No.

Japan International Cooperation Agency (JICA)

Ministry of Agriculture and Forestry (MAF)
Lao PDR

THE BASIC STUDY
FOR
THE FOREST MANAGEMENT AND COMMUNITY SUPPORT PROJECT
IN
LAO PDR

FINAL REPORT

SEPTEMBER 2004

NIPPON KOEI CO., LTD.

GE
JR
04-018

LIST OF REPORT

FINAL REPORT

DATA BOOK 1

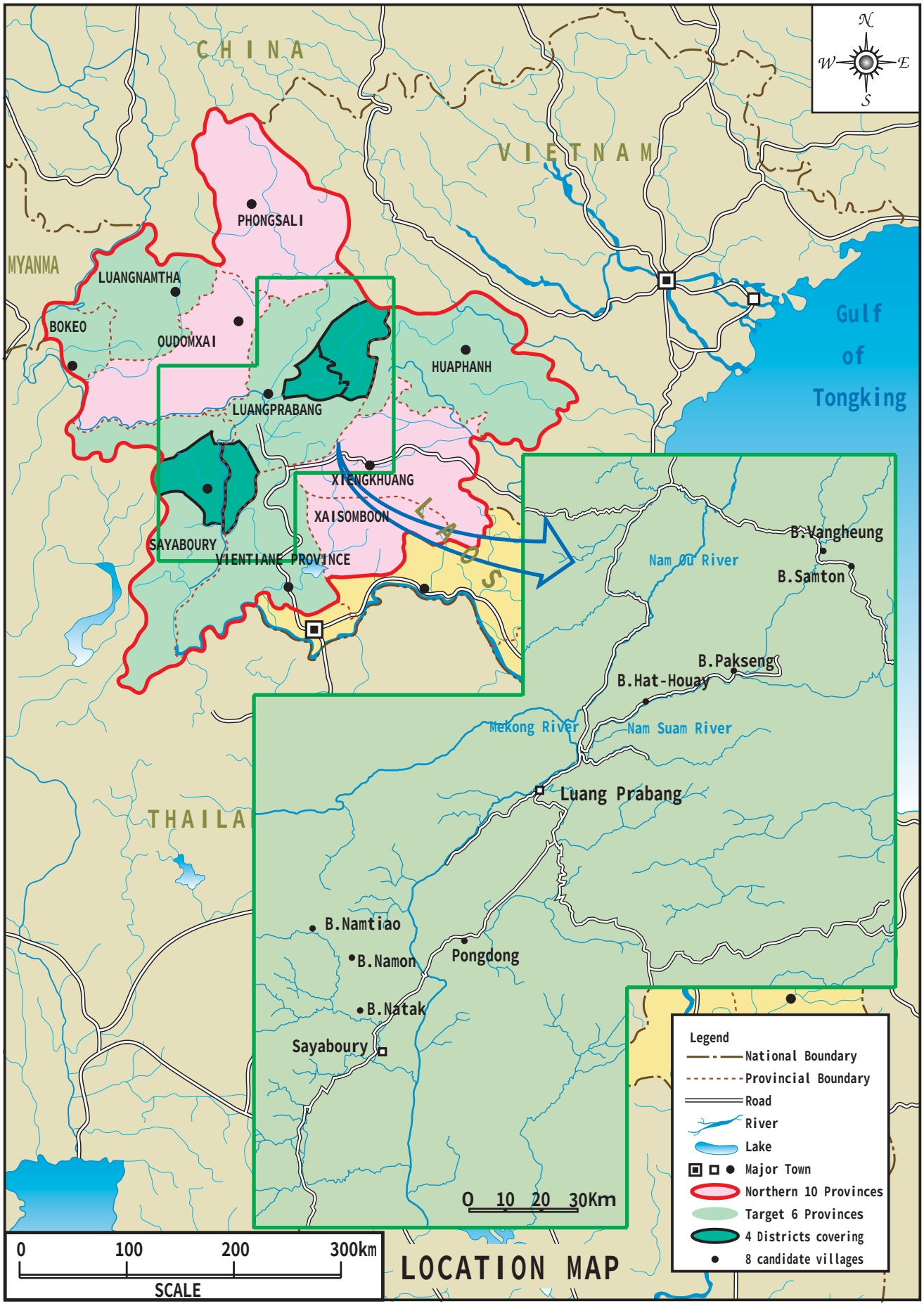
Part I: Socio-Economic Survey of the Eight (8) Candidate Villages

Part II: Marketing Survey of the Basic Study for FORCOM

DATA BOOK 2

Part III: Training Needs Assessment of the Target PAFOs and DAFOs

Part IV: Inventories of Training Courses and Available Resources for Training


CHINA
VIETNAM
MYANMA
THAILA
LAOS
PHONGSALI
LUANGNAMTHA
BOKEO
OUDOMXAI
LUANGPRABANG
HUAPHANH
XIENGKHUANG
XAISOMBOON
SAYABOURY
VIENTIANE PROVINCE
Gulf of Tongking
B.Vangheung
B.Samton
B.Pakseng
B.Hat-Houay
Nam Ou River
Mekong River
Nam Suam River
Luang Prabang
B.Namtiao
B.Namon
Pongdong
B.Natak
Sayaboury
0 10 20 30Km
0 100 200 300km
SCALE
LOCATION MAP
Legend
National Boundary
Provincial Boundary
Road
River
Lake
Major Town
Northern 10 Provinces
Target 6 Provinces
4 Districts covering
8 candidate villages

Village-1: Pakseng

Photo 1-1 Rice grown in dry field at slash - and burn farming area

Photo 1-2 Inhabitants participation (woman)

Photo 1-3 slash - and - burn farming

Photo 1-4 Common forest and slash - and - burn farming in village

Photo 1-5 River and slash - and - burn farming in village

Photo 1-6 River and slash - and - burn farming in village

Village-2: Hat Houay

Photo 2.1 Discussion for forestry utilization by inhabitants participation

Photo 2.2 Common forest on the other side river

Photo 2.3 Command a view of paddy field from slash - and - burn farming area

Photo 2.4 Home garden near the village

Photo 2.5 Irrigation facility of Quaker support

Photo 2.6 Slash - and - burn farming

Village-3: Samton

Photo 3.1 Preparing the Social Map

Photo 3.2 Slash - and - burn farming

Photo 3.3 Keep pigs in captivity.

