under jurisdiction of Nakom, Phongnang, Nanguen-Nua villages will be integrated into one system which is expected to be served by a new permanent diversion weir across the Nam Nga.







LEGEND	
	State Road
	River
	Village
	Paddy Field
	Diversion Weir
	Irrigation Canal

Fig 4-3-8
 Existing Weirs & Irrigation Area (Namphao)
 The Study on Watershed Management Plan for Forest Conservation in Vangvieng District

CHAPTER 5

RESULTS OF PRA

CHAPTER 5 RESULTS OF PRA

5.1 PRA Works

The objectives of PRA were to facilitate village level planning based on villagers' needs focussing on future land use and to formulate a village-based watershed management plan map. The PRA works were carried out covering all 29 villages in the Model Area during the period from August to November 1997 by subletting major works to a local consulting firm (hereinafter referred to as "the subcontractor"). The actual time schedule of major work items of PRA is outlined as shown in Fig. 5-1-1.

Major Work Item	1997					
	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1) 3-D model construction						
2) PRA training of Subcontractor's team						
3) PRA execution in 29 villages						
4) Office work for preparation of report						

Fig. 5-1-1 Outline of Actual Time Schedule of PRA Works

5.2 Present Land Use

5.2.1 Village Boundaries and Areas

(1) Village Boundaries

In order to know the present land use in each village, the village boundary was firstly confirmed with villagers. Although the village boundaries in the Model Area have not yet been delineated and authorized by the local government, the villagers have decided the boundaries to a certain degree. Through PRA, however, overlapped areas utilized by two or three villages were recognized at 24 locations as shown in Fig. 5-2-1. The total area of these overlapped areas is about 6,400 ha or about 14% of the total area of the 29 villages, (45,500 ha). The village boundaries are more complicated in the Somboun Area comparing to those in the Namon Area.

Among 24 locations or 6,400 ha of overlapped areas, four locations or about a half of the areas were perceived by the villagers. The villagers were unaware of the remaining overlapped areas. Even so, no particular conflict between villages has occurred by reason

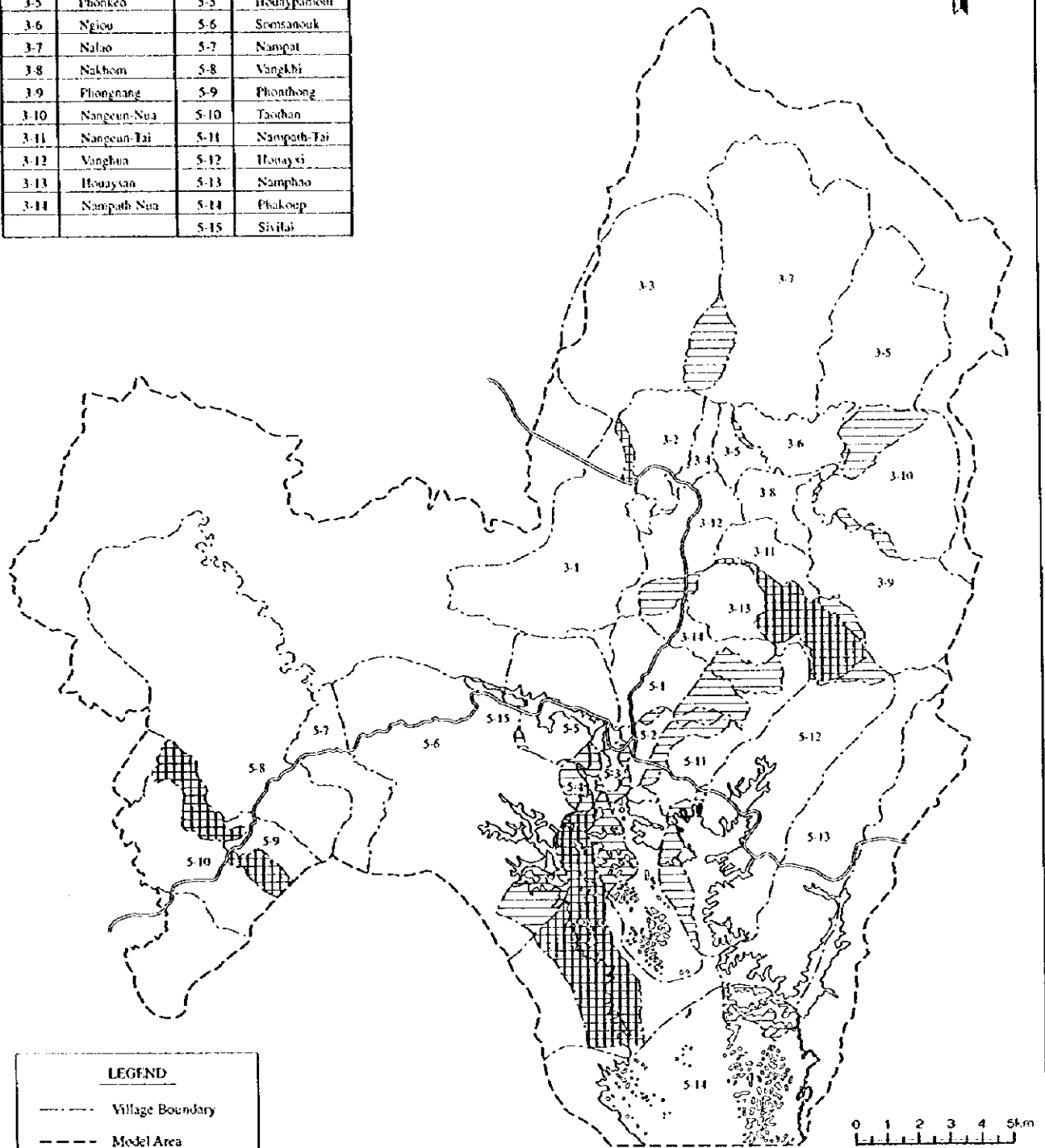
of this unclearness of village boundaries, except for one location between Phonthong and Taothan village. This overlapped area has sometimes caused trouble in land use mainly in slash and burn cultivation areas.

(2) Village Areas

The land area of each village is estimated based on the information obtained through PRA. In the estimate, the overlapped areas perceived by the villagers are allocated to the related villages based on the population size of each village. The other overlapped areas of about 3,200 ha are ignored and double counted. Since the double counted area is only about 7% of the total village area, this would have little influence upon the evaluation of village land use characteristics.

In terms of land area, the biggest village in the Model Area is Somsanouk (4,340 ha), while the smallest village is Sivilai (4 ha). These two villages are categorized as a special village in the Model Area (see Subsection 4.3.1 (1)). On average, the per capita village land is 2.7 ha in the Namon Area and 2.8 ha in the Somboun Area. The per capita village land is the smallest in Phonsavang (0.3 ha per capita) if that in Sivilai is excluded and the biggest in Phongnang (8.8 ha per capita). Further details are presented in Annex 3.

VILLAGE LIST			
Namon Area		Somboun Area	
3-1	Vangmiang	5-1	Houaymo-Nua
3-2	Namon-Tai	5-2	Houaymo-Tai
3-3	Namon-Nua	5-3	Thabua-Nua
3-4	Phonsavang	5-4	Thabua-Tai
3-5	Phonkeo	5-5	Houaypanom
3-6	Ngieu	5-6	Somsanouk
3-7	Nalao	5-7	Nampat
3-8	Nakhom	5-8	Vangkhi
3-9	Phongnang	5-9	Phonthong
3-10	Nageun-Nua	5-10	Taodan
3-11	Nageun-Tai	5-11	Nampath-Tai
3-12	Vanghua	5-12	Houayxi
3-13	Houaysan	5-13	Namphao
3-14	Nampath-Nua	5-14	Phakoeip
		5-15	Sivilai



LEGEND	
	Village Boundary
	Model Area
	Road
	Overlapped Area Perceived by Villagers
	Overlapped Area not Perceived by Villagers

Fig 5-2-1

Village Boundries Delineated by Villagers in PRA

The Study on Watershed Management Plan for Forest Conservation in Vangvieng District




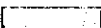
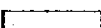

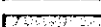
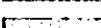