Photo 3.4 Tree Bark(Puak Muak)

Photo 3.6 Field residence area

Photo 3.5 Tree Bark
(Storage of Puak Muak)

Village-4: バンフン村

Photo 4.1 Water Supply works （pipeline）

Photo 4.2 Slash - and - burn farming

Photo 4.3 Preparing the resource map

Photo 4.4 Field residence area

Photo 4.5 Slash - and - burn farming

Photo 4.6 The River near the field

Village 5: Pongdong

Photo 5.1 Discussion for forestry utilization by inhabitants participation

Photo 5.2 Slash - and - burn farming area

Photo 5.3 Cultivate corn plants on garden area

Photo 5.4 Paddy field

Photo 5.5 Group work of seeding

Photo 5.6 Paddy field and slash - and - burn farming

Village 6: Namitao

Photo 6.1 Village of Namitao

Photo 6.2 Slash - and - burn farming area

Photo 6.3 Preparing the Social Map

Photo 6.4 Slash - and - burn farming area

Photo6.5 Residence on village

Photo 6.6 River near the field

Village 7: Namon

Photo 7.1 Preparing the Social Map

Photo 7.2 Protection Forest

Photo 7.3 Village of Namon

Photo 7.4 Blacksmith

Photo 7.5 Paddy Field area

Photo 7.6 Slash - and - Burn farming area

Village 8: Natak

Photo 8.1 Preparing the Social Map

Photo 8.2 Cultivate corn plants on garden area

Photo 8.3 Paddy field area

Photo 8.4 Cultivation of Paper mulberry

Photo 8.5 Weir put together by wood

Photo 8.6 Rice grown in dry field

SUMMARY

1. Background of the Basic Study

"Forest Management and Community Support Project (FORCOM)" has started in February 2004 and will have been implemented for 5 years (until 2009). As a first step, there was a need to collect detailed information / data at provincial as well as village levels to set a focus of the project. To this end, JICA decided to conduct a basic study by dispatching a study team composed of several technical fields of specialists between March and September 2004.

2. Objectives and Scope of the Study

The principle objective of the basic study (the Study) is to gather the information / data related to the study area (provinces and villages) as well as the government offices concerned, which FORCOM requires for setting the focus of the project. In particular, the detailed information /data related to the following 8 candidate villages were gathered in the Study.

a. Pakseng (Pakseng District)
b. Hat Houay (Pakseng District)
c. Samton (Vengkham District)
d. Vangheung (Viengkham District)
e. Pongdong (Nan District)
f. Namtiao (Sayabury District)
g. Namon (Sayabury District)
h. Natak (Sayabury District)

The collected information/data through the Study are:

a. Socio-economic condition of the 8 candidate villages
b. Village profiles of the 8 candidate villages
c. Customs and rules on land and resource uses
d. Market condition of agricultural and non-timber forest products in the 6 provinces and the 8 candidate villages
e. Present land use and vegetation cover of 10 provinces in the northern region based on the LANDSAT-7 satellite images
f. Inventory of the staff of NAFES, PAFOs and DAFOs of 6 provinces
g. Training needs of PAFO staff of the 6 provinces and DAFO staff of 4 districts which have jurisdiction over the candidate villages
h. Inventory of on-going and implemented training courses / modules
i. Inventory of available trainers / resource persons and materials for training
j. Analyzed the SPOT satellite images of the priority 4 villages
k. Present land use and vegetation of the priority 4 villages based on the SPOT HRV1 and SPOT HRG2

3. Schedule of the Study

The Study was implemented over about 7 months from March to September, 2004.

4. Land Use Map Covering 10 Northern Provinces

The study team purchased and analyzed the LANDSAT-7 satellite images to make a land use map covering the 10 provinces in the northern region, namely, Phongsaly, Luangnamtha, Oudomxay, Bokeo, Luangprabang, Houaphanh, Sayabury, Xiengkhuang and Vientiane provinces, and Xaysomboun special region. As a result, the land use conditions of each province were clarified as shown in Chapter 2.2.

5. Village Profile Survey

In order to clarify the socio-economic as well as natural conditions of the 8 candidate villages, the study team undertook the village profile survey through a semi-structured interview with village key informants including a village head and some members of village authority. The results of the village profile survey is presented in Chapter 3.1.

6. Land

The areas of agricultural land and forest land, and the total village area of the 8 candidate villages are as follows:

Areas of Agricultural and Forest Lands

Village	Total Village Area (ha)	Agricultural Land (ha)	Forest Land (ha)	Source
1. Pakseng	1,890	400	1,480	PAFO
2. Hat Houay, */	2,912	250	2,652	PAFO
a) Hat Houay	(1,779)	(119)	(1,650)	PAFO
b) Houay Ouang	(1,133)	(131)	(1,002)	PAFO
3. Samton	1,335	223	1,012	PAFO
4. Vangheung	494	138	356	PAFO
5. Pongdong	1,302	223	1,079	PAFO
6. Namtiao	n.a.	70	n.a.	DAFO
7. Namon	2,775	293	2,482	DAFO
8. Natak	6,372	266	6,061	DAFO

Source: JICA Study team

Note: */ Houay Ouang village was merged with Hat Houay village in 2001.