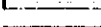
5.2.2 Present Land Use Characteristics

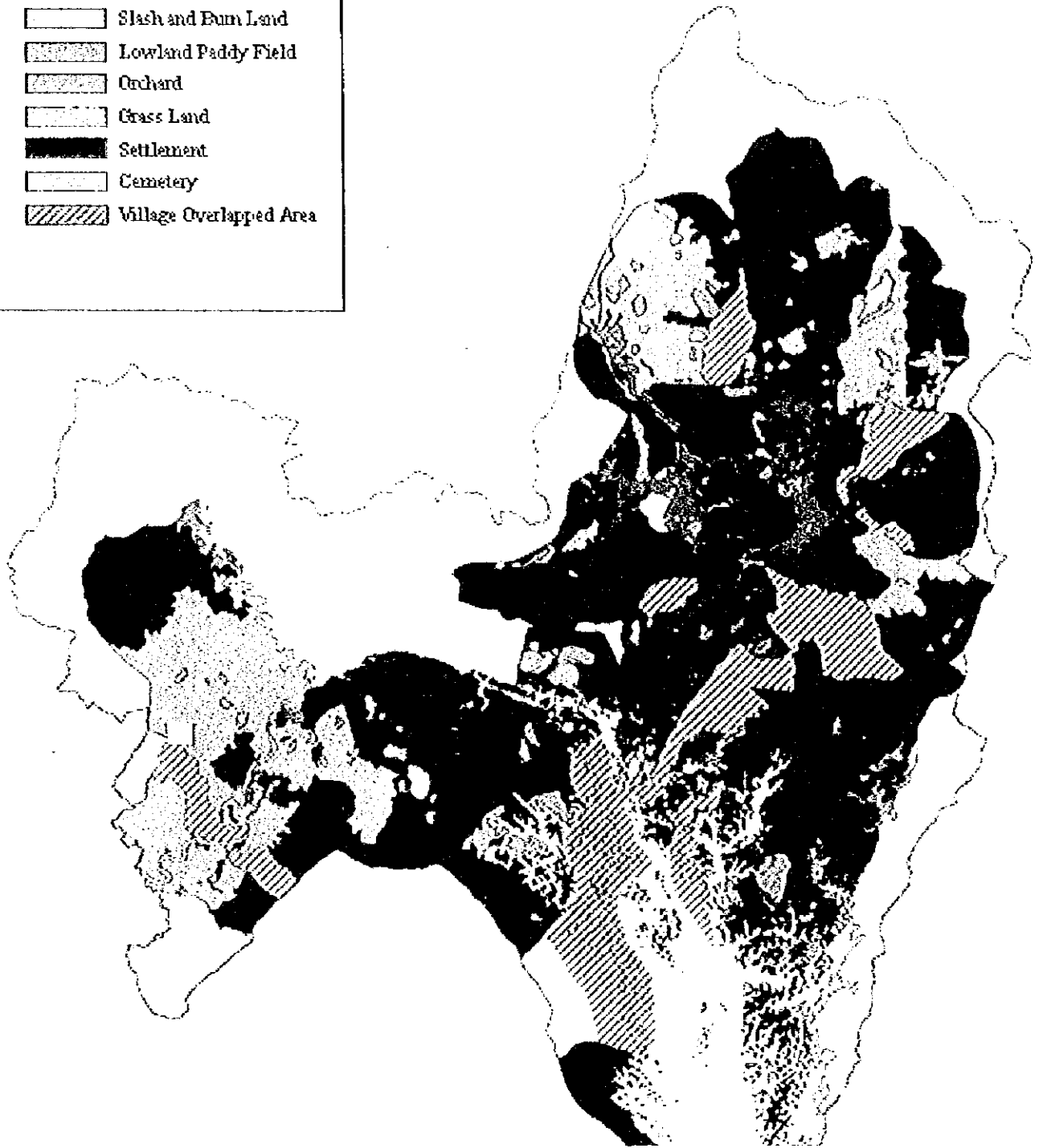
The present land use conditions confirmed with villagers are illustrated in Fig. 5-2-2. And detailed present land use characteristics are presented in Annex 3. In the tabulation of each land use category, only overlapped areas perceived by the villages are allocated to the respective villages in the same manner adopted for the above analysis. The land use characteristics in the total area of the 29 villages are as follows:

- a) The largest land use category is natural forest (including secondary forest and degraded forest) occupying about 34,700 ha or about 75% of the total 29-village land area. The proportion of natural forest in the Namon Area (about 85%) is larger than that in the Somboun Area (70%).
- b) The second largest land use category is water body accounting for about 14% of the total 29-village land area. Particularly in the Somboun Area, this proportion is more than 20%, because of the existence of the Nam Ngum reservoir in the area.
- c) The land use for slash and burn cultivation (for 1997 crop) is the third largest category occupying about 1,600 ha or about 4% of the total 29-village land area. The proportion of this land use category is higher in the Somboun Area than that in the Namon Area.
- d) The total land area of lowland paddy is about 1,300 ha or about 3% of the total 29-village land area. In the Namon Area, however, this land use category is considerably large at 1,030 ha or about 6% of the total village land area in the Namon Area. On the contrary, this is small at 260 ha or only 1% of the total village land area in the Somboun Area.

In addition to the above, the per capita land use conditions in the total 29-village land area are tabulated as shown in Table 5-2-1. The characteristics of per capita land use are outlined as follows:

LEGEND

-  Protection Forest
-  Symbiosis Forest
-  Man-made Forest
-  Other Forest
-  Slash and Burn Land
-  Lowland Paddy Field
-  Orchard
-  Grass Land
-  Settlement
-  Cemetery
-  Village Overlapped Area



0 5 km

Fig. 5-2-2

Present Land Use Map Described by PRA

The Study on Watershed Management Plan for
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- a) The proportion of agricultural land which consists of slash and burn land, grassland, lowland paddy, orchard, and fish pond is small at only 11% in the Namon Area, 7% in the Somboun Area and 8% in the total 29-village land area. The smaller proportion of agricultural land in the Somboun Area indicates difficulties of agricultural production in this area.
- b) The big difference between the Namon and Somboun Areas in agricultural land use is indicated by lowland paddy, whose per capita land is 0.15 ha in the Namon Area and 0.03 ha in the Somboun Area.
- c) Per capita slash and burn land is 0.08 ha in the Namon Area, 0.11 ha in the Somboun Area and 0.1 ha in the total 29-village land area. The difference between the Namon and Somboun Areas is small compared to that in lowland paddy.

(3) Present Forest Utilization

Many villagers use the forests for slash and burn cultivation, collection of fuelwood, timber and non-wood forest products, hunting, etc. In order to control villagers' utilization of forest, most village authorities have utilization rules to a certain degree, and in PRA the following 10 types of forest in terms of utilization were confirmed.

Table 5-2-2 Forest Utilization Types

Forest Utilization Type	Slash & Burn Cultiv.	Logging	Fuel-wood Collect.	Hunting	Non-wood Forest Products
A	Yes	Yes	Yes	Yes	Yes
B	No	Yes	Yes	Yes	Yes
C	No	No	Yes	Yes	Yes
D	No	No	No	Yes	Yes
E	No	No	No	No	Yes
F	No	No	No	No	No
G	No	Yes	No	Yes	Yes
H	No	No	Yes	No	No
I	Yes	No	Yes	Yes	Yes
J	Unknown or not decided yet				

The villagers may utilize freely the forest types A and J. However, they use the forest types B to I with certain restrictions. For instance, slash and burn cultivation is not allowed in the forest types B to H, and logging is also not allowed in the types C to F and H and I, although these rules are not always observed by the villagers. The distribution of forest lands based on these utilization types is summarized in Table 5-2-3. As seen in the table, certain restrictions on forest use are placed on about 30% of the natural forest lands in the total 29-village land area. For the remaining 70%, however, no particular restrictions are placed on utilization. (Details are presented in Annex 3.)

Table 5-2-3 Summary of Forest Utilization at Present

Forest Utilization Type	Namon Area		Somboun Area		Moudel Area	
	Area (ha)	% in Total NF (%)	Area (ha)	% in Total NF (%)	Area (ha)	% in Total NF (%)
1) Slash and burn cultivation is not allowed	3,999	25.0	5,642	30.1	9,641	27.8
2) Logging is not allowed	955	6.0	3,051	16.3	4,006	11.5
3) Tree felling for fuelwood is not allowed	623	3.9	3,024	16.1	3,647	10.5
4) Hunting is not allowed	421	2.6	608	3.2	1,030	3.0
5) Non-wood forest products collection is not allowed	421	2.6	536	2.9	957	2.8
6) No particular control is done	11,888	74.4	12,927	68.9	24,816	71.4
Total Natural Forest land (NF)	15,983	100.0	18,758	100.0	34,741	100.0

NF = Natural forest

5.3 Problems on Present Land Use and Their Causes

The problems and causes analysis on the present land use was carried out with the villagers. The major problems clarified in each village were all similar, and they could be collectively summarized into two major problems, i.e. (i) lack of agricultural land and (ii) low productivity of agricultural land. These problems were pointed out in many villages in relation with paddy cultivation in lowland paddy and slash and burn land. This reveals that the biggest concern of the villagers with the present land use is the increase of paddy production.

As another problems, forest degradation and frequent occurrence of diseases of livestock were also pointed out in many villages, although the latter problem has no direct relation with the present land use. Decrease of fish resources was confirmed by the villagers in Thahua-Nua, because their fish catches made in the Nam Ngum reservoir are an important economic activity.

After clarification of the problems, the villagers analyzed the causes and impact of the problems. The results of these analyses from all the villages are summarized in Table 5-3-1 and described hereinafter.

(1) Lack of Agricultural Land

As seen in Table 5-3-1, lack of lowland paddy and lack of slash and burn land are the major sub-items of the problem of lack of agricultural land. In context with the former problem, the causes clarified by the villagers are topographic constraint, lack of irrigation water, and insufficiency of irrigation facilities. The impacts of the problem are food shortage, difficult life in the village, population outflow, and increase of slash and burn land. In order to solve the problem, the villagers need to develop or improve new lowland paddy land, irrigation facilities, farm roads, and industries other than agriculture.

Table 5-3-1 Summary of Problems and Causes Analyses on Present Land Use

Problem	Cause	Impact	Solution
I. Lack of Agricultural Land			
1. Lack of lowland paddy land	<ul style="list-style-type: none"> - Topographically restricted for new land development - Lack of roads to farms - Lack of irrigation facilities - Lack of irrigation water 	<ul style="list-style-type: none"> - Food shortage - Difficult to live in a village - Population outflow - Increase in slash and burn cultivation 	<ul style="list-style-type: none"> - Development of new lowland paddy land - Development of irrigation system - Construction of farm roads - Promotion of other industries
2. Lack of slash and burn land	<ul style="list-style-type: none"> - Unclearness of village boundaries - Creation of new villages - Population increase 	<ul style="list-style-type: none"> - Short cultivation rotation - Slash and burn in remote areas/ other villages - Soil degradation - Decrease of forest resources - Conflict among villagers in land use - Food shortage - Population outflow 	<ul style="list-style-type: none"> - Establishment of clear village boundary - Promotion of land allocation - Development of new agric. land - Establishment of clear rules for land use - Promotion of other industries
II. Low Productivity in Agricultural Land			
1. Low productivity in lowland paddy	<ul style="list-style-type: none"> - Lack of irrigation water - Lack of irrigation facilities - Lack of cultivation technique - Damaged by livestock - Damaged by pest - Use of low quality seeds 	<ul style="list-style-type: none"> - Food shortage - Low income 	<ul style="list-style-type: none"> - Construction/ rehabilitation of irrigation facilities - Introduction of cash crops instead of paddy - Introduction of new culti. technique - Establishment of grazing land with fences - Use of fertilizer /chemical - Use of better seeds
2. Low productivity in slash and burn land	<ul style="list-style-type: none"> - Degraded soils in slash and burn land - Damaged by animal - Damaged by pest 	<ul style="list-style-type: none"> - Food shortage - Low income 	<ul style="list-style-type: none"> - Cash crop cultivation in slash and burn land - Cultivation of fruit trees - Introduction of new culti. technique
III. Other Agriculture			
1. Forest degradation	<ul style="list-style-type: none"> - Expansion of slash and burn cultivation - Unclearness of land ownership - Unclearness of village boundaries - Illegal logging (by other villagers) - Forest fire - Free grazing of livestock - Uncontrolled fuelwood collection 	<ul style="list-style-type: none"> - Decrease of river flow in the dry season - Occurrence of flood in the wet season - Expansion of low productive land - Increase of soil erosion - Increase of sedimentation in rivers - Expansion of low productive land - Shortage of timber 	<ul style="list-style-type: none"> - Introduction other production system to reduce S&B - Promotion of forest land allocation - Establishment of clear village boundaries - Establishment of production, grazing, and forest zones - Promotion of reforestation and fruit tree plantation - Making a fence for grazing land - Establishment rules for forest use and more propagation
2. High incidence of diseases	<ul style="list-style-type: none"> - Easily infected due to free grazing - Limited vaccination - Low quality and quantity feed - Limitedly available grazing land - Lack of raising technique 	<ul style="list-style-type: none"> - High mortality of livestock - Lack of draft animals for farming - Low income 	<ul style="list-style-type: none"> - Establishment of grazing land with fence - Give more vaccination - Supply of better feed - Introduction of new grazing technique - Development of grass land - Ban of sale of disease animal
3. Decrease of fish resources	<ul style="list-style-type: none"> - Increase of fishermen - No fish conservation area - Fishing in breeding season 	<ul style="list-style-type: none"> - Decrease of fish catch - Increase of investment for fishing gear - Low income 	<ul style="list-style-type: none"> - Establishment of conservation area - Ban of fishing in breeding season

Source: PRA, September - November, 1997

Regarding the problem of lack of slash and burn land, the causes pointed out by the villagers are ambiguity of village boundaries and increase of population. The impacts of the problem are shortening of rotation period for slash and burn cultivation, execution of slash and burn in other villages, occurrence of conflict among the villagers on land use, and degradation of forest. To solve the problem, the villagers want to establish clear village boundaries, implement a land- forest allocation programme, develop new agricultural land, and establish and strengthen regulations on land use.

(2) Low Productivity of Agricultural Land

The villagers identified sub-items related to the low productivity of agricultural land in lowland paddy land and slash and burn land. The causes of the low productivity in the lowland paddy are insufficient irrigation water and irrigation facilities, lack of crop cultivation techniques, damages by livestock and pests, etc. The major impacts of this problem are food shortage and low income. To solve the problem, they need to develop and improve irrigation facilities, promote cash crop cultivation, introduce improved crop cultivation technologies, establish grass and grazing land, etc.

As causes of the low productivity of slash and burn land, the villagers pointed out degraded soil, damages by livestock and pests, etc. Impacts of the problem are the same as those in the lowland paddy, i.e. food shortage and low income. To solve the problem, they need to promote cash crop cultivation in the slash and burn land, introduce new cultivation techniques, etc.

(3) Forest Degradation

The villagers identified the causes of forest degradation as expansion of slash and burn land, forest fire, ambiguity of village boundaries and land tenure, illegal logging, uncontrolled grazing of livestock and fuelwood collection, etc. The impacts of the problem are decrease of river base flow in the dry season, occurrence of floods in the wet season, increase of soil erosion and sedimentation in rivers, expansion of low productive land, shortage of timber, etc. To solve the problem, they want to introduce another production system instead of slash and burn cultivation, promote a forest- land allocation programme, establish clear village boundaries, establish production, grazing and forest zones, promote afforestation and fruit tree planting, etc.

(4) Frequent Occurrence of Livestock Disease

The villagers pointed out that the causes of frequent occurrence of livestock diseases are due to the predominance of free grazing, lack of grass land, lack of raising techniques, etc.

The impacts of the problem are high mortality rate of livestock, decrease of draft animals for farming, and low income. To solve the problem, they need to establish grazing land with fences, promote protective inoculation, supply better feed, introduce new grazing techniques, etc.

(5) Decrease of Fish Resources

The villagers indicated that the causes of this problem are the increase of fishermen, unestablished fish conservation zone, and uncontrolled fish catches even in the breeding season. To solve the problem, the villagers want to establish a fish conservation zone, and control fishing in the breeding season.

5.4 Village Level Land Use Plan


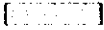
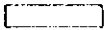

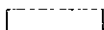
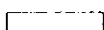


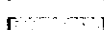
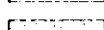
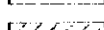
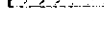

5.4.1 Land Use Plan Formulated by Villagers

Based on the above examined problems on present land use and their causes and solutions, the proper land use plan was discussed with the villagers, and the future land use plan was formulated as shown in Fig. 5-4-1. As already mentioned, the villagers' land use plan was formulated for the next five years.

As a tendency of all the 29 villages, the villagers intend to expand the land use category of orchard by 11 times as large as the present level, followed by man-made forest (9 times), grass land (4 times), lowland paddy (1.5 times), and fish pond (1.4 times). They also intend to expand the slash and burn land by about 4.4 times as large as the present level. However, they plan to use this land for the next five years with 4 to 5-year rotation. Due to these increases of agricultural land, the area of natural forest is to be decreased to about 70% of that at present.