7. Resource Utilization and Major Products

Resource maps were prepared by villagers at each village to clarify the present use of lands and other resources, which suggested that villagers much depended on various resources available in the village for their livelihood.

8. Venn Diagram and Major Products for Marketing

Villagers discussed major products/resources for marketing and their importance, and they made a Venn Diagram of commodities. Major products/resources for marketing in each village are rice, sesame, Job's tear, paper mulberry, tiger grass, tree bark, sugar palm fruits, buffalo, pig, poultry, etc.

9. Social Status in the Village and Dependence on Resources

During the social map preparation process, the study team asked the participants to clarify themselves based on the well-being perceived in the village. It is very common in this region to classify the wealthiness into three levels like i) "high" or "over sufficient", ii) "medium" or "sufficient", and iii) "low" or "under sufficient". The numbers of household and the composition of each level in the 8 villages are summarized as follows:

Numbers of HH and the Composition of Each Level

Village	Total HHs	Well-being Level		
		Over Sufficient (High)	Sufficient (Medium)	Under Sufficient (Low)
1. Pakseng	129	10 HHs (8%)	44 HHs (34%)	75 HHs (58%)
2. Hat Houay	90	6 HHs (6.7%)	15 HHs (16.7%)	69 HHs (76.6%)
3. Samton	77	13 HHs (16.7%)	18 HHs (23.1%)	47 HHs (60.2%)
4. Vangheung	54	7 HHs (12.7%)	28 HHs (50.9%)	20 HHs (36.4%)
5. Pongdong	102	26 HHs (25.5%)	33 HHs (32.3%)	43 HHs (42.2%)
6. Namtiao	59	4 HHs (6.8%)	52 HHs (88.1%)	3 HHs (5.1%)
7. Namon	247	46 HHs (18.6%)	181 HHs (73.3%)	22 HHs (8.1%)
8. Natak	227	51 HHs (22.55)	129 HHs (56.8%)	47 HHs (20.7%)

Source: JICA Study team

10. Present Rules on the Management/Use of Lands and Resources

"Land zoning"(Land Allocation) program had been undertaken in each village by PAFO and DAFO between 1993 and 1997. The staff of PAFO and DAFO together with villagers categorized forests into different forest types such as i) conservation forest, ii) production forest and iii) protection forest, and their use and management. Normally, a household could get 3 plots of agricultural production area and was instructed to cultivate those areas under 3-year rotation system.

In terms of management of the lands and resources, the villagers explained the study team how the management style has changed as summarized in the following table.

Comparison of Management Style of the Past and Present

Past management style	Present management style
- There were dense forests with big trees. - They were free to select any places for slash and burn cultivation. They used to select big trees to cut in lower percent of slope. - They were free to practice any size of slash and burn cultivation. - Average size was about 0.5 ha for small households and 1.0 ha for large families. - They could get a good production even from planting in small area. - With 50 kg of rice seeds for 1.0 ha, normal yield was 1.5 ton of paddy. - Fallow period was at least 7 years.	- There are no more big and good trees found at present. - All the farming lands were allocated to households with an average size of about 1.0 ha if two labors are available in the household. - Comparing with 10 years ago, weeding work is much harder. On average, 3 to 4 times per season is necessary. - Normal yield at present is about 0.7 to 0.8 ton of paddy per 50 kg of rice seeds for 1.0 ha. - Fallow period is 3 years.

Source: JICA Study team

11. Household Interview Survey

Household Interview Survey was conducted to quantitatively clarify the socio-economic condition of households in the candidate villages. The results of the household interview survey is presented in Chapter 3.3.

12. Number of Household Member

The average number per household among the 8 villages is 6.4 persons per HH.

13. Rice Availability and Annual Paddy Production

Rice availability varies among the 8 villages. Samton has the most households who face rice shortage. About 50% of villagers in Samton reply that they have rice shortage for 5.6 months. On the other hand no villagers in Natak have rice shortage and only 2% of the villagers in Namon have rice shortage for 1.0 month.

14. Availability of Facilities

Averages of availability of major facilities in the 8 villages are 52% for radio, 46% for toilet, 42% for bicycle, 23% for VCD, 17% for motorcycle, 15% for sewing machine, 7% for TV in order of high percentage of availability.

15. Farmland owned per HH

Average areas of each farmland category owned per HH are 1.18 ha for "Hai-A"(slash and burn rice cultivation area), 0.6 ha for "Hai-B"(slash and burn other than rice cultivation area), 0.26 ha for lowland rice field, and 0.11 ha for orchard/tree plantation respectively with an average area of 2.14 ha per HH.

16. Major Crops in "Hai"(slash and burn cultivation area)

Major crops in "Hai" are i) upland rice, ii) Job's tear, and iii) sesame in order of production quantity.

17. Major NTFPs

Major NTFPs are i) paper mulberry, ii) tree bark, iii) tiger grass, and iv) bamboo shoot in order of production quantity.

18. Major Livestock raised

Average numbers of major livestock raised per HH are 0.7 head/HH of cattle, 1.3 head/HH of buffalo, 1.2 head/HH of goat, 3.3 heads/HH of pig, 25.5 heads/HH of chicken, 5.4 heads/HH of duck.