In the future land use in the Namon Area, man-made forest is planned to be increased by 21 times as large as the present level, followed by orchard (11 times), grass land (2.7 times), and lowland paddy (1.2 times). In the Somboun Area, the area is to be expanded in orchard (11 times), man-made forest (7 times), grassland (5 times), lowland paddy (2.6 times) and fish pond (1.5 times).

LEGEND

	Protection Forest
	Symbiosis Forest
	Man-made Forest
	Other Forest
	Slash and Burn Land
	Lowland Paddy Field
	Orchard
	Grass Land
	Settlement
	Cemetery
	Village Overlapped Area
	Villages Boundary
	Model Area Boundary

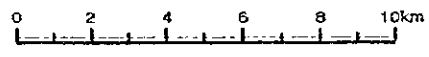
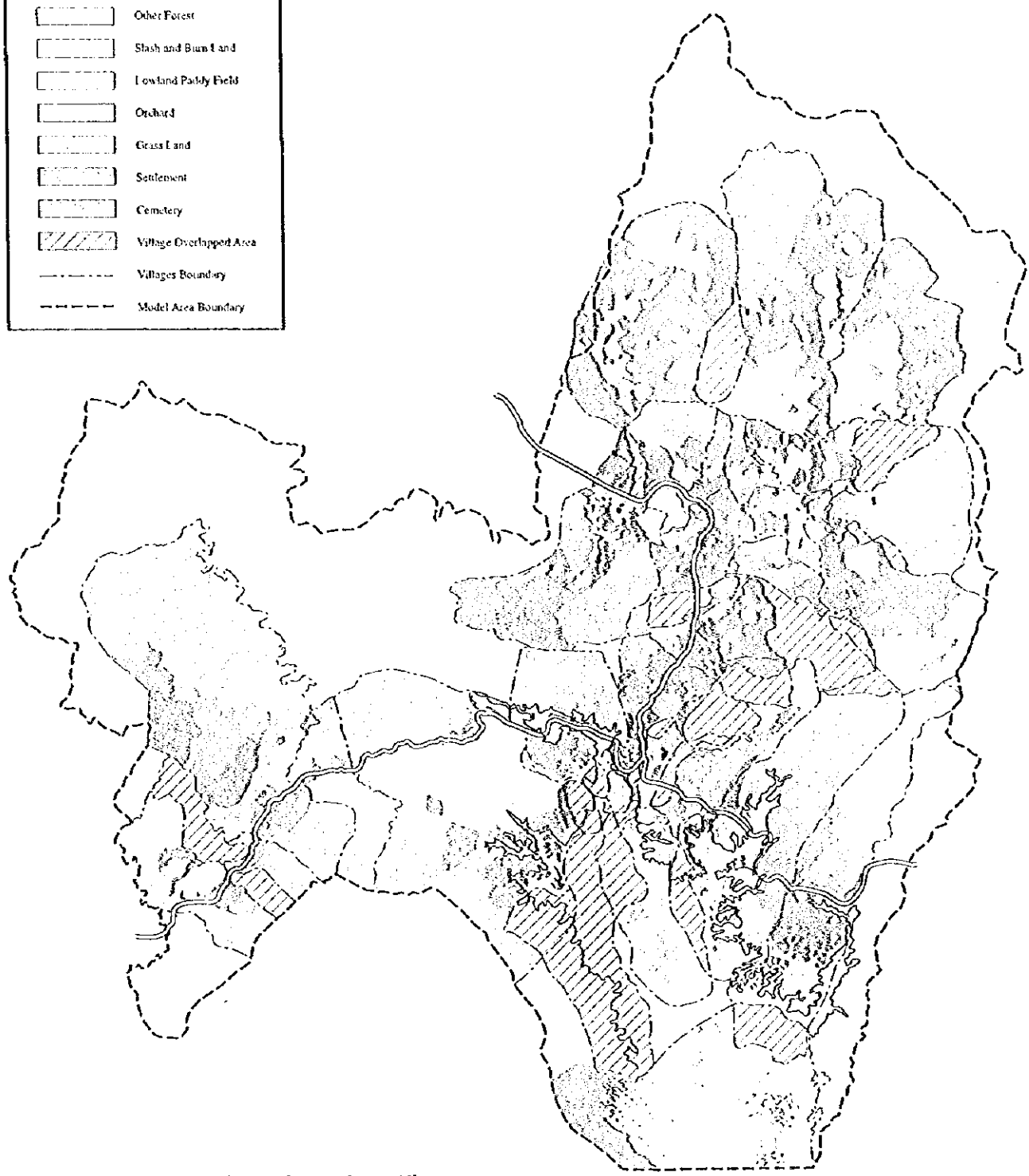


Fig. 5-4-1
Village Level Future Land Use Classification Map
 The Study on Watershed Management Plan for
 Forest Conservation in Vangvieng District

5.4.2 Forest Utilization Plan Formulated by Villagers

Based on the results of analyzing the problems and causes of forest degradation explained in Subsection 5.3 (3), the forest utilization plan was discussed and formulated with the villagers. All the results obtained from the villages are tabulated in accordance with the forest utilization types presented in Subsection 5-2-3 and in Annex 3. A summary of the villagers' forest utilization plan is shown in Table 5-4-1.

Table 5-4-1 Summary of Future Forest Utilization Plan

Forest Utilization Type	Namon Area		Somboun Area		Model Area	
	Area (ha)	% in Total NF (%)	Area (ha)	% in Total NF (%)	Area (ha)	% in Total NF (%)
1) Slash and burn cultivation is not allowed	12,124	96.8	11,313	95.9	23,437	96.4
2) Logging is not allowed	7,561	60.4	8,241	69.8	15,802	65.0
3) Tree felling for fuelwood is not allowed	7,435	59.4	8,241	69.8	15,676	64.5
4) Hunting is not allowed	3,658	29.2	5,825	49.4	9,483	39.0
5) Non-wood forest products collection is not allowed	3,658	29.2	5,825	49.4	9,483	39.0
6) No particular control is done	395	3.2	490	4.2	885	3.6
Total Natural Forest land (NF)	12,519	100.0	11,803	100.0	24,322	100.0

NF = Natural forest

As seen in the table, the villagers intend to conserve about 23,400 ha or 96% of the future forest land (about 24,300 ha in 29 villages) by banning slash and burn cultivation. (The remaining about 900 ha or 4% in forest utilization type No. 6 in the above table is considered to be ignored in the village PRA.) They also intend to conserve about 65% of the future forest land by banning logging and tree felling for fuelwood collection, and about 40% of the same by banning hunting and non-wood forest products collection. It is therefore evaluated that the villagers well perceive the importance of forests as they analyzed themselves in Subsection 5.3 (3), and they particularly intend to control the slash and burn cultivation.

In addition to the above, an another analysis on the villagers' forest utilization plan is made in accordance with the following four categories of forest utilization:

- a) Protection forest in which all human activities are not allowed
- b) Symbiosis forest in which only slash and burn cultivation is not allowed. Other activities such as fuelwood collection and hunting are allowed
- c) Man-made forest in which trees are planted and logged

- d) Other forest in which human activities including slash and burn are allowed or utilization type is unknown

As shown in Table 5-4-2 and Fig. 5-4-1, the area of total protection forest in the 29 villages is to be expanded by 16 times compared to that at present. The areas of symbiosis and man-made forests are also to be expanded by about 1.6 times and 9 times, respectively. Contrarily, the other forests in the future are to be decreased to only 4% of that at present. For the respective areas, the area of future protection forest is to be expanded by 8.7 times in the Namon Area, and by 12.3 times in the Somboun Area. On the other hand, the symbiosis forest is to be expanded by 2.4 times in the Namon Area, and 1.1 times in the Somboun Area.

Table 5-4-2 Changes of Forest Utilization from Present to Future by Categories and Villages

Vill. No.	Village	Forest Utilization at Present				Forest Utilization in the Future				Changes in Forest Utilization (Future - Present of Future / Present x 100)											
		Protection (ha)	Sym-biosis (ha)	Man-made (ha)	Others (ha)	Protection (ha)	Sym-biosis (ha)	Man-made (ha)	Others (ha)	Protection Forest (ha)	Symbiosis Forest (ha)	Man-made Forest (ha)	Other Forests (ha)	Total Forests (ha)							
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)						
Namoun Area																					
3-1	Vangmiang	0	187	16	1,336	1,538	491	840	54	0	1,385	491	-	653	450	38	346	-1,336	0	-153	90
3-2	Namon-Tai	0	456	0	0	456	206	195	55	0	456	206	-	-261	43	55	-	0	-	0	100
3-3	Namon-Nua	0	673	0	1,589	2,262	52	1,819	64	0	1,936	52	-	1,146	270	64	-	-1,589	0	-326	86
3-4	Phonsavang	0	0	3	143	146	31	102	14	0	147	31	-	102	-	11	465	-143	0	1	101
3-5	Phonkeo	0	102	3	1,802	1,907	60	1,194	28	254	1,536	60	-	1,092	1,171	25	875	-1,547	14	-371	81
3-6	Ngio	0	104	0	333	437	50	178	7	112	346	50	-	74	171	7	-	-222	34	-91	79
3-7	Nalao	0	222	0	2,861	3,082	971	1,419	60	29	2,479	971	-	1,197	640	60	-	-2,832	1	-604	80
3-8	Nakhom	0	215	0	0	215	20	134	33	0	187	20	-	-81	62	33	-	0	-	-28	87
3-9	Phongnang	0	363	0	1,220	1,583	705	643	0	0	1,349	705	-	280	177	0	-	-1,220	0	-234	85
3-10	Nangoun-Nua	377	265	0	813	1,454	395	44	159	0	598	19	105	-221	17	159	-	-813	0	-856	41
3-11	Nangoun-Tai	0	483	0	415	898	393	262	0	0	655	393	-	-221	54	0	-	-415	0	-243	73
3-12	Vanghuan	0	0	0	692	692	73	553	0	0	626	73	-	553	-	0	-	-692	0	-66	91
3-13	Houaysan	0	70	0	782	852	144	671	0	0	815	144	-	602	962	0	-	-782	0	-37	96
3-14	Nampath-Nua	44	438	1	0	484	67	411	14	0	493	23	152	-27	94	13	1,014	0	-	9	102
Sub-total or Average		421	3,578	23	11,984	16,006	3,658	8,466	488	395	13,007	3,236	868	4,888	237	465	2,095	-11,589	0.0	-2,999	81
Samboun Area																					
5-1	Houaymo-Nua	40	56	0	745	841	177	506	0	2	684	137	444	450	903	0	-	-743	0	-157	81
5-2	Houaymo-Tai	0	355	0	247	602	362	174	74	0	610	362	-	-181	49	74	-	-247	0	7	101
5-3	Thahua-Nua	0	84	5	583	672	79	477	69	2	627	79	-	393	570	64	1,347	-581	0	-45	93
5-4	Thahua-Tai	0	89	1	570	660	63	509	1	0	572	63	-	419	570	0	100	-570	0	-88	87
5-5	Houaypamom	20	89	13	671	793	113	14	49	469	644	93	560	-75	15	36	387	-203	70	-149	81
5-6	Somsanouk	0	770	0	2,626	3,395	1,063	696	0	0	1,759	1,063	-	-74	90	0	-	-2,626	0	-1,636	52
5-7	Nampat	0	168	0	587	755	155	13	18	0	186	155	-	-155	8	18	-	-587	0	-569	25
5-8	Vangkhi	0	1,742	11	2,238	3,990	1,539	1,146	310	0	2,996	1,539	-	-595	66	299	2,818	-2,238	0	-995	75
5-9	Phonthong	0	167	2	201	370	211	39	6	0	256	211	-	-128	23	3	259	-201	0	-114	69
5-10	Taathan	0	315	6	918	1,239	228	214	90	0	532	228	-	-100	68	84	1,483	-918	0	-707	43
5-11	Nampath-Tai	48	599	53	431	1,131	523	289	80	9	901	475	1,089	-310	48	27	151	-422	2	-230	80
5-12	Houayxi	0	44	18	1,884	1,945	903	127	34	8	1,072	903	-	83	290	17	196	-1,876	0	-873	55
5-13	Nampath	364	178	2	1,043	1,587	374	665	2	0	1,041	103	103	488	374	0	100	-1,043	0	-546	66
5-14	Phakou	0	516	2	371	889	35	620	54	0	709	35	-	104	120	52	3,375	-371	0	-180	80
5-15	Sivilai	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	94	0	-	0	94
Sub-total or Average		472	5,170	112	13,115	18,870	5,825	5,488	786	490	12,589	5,353	1,234	318	106	674	702	-12,626	4	-6,280	67
Total or Average		893	8,748	135	25,099	34,876	9,483	13,954	1,274	885	25,596	8,589	1,061	5,207	160	1,139	942	-24,214	4	-9,280	73

Source: PRA, September - November, 1997

5.5 Villagers' Needs

5.5.1 Preference Ranking for Land Use

Based on the above-mentioned results, villagers' preference ranking on land use was confirmed. Top priority was given to the development/ improvement of annual crop cultivation land, mainly for lowland paddy, by 13 villages (among 14 villages) in the Namon Area and eight villages (among 15) in the Somboun Area as shown in Table 5-5-1. Because many villagers in the Somboun Area recognized that the land development potential for lowland paddy is considerably small, and suitable land for slash and burn cultivation is decreasing in this area, the first priority was given to the other land use categories, i.e. grass land/ livestock development (including some fish culture development) by five villages and orchard development by two villages. As the second priority in the Namon Area, orchard development was selected by eight villages, grass land/ livestock development (including some fish culture development) was chosen by five villages, and the remaining one village preferred man-made forest development. As the second priority in the Somboun Area, grass land/ livestock development (including some fish culture development) was selected by six villages, orchard development was chosen by five villages, and the remaining four villages preferred annual crop cultivation land development.

As a whole, the villagers prefer to develop/ improve the lowland paddy and irrigation facilities to increase paddy production, and to develop/ improve the grass land/ livestock, fish pond and orchard to increase their cash income. For implementation of these development/ improvement works, many villages expressed their wish to provide not only labor and available construction materials such as stones and timber, but also a certain proportion of construction cost.

5.5.2 Preference Ranking of Villagers' Needs for Implementation of Land Use Plan

The preference ranking of the villagers' needs for implementation of their land use plan was also confirmed in PRA. As a result, their needs differ considerably by village as presented in Annex 3. In order to know the tendency, items with the villagers' highest needs are tabulated in Table 5-5-2.

Table 5-5-1 (1/2) Preference Ranking of Villagers' Needs on Land Use

	No. 1		No. 2		No. 3		No. 4		No. 5	
	Main Item	Sub Item	Main Item	Sub Item	Main Item	Sub Item	Main Item	Sub Item	Main Item	Sub Item
Namou Area										
3-1 Vangmiang	Annual crops	Rice Peanut Maize	Fruit trees	Rambutan Tamarind	Indust. trees	Tectona grandis Afzelia sp. Hopea sp.	Livestock & Fishery	Poultry Fish Cattle & pig	Non-agriculture	Weaving
3-2 Namon-Tai	Annual crops	Rice Peanut Cucumber	Fruit trees	Tamarind Longan Rambutan	Indust. trees	Teak Eucalyptus Cochinchinesis	Livestock	Poultry Pig & cattle	Non-agriculture	Weaving Blacksmith
3-3 Namon-Nua	Livestock	Cattle/buffalo Fish Poultry	Fruit trees	Tamarind Rambutan Mango	Annual crops	Rice Peanut Pineapple	Indust. trees	Rubber trees Teak Eucalyptus		
3-4 Phonkavang	Annual crops	Rice Peanut Melon	Livestock & Fishery	Pig Poultry Fish	Non-agriculture	Weaving	Fruit trees	Pineapple Banana Mango		
3-5 Phonkeo	Annual crops	Rice Cassava Watermelon	Fruit trees	Mango Tamarind Lemon	Indust. trees	Tectona grandis Sindora sp. Pterocarpus sp.	Livestock	Cattle Pig Poultry	Non-agriculture	Knitting Blacksmith
3-6 Ngrou	Annual crops	Rice Chile Cabbage	Fruit trees	Tamarind Mango Longan	Indust. trees	Teak Leucaena alata Eucalyptus	Livestock	Cattle Pigs Poultry	Non-agriculture	Weaving
3-7 Nalao	Annual crops	Rice Maize Cassava	Fruit trees	Tamarind Mango Lemon	Indust. trees	Teak Mai Ngrou Mai Dou				
3-8 Nakhom	Annual crops	Rice Cucumbers Peanut	Fruit trees	Mak Phuk Tamarind Coconuts	Indust. trees	Teak Mai Dou Mai Tac	Livestock & Fishery	Buffalo Cow Fish		
3-9 Phongnang	Annual crops	Rice	Livestock	Cattle Pig Poultry	Fruit trees	Mango Pineapple	Indust. trees	Teak		
3-10 Nangoun-Nua	Annual crop	Rice	Indust. trees	Teak Rose wood Afzelia	Fruit trees	Mango Coconuts Pomelo	Livestock	Buffalo Cow		
3-11 Nangoun-Tai	Annual crops	Rice Cassava Ginger	Livestock & Fishery	Cow Buffalo Fish	Fruit tree	(pineapple)	Indust. trees	Tectona- grandis		
3-12 Vanghua	Annual crops	Rice Cucumber Beans	Fruit trees	Coconut Rambutan Lamout	Livestock & Fishery	Cow Poultry Fish	Indust. trees	Teak Mai Khilek Mai Kungpu	Non-agriculture	Weaving
3-13 Houaysan	Annual crops	Rice Peanuts Water melon	Livestock	Pig Buffalo Cow	Fruit trees	Banana Pineapple				
3-14 Nampath-Nua	Annual crops	Rice Chile Maize	Livestock	Buffalo Cow Pig	Indust. trees	Teak Eucalyptus	Fruit trees	Pineapple Banana Mango	Non-agriculture	Weaving