19. Estimated Marketed Volumes of Major Products by Village

Based on the results of the household interview survey, the total marketed volumes of major products from each village were estimated as summarized in the following table.

Estimated Marketed Volumes of Major Products by Village

Major Products sold outside the village (estimated)	(unit)	8 Villages							
		Pak-seng	Hat Houay	Sam-ton	Vang-heung	Pong-dong	Nam-tiao	Na-mon	Na-tak
1) Rice	kg	5,557	6,612	673	-	30,863	11,394	69,956	38,459
2) Job's tear	kg	9,021	15,801	2,191	-	93,522	20,722	9,107	-
3) Sesame	kg	-	23,185	1,740	445	-	2,194	521	6,989
4) Paper mulberry	kg	4,552	7,163	14,430	835	3,670	1,859	20,803	13,611
5) Tree bark	kg	3,535	15,976	7,946	90	873	-	6,138	-
6) Tiger grass	kg	1,563	13,237	1,756	495	896	867	-	1,602
7) Bamboo shoot	kg	1,118	-	-	-	9,088	-	8,489	26,607
8) Palm fruit	kg	-	-	-	-	-	21,507	148,314	-
9) Buffalo	head	17	21	33	-	35	13	142	105
10) Goat	head	4	14	75	15	-	-	-	13
11) Pig	head	33	65	42	23	68	22	224	314
12) Chicken	head	424	796	207	138	183	4	1,418	6,116

Source: JICA Study team

20. Source of Major Income

Major income sources enumerated by the interviewees were i) livestock, ii) private business, iii) NTFPs, iv) field crops, v) salary, vi) temporary job, vii) remittance, viii) fruit tree, ix) rice, and x) handicraft, in order of average amounts of income per HH/year among the 8 villages.

21. Major Cash Income

Average annual amount of major cash income per household among the 8 villages is 4,959,000 Kip/year/HH.

22. Items of Major Expenditure

Items of major expenditure enumerated by the interviewees were i) food, ii) health, iii) clothes, iv) education, v) social activities, vi) transportation, vii) tax, and viii) fuel/electricity, in order of average amounts of expenditure per HH/year among the 8 villages.

23. Major Expenditure

Average annual amount of major expenditure per household among the 8 villages is 2,958,000 Kip/year/HH.

24. Utilization of Credit/ Loan

The villagers, if needed, borrow some money normally from a bank or their relatives. Sometimes they borrow from their friends, neighbours or other systems such as

a mutual aid group, trader's credit, a project fund, etc. Major purposes of borrowing money are for i) buying livestock, ii) private business, and iii) medical treatment.

25. Extension

Times of visit by the extension staff are one of the indicators for the DAFO staff extension activities. According to the interviewees of the 8 villages, 37 % (of Namtiao) to 77% (of Samton) of the villagers have never received any training or technical advice from DAFO extension staff. The others have received training or technical advice one to four times before.

26. Activities wanted to Make Easy

The interviewees were asked to choose up to 5 activities which they want to make easy. There are differences between male and female about works which they want to make easy. Males chose i) slashing, ii) harvest, iii) weeding, iv) plowing, and v) fencing. On the other hand, females chose i) collecting fuel wood, ii) weeding, iii) harvest, iv) child/elderly care, and v) fetching water.

27. General View of the Marketing System

Commodities for marketing are divided into 5 major groups such as; crops, livestock, timber and wood products, NTFPs, and handicrafts. Because of the low population density, low production, low accessibility, and the lack of rural infrastructure, agriculture marketing in the 6 northern provinces are generally on a small scale and very segmented.

28. Distribution Channel of Major Commodities

- Cash Crops:

Collectors from import-export companies collect crops at designated assembly points and then transport them to factory/company storage or to border points. Normally, the products are bought without grading at first assembly point and transported to company/factory storage facilities for grading or processing before export.

- Buffalo and Cattle:

Buffalo and cattle are being sold to Thailand at present in addition to sales in the domestic markets. Registered district and provincial middlemen who visit individual farmers to buy the animals and assemble then until they get one or two truck load. The animals are transported by truck and/or by boat next to the border trade port. In the domestic market flow, the middlemen play a vital role, since it is usually middlemen who buy the animals and transport them to slaughter houses. Slaughtered animals and meat are sold at abattoir gate and then sent to retailers in the market.

- NTFPs:

The distribution channel of NTFPs to the local market is disorganized and chaotic. There are many small traders and fresh markets are full with many sellers with small quantity of the same products. The distribution channel of exportable NTFPs is more organized. Collectors from import-export companies collect and assemble NTFPs at designated assembly points (village, district, road site, river port site). They are

transported by truck or barge/boat to the processing factories for processing and then exported or sold in the local market.

29. Exportable Commodities

In case of NTFPs and cash crops for the export market, prices are set by the import-export companies in proportion to the export prices at the different border point. Price is usually set at village assembly point, company storage gates and border point. Due to the different costs for handling and transportation of the goods to the border, price of commodities also varies depending on the provinces.

30. Constraints in Marketing at Village Level

Villagers expressed their concern about the low productivity caused by drought and the reduction of fallow periods in upland area. A decreased NTFPs' production is also reported due to over exploitation. In some villages, therefore, almost all food-based products are consumed and therefore nothing is left for selling. Other constraints identified by the survey team are:

- Price is not stable and often fluctuated (for paper mulberry, tiger grass, tree bark).
- No people come to buy when there is a surplus of production (for sesame and Job's tears).
- They can not meet the quantity / volume required by buyers due to lack of land, lack of labor, lack of fund and because of occurrence of drought.
- Assembly point is far from the production areas and commodities are hard to be transported.
- Small animals and poultry are infected by epidemic diseases twice a year and cannot be sold.
- Animal feeds are not sufficient.
- For weaving handicrafts, they lack funds to buy raw materials and the market is limited.

31. Market Conditions in the 8 Candidate Villages

- Crops:

The production of agricultural and forestry commodities are limited in the 8 villages. The production of food crops such as rice and maize are mostly for household consumption. Food crops traded for getting cash for the households are very limited in quantity. Production of cash crops commodities is also limited in item, like sesame and jobs tear.

There are limitations for the villagers to increase agricultural production due to shorter fallowing period of slash and burn cultivation under the land allocation program. Another factor impacting the production and trade is the price dumping due to dependency on border trade for the cash crops. Further, the poor accessibility in the region especially during the raining season is another constraint that increases the cost of transportation, thus further more reduces the price of commodities at village level.

- Livestock:

Livestock production especially for large animals is well developed in Luangprabang and Sayabury. The population of buffalo is high in Sayabury but limited

in Luangprabang. The limitation for the production of cattle is due to people's eating preference for buffalo meat in the region. The production of small animals such as pig and poultry is remarkable especially in Sayabury. Poultry are mainly produced for home consumption with some small trade between villages.

- NTFPs:

The survey area counts more than 7 major NTFP commodities, the most tradable ones are paper mulberry, tiger grass, tree bark, sugar palm and bamboo shoots. Food based NTFPs such as bamboo and others are mostly for household consumption with small quantity sold in nearby markets. The NTFPs exploitation area consists of secondary forest coverage, which is limited for most of the village. On the other hands, because of food shortage, those resources may diminish due to over exploitation. According to the results of the survey, about all of the 8 villages population is solely depending on those resources for their subsistence.

32. Inventory of the Staff of PAFOs and DAFOs

A total of 162 staffs belongs to the central office (NAFES) at present, while the number of staff in the provincial offices (PAFOs) ranges from 88 to 216. The staffs in the district offices (DAFOs) are not more than 20, except DAFO Sayabury which has more or less 50 staffs at present. As for the educational attainment of the staff, the majority of them are diploma holders (either medium or high diploma), approximately 60 % of the total staff. There are also some staffs who have higher decrees (Bsc, Msc or Ph. D) especially in NAFES, Vientiane PAFO and Luangprabang PAFO.

33. Training Needs Analysis

The study team analyzed training needs of the staff based on the results of the following surveys, namely, i) interview to directors / heads; ii) one-day workshop with managerial staffs; and iii) questionnaire survey to the staff.

34. Past Training Courses attended

The majority of the staffs of the offices except Nan DAFO can be grouped into those who have had no training or only one training course. In Nan DAFO, there are only 2 persons who are grouped into those groups owing to continuous assistance of the SIDA project. Out of 47 training courses that the staff of Nan DAFO has attended, about 30 courses were organized by SIDA.

On the other hand, the survey also revealed the number of training courses that the staff has participated. A total of 1,130 training courses have been undertaken for the staffs of the 6 PAFOs and 4 DAFOs. All the training courses were classified into 9 categories or 57 sub-categories based on the type of training as detailed in Chapter 5.2.2.

35. Gaps in Capabilities

More than 80% of respondents (614 respondents) judged that they lacked capability/ knowledge for complying with the respective duties. Directors of PAFOs showed their dissatisfaction with the systems in the office, which should have helped the staff to perform their duties. Besides, general skills (i.e., English and computer skills)

and other technical skills of the staff except irrigation were also rated as "need improvement". The extent of gaps in the capability of DAFOs is more significant than that of PAFOs, although the general trend in the results is similar to each other. The informants of the DAFOs scored higher point (higher gap) to "systems", "general skills" and "technical skills on meteorology" among others.

36. Problems and Issues on Extension Work

A problem analysis was undertaken through the workshop at each office with the participation of managerial staffs of the offices. In almost all the sessions, "the office (PAFO/DAFO) can not achieve its targets" or "the office can not comply with its tasks" was selected as the core problem of the organization. Further discussions identified 6 to 9 direct causes of the core problem, which include: i) lack of budget; ii) lack of equipment; iii) lack of staff; iv) lack of capabilities/knowledge; v) poor accessibility/ lack of vehicles; vi) inadequate performance of staff; vii) inappropriate plans; viii) poor coordination between/among sections; ix) unclear tasks and duties; x) low villager's acceptance; and xi) weak law enforcement.

37. Training Needs

The training needs were identified separately for the extension workers (PAFES and technical units of DAFO) and for the entire PAFO. In the assessment, the study team assumed the ideal functions of each level of staff, namely, "generalist/community developer" for extension workers in DAFO, "coordinator/community developer" for PAFES, and "subject matter specialists (SMSs)" for technical staffs of PAFO. Based on the gaps identified, training courses required for enhancing capacity of the staffs were identified for each level of staff. The long-listed training courses with the respective priorities are presented in Chapter 5.2.5.

38. Inventory of Training for Human Resource Development

Human-resources development (HRD) is necessary activity in order to keep the capable staff to continue a sustainable organization. Considerable effort has been put into the planning and management for HRD at the Ministry level. The major implemented and on-going projects in the field of human resource development are as follows. It is thought that these projects provide us with useful information as the reference projects in the aspect of human resource development.