Source: PRA, September - December, 1997

Table 5-5-1 (2/2) Preference Ranking of Villagers' Needs on Land Use

	No. 1		No. 2		No. 3		No. 4		No. 5	
	Main Item	Sub Item	Main Item	Sub Item	Main Item	Sub Item	Main Item	Sub Item	Main Item	Sub Item
Somboun Area										
S-1 Houaymo-Nua	Annual crops	Rice Maize Chile	Fruit trees	Mango Coconuts Tamarind	Indust. trees	Teak Mai Dou Kahin Narong	Livestock	Cow Buffalo Goats	Non-agriculture	Weaving Tailoring
S-2 Houaymo-fai	Annual crops	Rice Cassava	Fish culture	Pa Nin Carp Catfish	Fruit trees	Jackfruit Mango Tamarind	Livestock	Buffalo Cow Goat	Non-agriculture	Weaving
S-3 Thahua-Nua	Fruit trees	Mango Tamarind Jackfruit	Livestock	Cow Buffalo Pig	Indust. trees	Teak Rose wood Alzalia				
S-4 Thahua-fai	Livestock	Cattle Poultry	Fish culture		Fruit trees	Mango Tamarind Longan	Indust. trees	Teak Genus Leuceana Eucalyptus		
S-5 Houaypamom	Annual crops	Rice Cassava	Fruit trees	Banana Pineapple Mangoes	Indust. trees	Teak Maidou Mintacka	Livestock	Cow Buffalo Poultry	Non-agriculture	Weaving Bamboo works
S-6 Somsanouk	Livestock & Fishery	Cow Fish Poultry	Annual crops	Rice Cassava Chile	Fruit trees	Banana Pineapple Mango	Indust. trees	Teak		
S-7 Nampat	Livestock & Fishery	Cattle Fish Pig	Fruit trees	Coconuts Lemon Pineapple	Annual crops	Chile Cassava Onion	Non-agriculture	Weaving		
S-8 Vangkhi	Annual crops	Rice	Livestock	Pig Cattle Poultry	Fruit trees	Rambutan Mango Longan	Non-agriculture	Weaving	Indust. trees	Teak
S-9 Phonthong	Annual crops	Rice Chile Cabbage	Livestock & Fishery	Cattle Buffalo Fish	Fruit trees	Banana Mango Pineapple	Indust. trees	Teak Mai Gue Tree	Non-agriculture	Weaving
S-10 Taohan	Annual crops	Rice Chile	Fruit trees	Tamarind Mango Banana	Livestock	Cattle Fish Poultry	Indust. trees	Teak	Non-agriculture	Weaving
S-11 Nampath-fai	Fruit trees	Tamarind Hogpalum Mango	Annual crops	Rice Peanut Pineapple	Indust. trees	Teak Pierocarpus Sindoras cho.	Livestock	Poultry Pig Cows		
S-12 Houayxi	Livestock & Fishery	Fish Poultry Pig	Annual crops	Cassava Maize Banana	Indust. trees	Teak Mai Safang Mai Pong	Non-agriculture	Weaving		
S-13 Namphao	Annual crops	Rice Cassava Pineapple	Livestock & Fishery	Pig Poultry Fish	Fruit trees	Banana Mango Tamarind	Indust. trees	Teak	Non-agriculture	Weaving
S-14 Phakoup	Livestock	Pig Poultry Fish	Non-agriculture	Weaving	Annual crops	Cassava Chile	Fruit trees	Banana Mango Jujube	Public infrast.	Dispensary Tubewell School repair
S-15 Sivilai	Annual crops	Rice Cash crops	Fruit trees		Indust. trees	Pineapple	Livestock	Cow Buffalo Pig	Fishery	

Source: PRA, September - December, 1997

Table 5-5-2 Summary of Preference Ranking of Villagers' Needs for Implementation of Land Use Plan

Category/ Item	Namon Area	Somboun Area	Model Area
1. Annual Crops			
1) Fund	2	1	1
2) Seed/stock	3	2	2
3) Market		3	
4) Irrigation	1		3
2. Fruit Trees			
1) Fund	1	2	2
2) Seed/stock	2	1	1
3) Technic	3	3	3
3. Livestock/ Fishery			
1) Fund	1	1	1
2) Seed/stock	2	2	2
3) Technic	3	3	3
4. Industrial Trees			
1) Fund	1	2	1
2) Seed/stock	2	1	2
3) Technic	3	3	3
5. Cottage Industry			
1) Fund	1	1	1
2) Technic	3	3	3
3) Market	2	2	2

Note: 1; Items with the highest numbers of "highly needed"
 2; Items with the secondly highest numbers of "highly needed"
 3; Items with the thirdly highest numbers of "highly needed"

As a whole, the villagers' needs are higher for funds, seed/ stock and techniques, and lower for fertilizer and agro-chemicals. The villagers' needs are considerably different between the Namon and Somboun Areas in the development of annual crop cultivation land, i.e. the need for irrigation is the highest in the former area, and that for market is the highest in the latter area. This is probably because of the preference of the villagers for the development/ improvement of lowland paddy in Namon, whereas, in Somboun, they intend to introduce, in addition to lowland paddy, upland crops which are usually difficult to market. For the development of man-made forest, the villagers' needs are higher for funds and seed/stock (seedlings) than techniques.

The villagers' needs for the development of cottage industries are also presented in the above table, although this development is not directly connected with land use planning. Since recent selling prices of *sinh* (traditional skirt) produced in the Model Area are low, the villagers' needs are considerably high for marketing.

5.5.3 Villagers' Preference Ranking for Social Infrastructure Development

The villagers' preference is high for the development of social infrastructure such as roads, domestic water, schools and electricity, and development of these has direct and indirect relations with the land use planning. The villagers' preference ranking for social infrastructure development was thus confirmed in PRA, and the results are presented in Table 5-5-3.

In the Namon Area, the first ranking was given to road improvement by seven villages followed by electrification by three villages, domestic water supply by two villages and primary school improvement by two villages. Many villages gave the first ranking to road improvement, because ten villages in this area are located far from Route 13 and the conditions of local roads from these villages to Route 13 are poor in general. In the Somboun Area, the first ranking was given to domestic water supply by seven villages followed by primary school improvement by five villages, electrification by two villages and road improvement by one village. Since no water supply is available in seven villages in this area, this result is also understandable. In general, the village authorities are responsible for construction and improvement of primary schools and their funds for this purpose are usually insufficient. Thus, the preference ranking for school improvement is considerably high in both areas.

5.6 Evaluation of PRA Results

As stated in S/W of the Study, the objective of the Study is to formulate an integrated watershed management plan in the Vangvieng district in order to contribute to the improvement of resource management and livelihood of the local people. It is thus expected to prevent forest degradation and soil erosion, and maintain environmental sustainability through these improvements.

Based on this objective and on the results of the PRA and Socioeconomic Baseline Survey, the assessment of major problems of watershed degradation and their causes are firstly carried out in this Subsection. Then, the potential for watershed conservation by removing these problems is examined.

5.6.1 Problems in Watershed and Their Causes

The predominant problems of watershed degradation and their causes are simply illustrated as shown in Fig. 5-6-1.