- Lao-Swedish Forestry Programme
- Forest Management and Conservation Programme (FOMACOP)
- Farmer Irrigated Agriculture Training Project (FIAT)
- Laos Extension for Agriculture Project (LEAP)
- Micro-Project Development through Local Communities
- Rural Development in Mountainous Area of Northern Lao PDR

39. Training Courses

The information regarding past or on going trainings was collected through the interview survey with a total of 180 training courses, which consist of the information such as i) contents of training, ii) methodology applied, iii) resource persons used, iv)

training period, v) place/venue of training, and vi) training materials/equipment used. The list of training courses is presented in the Supporting Study Report

40. Relevant Training Resources of NGO

Currently, there are nearly 80 INGOs working in Lao PDR with a wide range of development programs. Generally INGOs have introduced and encouraged participatory development approaches in the programs that they support in partnership with government's agencies. Building local capacity (both INGO staff and local government partner) in participatory development approaches continues to be a priority component of many INGO programs.

NGOs have mainly used "Capacity-Building Activity" approaches. The most frequent staff trainings among this group of NGOs have been: project management, training of trainers, community development/organizing approaches. Villager training also is an important component of NGO training programs. Counterparts' training done by NGO are available.

41. Resource Persons

Based on the data collected through the interview surveys, a list of the resource persons was prepared as shown in the Supporting Study Report. The list covers the information on the resource persons such as i) specialty/background, ii) work experience, iii) experience a trainer/lecturer/resource person, and iv) list of project/institutions that he/she has made training so far.

42. Collection of Useful Training Materials available in the Country

The study team collected the training materials used for the on-going or past training courses. The number of training materials are over 160 and they covered wide subjects.

43. Concept for Identification of Livelihood Development Options

For the identification of livelihood development options, the study team took the following steps.

a. to list major products/resources and/or economic activities in each village.
b. to select possible products/resources that might be developed for livelihood options.
c. to clarify the present conditions of selected products/resources in terms of productivity, process and marketing.
d. to assess development potential of selected products/resources.
e. to list the possible livelihood development options.

44. Possible Livelihood Development Options

Based on the present condition and development potential of listed crops/resources, the possible livelihood development options for each village are presented in Chapter 7.3, and summarized as follows.

- Improvement of rice production;

- Cash crop production;
    - Sustainable upland farming;
    - Fruit tree plantation;
    - NTFPs plantation promotion;
    - Mushroom culture;
    - Resource management;
    - Animal bank;
    - Native chicken raising;
    - Aquaculture promotion; and
    - Weaving promotion.

45. Formation of Training Curriculum

The following concepts were taken into account in formulating a framework for human resource development program for extension workers as well as SMSs of the target PAFOs/ DAFOs.

a. The goal of the capacity enhancement should be in line with the national strategy on the agricultural and forestry extension service.
b. Capacity building should be continuous and systematic under a clear vision of what the trainee should be after training.
c. The curriculums should be fitted to his/her daily work and concerns.
d. A principal goal of human resource development program is to grow capable staffs who could be the core of the extension work on the technologies/techniques demonstrated in the priority sites to other villages.
e. The curriculums should be realistic and reasonable considering available human resources in the country as well as time and budgetary limitation of the project.

46. Training Programs

In order to enable the extension staff of PAFOs and DAFOs who will support FORCOM projects, substantial technical training support should be provided. Drafted training curriculums for human resource development programs are categorized as i) for extension workers, ii) for Subject Matter Specialist (SMP), iii) for management, and iv) optional training for improvement as presented in Section 8.2.

47. Purchase and Analysis of the Latest Satellite Images covering the Priority Villages

The study team procured SPOT HRV/HRG and Aster satellite images covering the following 4 villages in June 2004, namely, i) Hat Houay, ii) Samton, iii) Pongdong, and iv) Namon, which were identified as priority villages among the 8 candidate villages in the 1st field work. The above satellite images were analyzed to i) identify and understand the present conditions of the landuse/landcover, and ii) prepare the basic digital data (images and GIS data) for the future forest management activities, e.g. monitoring programs.

48. Classification of Land Use

Based on the digital analysis of the SPOT data, a preliminary landuse/landcover classification was done. Following are the classes.

- Forests (natural/ secondary/ plantation)
- Shifting cultivation (Slash and burn area)
- Fallow land
- Paddy field
- (Orchard)
- Road and Populated area
- River

The definition of "Forest" follows FAO's definition used in Forests Resources Assessment 2000, as the term includes natural forests and forest plantations, which is land with a tree canopy cover of more than 20%. Forests are determined both by the presence of trees and the absence of other predominant land uses. The height of trees should be more than 5 m.

49. Method of Analysis

SPOT usually contains 3 (for SPOT HRV) or 4 (for SPOT HRG) layers or bands each of which has its distinct information on the density of reflection on its spectral wave length. The analysis also includes Normalized Vegetation Index (NVI) defined as (Band3 – Band2)/(Band3 + Band2). Slope image derived from ASTER digital elevation model (DEM) is also applied to the analysis layers. "The Layer Mixing" (a set of layers or bands for the analysis) therefore includes 5 to 6.

The classification is mainly performed by Nearest Neighbor Method (supervise) using eCognition Elements 4.0. Further, through the field investigations in August 2004, lots of information were collected, including samples of classification for the image analysis. The area distribution of each land type is determined as summarized below.

Area Distribution of Present Land Use

Land type	Hat Houay		Samton		Pongdong		Namon, 1/		Namon, 2/	
	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)
Forest	2,138	71.5%	901	50.8%	694	47.5%	6,660	73.2%	5,426	71.0%
River	18	0.6%	-	-	-	-	47	0.5%	36	0.5%
Road/ Populated area	8	0.3%	11	0.6%	21	1.4%	50	0.5%	50	0.7%
Fallow land	456	15.3%	442	24.9%	408	27.9%	1,437	15.8%	1,270	16.6%
Shifting cultivation	306	10.2%	419	23.6%	271	18.6%	611	6.7%	583	7.6%
Paddy field	49	1.6%	-	-	68	4.6%	171	1.9%	170	2.2%
Grass land	13	0.4%	-	-	-	-	114	1.2%	109	1.4%
Total	**2,988**	100.0%	**1,774**	100.0%	**1,462**	100.0%	**9,092**	100.0%	**7,647**	100.0%

Source: JICA Study team

Note: 1/ Boundary shown in the Land Allocation Map by DAFO, 2/ Boundary claimed by the villagers

50. Social and Customary Information on Land Use

"Customary Land Use Maps" that contain the social and customary information of land use in the priority villages were prepared using the blank base maps from the analyzed SPOT images. In all the priority villages, the major land uses are:

a. Paddy field (*"Na"*);
b. Area where villagers can use for slash and burn cultivation ("*Din Phalith"*);;
c. Reserved area for future development ("Din He");
d. Grazing land;
e. Community production forest or forest where villagers can cut trees for domestic purposes but can not operate slash and burn cultivation (*"Pa Somsai"*);
f. Conservation forest ("*Pa SaNgouan"*); and
g. Watershed protection forest ("*Pa Ponkanh Len Nam"*)

In general, there is a tendency that villagers try to maintain forests in the upper reach of the rivers important for the villages especially for rice farming. On the other hand, forests in the area where they can hardly cultivate due to steepness and/or soil condition are maintained as either conservation forests or community forests. Other areas are generally used for slash and burn cultivation or kept as a reservation area.

51. Preparation of Detailed Land Use Maps

Detailed land use maps were prepared by overlaying the customary information of land use on the vegetation and land use maps.

52. Preparation of Recommended Land Use Maps

The Study team prepared "Recommended Land Use Maps" of Hat Houay and Samton, considering the MAF's guideline on land allocation and the procedures prepared by the Lao-Swedish Forestry Program.

53. Recommendations For Monitoring

Through the activities related to the satellite image and GIS analysis and field investigations, the following two recommendations have arisen for the FORCOM project:

a. Necessity of an integral monitoring framework using satellite image and GIS analysis; and
b. Necessity of the capacity building of both NAFES and PAFO with regard to GIS/image analysis and monitoring activities.

THE BASIC STUDY
FOR THE FOREST MANAGEMENT AND COMMUNITY SUPPORT PROJECT

Location Map

Abbreviations

Table of Contents

CHAPTER 1 INTRODUCTION 1

1.1 Background of the Basic Study 1
1.2 Objectives of the Study 1
1.2.1 Objectives of the Study 2
1.2.2 Information/Data to be gathered 2
1.3 Scope of the Study 2
1.3.1 Components of the Study and its Methodology 2
1.3.2 The Study Area 3
1.3.3 Schedule of the Study 4
1.4 Composition of Final Report 4

CHAPTER 2 LAND USE MAP COVERING 10 NORTHERN PROVINCES 6

2.1 Methodology 6
2.1.1 Outline of Work 6
2.1.2 Steps of Work 7
2.2 Present Land Use Maps 7

CHAPTER 3 RESULTS OF THE SURVEYS IN THE CANDIDATE VILLAGES 9

3.1 Village Profile Survey 9
3.1.1 Demography 9
3.1.2 Land 9
3.1.3 Infrastructure 10
3.1.4 Livelihood 10
3.2 Participatory Village Survey 11
3.2.1 Resource Utilization and Major Products 11
3.2.2 Venn Diagram and Major Products for Marketing 12
3.2.3 Social Status in the Village and Dependence on Resources 12
3.2.4 Present Rules on the Management/Use of land and Resources 14
3.3 Household Interview Survey 15
3.3.1 General Information 15
3.3.2 Living Condition 16
3.3.3 Agriculture and Forest Production 17
3.3.4 Estimated Marketed Volumes of Major Products by Village 20
3.3.5 Income and Expenditure 20
3.3.6 Utilization of Credit/Loan 22
3.3.7 Extension 23

3.3.8 Participation/Engagement of Household Members 23
3.3.9 Activities Wanted to Make Easy 24

CHAPTER 4 MARKETING SURVEY 25
4.1 General View of the Marketing System 25
4.2 Present Marketing Condition 25
4.2.1 Distribution Channels per Group of Commodity 25
4.2.2 Marketing of Commodities at Village and District Levels 27
4.2.3 Export and Border Trade 29
4.2.4 Prices 30
4.3 Organization and Infrastructure 31
4.3.1 Market Organization 31
4.3.2 Market Infrastructure 32
4.4 Constraints in Marketing 33
4.4.1 Village Level 33
4.4.2 District and Provincial Level 34
4.5 Marketing Conditions in the 8 Candidate Villages 34

CHAPTER 5 ASSESSMENT OF PAFOs AND DAFOs 36
5.1 Inventory of the Staff 36
5.2 Training Needs Analysis 37
5.2.1 Duties and Responsibilities of the Offices 37
5.2.2 Past Training Curses attended 37
5.2.3 Gaps in Capabilities 38
5.2.4 Problems and Issues on Extension Work 40
5.2.5 Training Needs 41

CHAPTER 6 INVENTORY OF TRAINING 44
6.1 Human Resource Development 44
6.2 Reference Project 45
6.3 Training Courses 47
6.4 Training Resources 48
6.4.1 Resource Persons 48
6.4.2 Collection of Useful Training Materials Available in the Country 49