Table 5-5-3 Preference Ranking of Villagers' Needs for Social Infrastructure

No.	Village	Preference Ranking			
		No. 1	No. 2	No. 3	No. 4
Namon Area					
3-1	Vangmiang	Road improve.	Domestic water	Health service	School improve.
3-2	Namon-Tai	Domestic water	Health service	School improve.	
3-3	Namon-Nua	Electrification	Domestic water	Health service	School improve.
3-4	Phonsavang	School improve.			
3-5	Phonkeo	School improve.	Health service	Road improve.	
3-6	Ngiou	Road improve.	School improve.	Electrification	Domestic water
3-7	Nalao	Electrification	New road&bridge	School improve.	Health service
3-8	Nakhom	Electrification	Road improve.	Domestic water	Health service
3-9	Phongnang	New road const.	Domestic water	School improve.	Health service
3-10	Nangeun-Nua	New road const.	School improve.	Domestic water	Health service
3-11	Nangeun-Tai	New road const.	School improve.	Domestic water	Health service
3-12	Vanghua	Domestic water	School improve.	Road to school	
3-13	Houaysan	Road improve.	School improve.	Domestic water	Health service
3-14	Nampath-Nua	Road to farm	School improve.		
Somboun Area					
5-1	Houaymo-Nua	Electrification	Health service	School improve.	Road to farm
5-2	Houaymo-Tai	Road to farm	Electrification to all villagers	Domestic water	School improve.
5-3	Thahua-Nua	School improve.	Electrification to all villagers	Domestic water	Health service
5-4	Thahua-Tai	School improve.	Domestic water	Health service	
5-5	Houaypamom	School improve.	Domestic water	Health service	
5-6	Somsanouk	Domestic water	Health service		
5-7	Nampat	Domestic water	School improve.		
5-8	Vangkhi	Domestic water	Health service	School improve.	
5-9	Phonthong	Domestic water			
5-10	Taothan	Domestic water			
5-11	Nampath-Tai	Domestic water	School improve.	Health service	Electrification
5-12	Houayxi	Domestic water	Electrification	School improve.	Health service
5-13	Namphao	School improve.	Domestic water	Health service	Community hall
5-14	Phakoup	School improve.	Domestic water	Health service	
5-15	Sivilai	Electrification	Health service		

Source: PRA, September - November, 1997

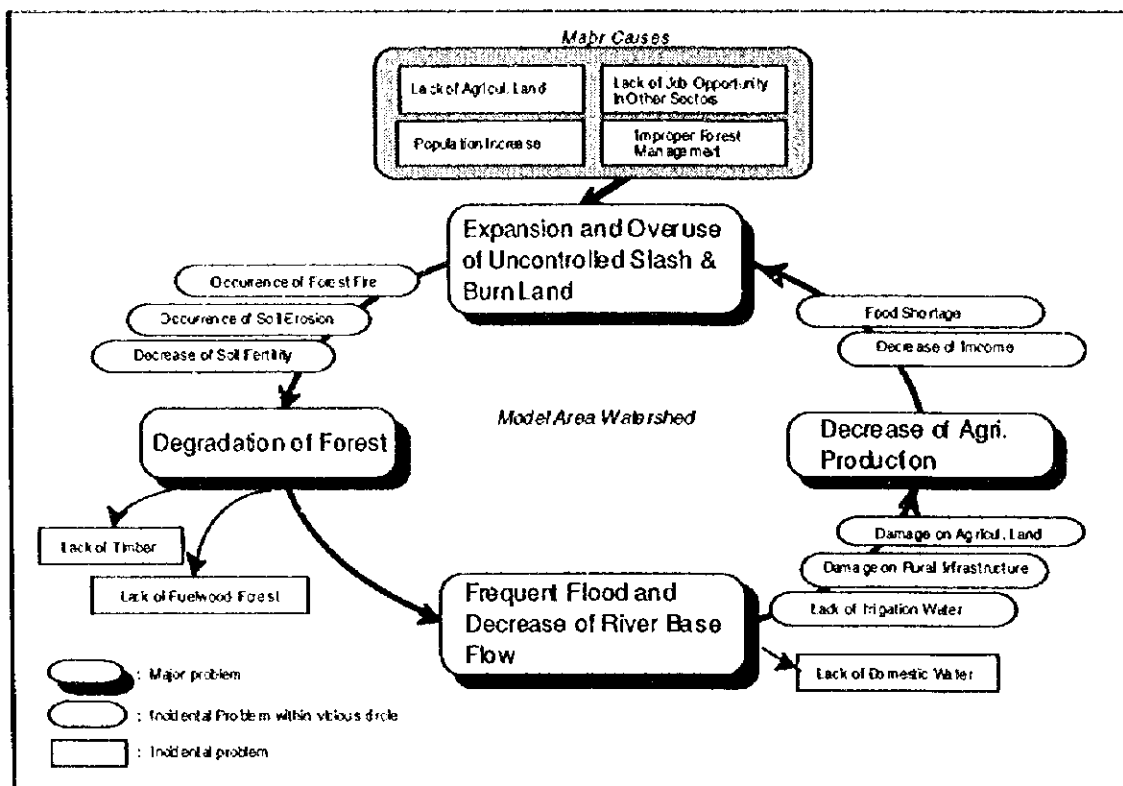


Fig. 5-6-1 Major Problems of Watershed Degradation and Their Causes

The major problems of watershed degradation are (i) expansion and overuse of uncontrolled slash and burn land, (ii) degradation of forest, (iii) frequent occurrence of flooding and decrease of river base flow, and (iv) decrease of agricultural production. These problems are considered to form a vicious circle as seen in the above figure.

The expansion and overuse of uncontrolled slash and burn land cause incidental problems such as forest fire, soil erosion, and soil degradation. As a result, another major problem, forest degradation, occurs. Forest degradation invites incidental problems such as shortage of timber and fuelwood forest, and also the major problem of frequent floods in the wet season and decrease of river base flow in the dry season. These problems bring incidental problems such as lack of irrigation water in the dry season and damages to the rural infrastructure and agricultural land, and also the major problem of decrease of agricultural production. This major problem invites incidental problems such as food shortage and income decrease, and leads to expansion and overuse of uncontrolled slash and burn land.

The major causes of the vicious circle, namely causes of watershed degradation, are (i) population increase, (ii) lack of agricultural land, (iii) lack of job opportunities in other sectors, and (iv) improper forest management, as analyzed by the villagers in PRA to a certain extent.

5.6.2 Potential for Watershed Conservation

It is proposed to consider countermeasures for watershed conservation with which the major causes of watershed degradation above mentioned are reduced and/or removed. The countermeasures needed for proper watershed conservation are thus examined hereinafter. In the examination, a socioeconomic projection is firstly made, since the target year of the Study is set at 2008. The socioeconomic projection includes projections of population, food balance of paddy, and expansion of slash and burn land due to the population increase.

(1) Socioeconomic Projection

1) Projection of population

In the population projection for the year 2008 for the Model Area, the national average growth rate of 2.48% p. a. (during 1985-1995 period) is directly applied, since official data on population forecasts for the Model Area are not available. The calculation result shows that the population in 2008 will be 9,100 in the Namon Area, 12,600 in the Somboun Area and 21,700 in the Model Area, about a 34% increase from the present population for the respective areas.

2) Paddy balance projection

The food balance of paddy in 2008 is projected based on the above calculated 2008 population and the following assumptions:

- a) Twenty percentage increase of lowland paddy production would be performed in 2008 due to cultivation technique improvement,
- b) Paddy production in the slash and burn land in 2008 will be the same as the present level, and
- c) Per capita consumption of paddy will be increased to 300 kg (which is the national average of the 1992-1994 period estimated by FAO) from the present level of 273 kg (result of Socioeconomic Baseline Survey).

As a result, as shown in Table 5-6-1, paddy deficit will be about 670 tons in the Namon Area, 2,280 tons in the Somboun Area and 2,950 tons in the Model Area.

Table 5-6-1 Socioeconomic Projection for Future Expansion of Slash and Burn Land

		Namon Area	Somboun Area	Model Area Total or Ave.
Present Condition (Based on Socio-economic Baseline Survey Results)				
I. Paddy Production				
Lowland paddy	(ton)	1,450	290	1,740
Upland paddy	(ton)	320	1,150	1,470
Total paddy	(ton)	1,770	1,440	3,210
II. Paddy Consumption				
Per capita consumption	(kg)	276	272	273
Population	(prn)	6,779	9,378	16,157
Total consumption	(ton)	1,870	2,551	4,420
III. Paddy Balance	(ton)	-100	-1,111	-1,210
Future Condition (Estimated for Yr. 2008)				
I. Paddy Production				
Lowland paddy a/	(ton)	1,740	348	2,088
Upland paddy b/	(ton)	320	1,150	1,470
Total paddy	(ton)	2,060	1,498	3,558
II. Paddy Consumption				
Per capita consumption c/	(kg)	300	300	300
Population d/	(prn)	9,100	12,600	21,700
Total consumption	(ton)	2,730	3,780	6,510
III. Paddy Balance	(ton)	-670	-2,282	-2,952
IV. Upland Paddy Area Requirement e/				
Additional production needed	(ton)	570	1,171	1,742
Assumed yield of upland paddy	(t/ha)	1.00	1.00	1.00
Additional upland area needed	(ha)	570	1,171	1,742
V. Increase of Slash and Burn Land Area				
Present slash and burn land area (1997)	(ha)	356	987	1,343
Additional S&B land area needed (2008)	(ha)	570	1,171	1,742
Total S&B land area needed (2008)	(ha)	926	2,158	3,085
Increase of S&B land area	(%)	260	219	230

Note: a/; 20% increase is assumed for the year 2008.

b/; Assumed to be the same with the present condition.

c/; Assumed to be the same with the national average from 1992 to 1994 according to FAO estimate.

d/; National population increase rate of 2.48 % p.a. during 1985-1995 period is applied for 1996 population.

e/; Only upland paddy area expansion is assumed to be performed to fulfill the paddy shortage.

3) Projection on expansion of slash and burn land

The projection on expansion of slash and burn land for the year 2008 is made based on the following assumptions:

- a) The balance between the amount of paddy deficit estimated above (e.g. 2,950 tons in the Model Area) and that at present level is assumed to be the amount of paddy deficit in 2008, and
- b) All the amount of paddy deficit in 2008 will be produced in slash and burn land with an average yield of 1.0 ton/ha.

As a result, requirement for increase of slash and burn land area in 2008 is 570 ha in the Namon Area, 1,170 ha in the Somboun Area and 1,740 ha in the Model Area as shown in Table 5-6-1. Comparing these areas with the ones at present (results of PRA), the slash and burn land in 2008 will be 2.6 times in the Namon Area, 2.2 times in the Somboun Area, and 2.3 times in the Model Area as shown also in Table 5-6-1.

In practice, however, it is difficult to expand the slash and burn land by more than double that at present, because new land for slash and burn is hard to find even under the present condition. The villagers can only shorten the rotation period for slash and burn cultivation. However, this leads to further watershed degradation, and is not an approach recommended for watershed conservation. Accordingly, the potential countermeasures for watershed conservation to reduce the slash and burn cultivation are (i) increase production of paddy and cash crops through introduction of new and/or improved production system, and (ii) increase cash income by promotion of other income generation programmes.

(2) Examination on Potential for Watershed Conservation

1) Potential for development of agricultural land

The present production system in the Model Area is mainly by paddy cultivation in the lowland paddy and slash and burn land. However, the potential for expansion of agricultural land to support the present production system is very low in the Model Area. According to PRA, the villagers intend to expand the lowland paddy in the future to about 1.5 times that at present as a whole. However, the area expansion of lowland paddy seems to be difficult in many proposed sites due to limited available irrigation water and high cost of expansion. Moreover, even if it is possible to realize all the expansion of lowland paddy proposed by the villagers, the shortage of paddy in the Model Area may not be fulfilled, and they probably need to continue paddy

production by expanding their slash and burn land. However, the area expansion of slash and burn land is also difficult in the Model Area. According to the Socioeconomic Baseline Survey, the average rotation period of slash and burn land is already about 2.6 years at present. As a result, abandoned areas are expanding and forest recovery in these areas is becoming difficult.

According to PRA, many villagers well understand that the potential for the development of new lowland paddy and new slash and burn land is low in the Model Area. Thus, their intention is also high for the improvement of the irrigation systems in order to increase crop unit yields. Beside the expansion of lowland paddy and slash and burn land, their intention is also high in the development of grass land/livestock, fish pond, orchard and man-made forest mainly for income generation. Since predominant land use categories in the Model Area are natural forest and water body, the development potential for these relatively new production systems is considered to be high in the Model Area.

For the implementation of villagers' land use plan, however, they will face financial and technical difficulties as confirmed in PRA. It is therefore proposed to provide financial and technical assistance to the villagers so as to realize their land use plan. Through this approach to watershed conservation, further participation of villagers is expected and reduction of slash and burn land will be achieved to a certain extent.

2) Potential for other industrial sector development

Agriculture is the economic backbone in the Model Area. According to the results of the Socioeconomic Baseline Survey, 84% of sample households are farm households cultivating lowland paddy and/or slash and burn land. However, self-sufficient type agriculture is dominant, and thus it brings relatively little cash income to the households. The cash income from the agriculture is estimated to be only 43% of the total cash income on average. Accordingly, in the Model Area, the primary target group of income generation programmes should focus on the farmers, and cash income increase should basically be realized through agricultural development including livestock, fishery, and forestry.

Other than agriculture, the development potential seems to be high in (i) marketing related business for agricultural products whose production is expected to increase in the future, (ii) cement related industry using limestone hugely available in and around the area, and (iii) cottage type industries such as weaving and bamboo works. From the viewpoint of creation of job opportunities, however, large scale employment is not

expected in marketing related businesses. A new cement factory planned to be established in the Vangvieng sub-district is expected to create some job opportunities, and also expected to work effectively for reduction of slash and burn cultivation. The existing Lao Vangvieng Cement Plant hires about 330 labors including some villagers in the Model Area. For example in Namon-Tai village, some villagers are working in the Cement Plant as laborers. In addition, in this village, assistance for agricultural development was also carried out under the Upland Agricultural Development Project (with financial assistance from the World Bank). These effectively helped income generation in the village, and as a result, this village completely stopped slash and burn cultivation in 1997. Regarding cottage industries, certain assistance is needed particularly for weaving which employs a considerable number of women in the Model Area. Since recent prices of the products are low, it is proposed to improve the capacity of weavers in quality control and marketing through providing training in these fields.

3) Potential for improvement of forest management

There are two major subjects in relation to improper forest management according to the PRA results, i.e. (i) ambiguity of village boundaries, and (ii) ambiguity of land tenure. In PRA, many villagers pointed out that the ambiguity of village boundaries disturbs their proper land and forest use. In fact, 24 locations in the Model Area are overlapped areas, each of which is utilized by two or three villages. Although all the village boundaries were confirmed with the villagers in the PRA, these have not been authorized yet by the local and central government, and the actual situation is considered to be more complicated than that illustrated in Fig. 5-4-1. The pressure of population on the land is expected to increase in the future. For execution of proper watershed management, it is thus proposed to establish clear village boundaries so as to clarify the territorial area or responsible area of each village.

In addition to the village boundaries, the land tenure situation is also unclear in the Model Area, particularly in the natural forest area where slash and burn cultivation is widely conducted. The majority of land use for slash and burn cultivation follows ambiguous traditional cultivation rights decided basically by each village authority. It is considered that the traditional rights had worked to a certain extent many years ago. Due to the population increase, however, suitable areas for slash and burn cultivation have decreased in recent years. In this situation, conflicts start to occur among the villagers and between the villages in use of the slash and burn land. Land and forest management can not be done properly, because, among others, the body responsible for the land is unclear. Poor management of land and forest may cause frequent

occurrence of forest fires and soil erosion. Therefore, it is also proposed to establish clear land cultivation rights for individuals in the Model Area.

Recognizing the above situation, the Government of Lao PDR initiated the Land-Forest Allocation Programme in 1996. This programme intends to reduce slash and burn cultivation and to conserve the forest by allocation of land to households who are non-owner cultivators of permanent farm land. Lands subject to the programme are basically land not used for production purposes and slash and burn land. The land size to be allocated to each household is decided based on available labor force with a maximum size of 3.0 ha/ labor. This programme has not been implemented in the Model Area, since priority was given to the northern part of Lao PDR where forest degradation is more severe than that in the Model Area. Since a new or improved agricultural production system needs to be introduced in the allocated land, certain technical and financial support to the villagers is also needed together with implementation of the Land- Forest Allocation Programme. For execution of the programme, the results of the PRA and the Socioeconomic Baseline Survey will be of great use to help reduce the cost and time required, because village boundaries and land use plans clarified with the villagers are available for all 29 villages in the Model Area.