CHAPTER 7 IDENTIFICATION OF LIVELIHOOD DEVELOPMENT OPTIONS 50
7.1 Concept for Identification 50
7.2 Development Potential of the Priority Villages 50
7.3 Possible Livelihood Development Options 51
7.4 Recommendations 53

CHAPTER 8 FORMATION OF TRAINING CURRICULUM 54
8.1 Basic Concepts 54
8.2 Training Programs 54

CHAPTER 9 ANALYSIS OF SATELLITE IMAGES 57
9.1 Purchase of the Latest Satellite Images covering the Priority Villages 57
9.2 Prime Objectives of the Analysis 57

CHAPTER 10 LAND USE AND VEGETATION SURVEY 58
10.1 Methodology 58
10.1.1 Classification of Land Use 59
10.1.2 Method of Analysis 59
10.1.3 Collection of social/customary information of present land use 60
10.1.4 Collection of existing land allocation map 60
10.1.5 Integration of the information 60
10.2 Results of the Surveys 61
10.2.1 Present Land Use and Vegetation Cover 61
10.2.2 Social and Customary Information on Land Use 62
10.2.3 Existing Land Allocation Maps 63
10.2.4 Preparation of Detailed Land Use Maps 63
10.3 Preparation of Recommended Land Use Maps 63

CHAPTER 11 FINAL OUTPUTS OF THE WORK 66

CHAPTER 12 RECOMMENDATIONS FOR MONITORING 67

List of Tables

Table 1	Summary of Village Profile for 8 Candidate Villages (1/2) (2/2)	T-1~2
Table 2	Major Products by Land Category	T-3
Table 3	Major Product/Resources for Marketing	T-4
Table 4	Roles and Functions of the Offices	T-5
Table 5	Number of Training Courses that the Staffs of PAFOs and DAFOs have attended	T-6
Table 6	Long Lists of Training Courses by the Office (1/2) (2/2)	T-7~8
Table 7	Major Products/Resources in the 4 Priority Villages	T-9
Table 8	Development Potential of Proposed Crops/Resources (Hat Houay)	T-10
Table 9	Development Potential of Proposed Crops/Resources (Samton)	T-11
Table 10	Development Potential of Proposed Crops/Resources (Pongdong)	T-12
Table 11	Development Potential of Proposed Crops/Resources (Namon)	T-13
Table 12	Possible Livelihood Development Options (Hat Houay) (1/2) (2/2)	T-14~15
Table 13	Possible Livelihood Development Options (Samton)	T-16
Table 14	Possible Livelihood Development Options (Pongdong) (1/2) (2/2)	T-17~18
Table 15	Possible Livelihood Development Options (Namon)	T-19

List of Figures

Figure 1	Land Use Map of Northern 10 Provinces	F-1
Figure 2	SPOT False Color Image of Hat Houay 2002	F-2
Figure 3	Normalized Vegetation Index of Hat Houay	F-3
Figure 4	ASTER Slope Image of Hat Houay	F-4
Figure 5	Present Land Use and Vegetation Map of Hat Houay	F-5
Figure 6	Customary Land Use Map of Hat Houay	F-6
Figure 7	Land Allocation Map of the Northern Part of Hat Houay	F-7
Figure 8	Detailed Land Use Map of Hat Houay	F-8
Figure 9	Recommended Land Use Map of Hat Houay	F-9

Figure 10	SPOT False Color Image of Samton 2003	F-10
Figure 11	Normalized Vegetation Index of Samton	F-11
Figure 12	ASTER Slope Image of Samton	F-12
Figure 13	Present Land Use and Vegetation Map of Samton	F-13
Figure 14	Customary Land Use Map of Samton	F-14
Figure 15	Detailed Land Use Map of Samton	F-15
Figure 16	Recommended Land Use Map of Samton	F-16
Figure 17	SPOT False Color Image of Pongdong 2002	F-17
Figure 18	Normalized Vegetation Index of Pongdong	F-18
Figure 19	ASTER Slope Image of Pongdong	F-19
Figure 20	Present Land Use and Vegetation Map of Pongdong	F-20
Figure 21	Customary Land Use Map of Pongdong	F-21
Figure 22	Land Allocation Map of Pongdong	F-22
Figure 23	Detailed Land Use Map of Pongdong	F-23
Figure 24	SPOT False Color Image of Namon 2002	F-24
Figure 25	Normalized Vegetation Index of Namon	F-25
Figure 26	ASTER Slope Image of Namon	F-26
Figure 27	Present Land Use and Vegetation Map of Namon	F-27
Figure 28	Customary Land Use Map of Namon	F-28
Figure 29	Land Allocation Map of Namon	F-29
Figure 30	Detailed Land Use Map of Namon	F-30

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AFTA	ASEAN Free Trade Area
ASEAN	Association of South East Asian Nations
CEPT	Common Effective Preferential Tariff
CIDSE	Cooperation Internationale pour le Developpement et la Solidarite
CUSO	Canadian Volunteer Organization
DAFO	District Agriculture and Forestry Office
DCO	District Commerce Office
DIO	District Industry Office
DTO	District Tax Office
DCTPCO	District Construction Transport Post and Communication Office
EU	European Union
FAO	Food and Agriculture Organization
FIAT	Farmer Irrigated Agriculture Training Project
FOMACOP	Forest Management and Conservation Programme
FORCAP	Forest Conservation and Afforestation Project
FORCOM	Forest Management and Community Support Project
FRC	Forestry Research Center
FSEW	Farming System Extension Worker
FTA	Free Trade Area
GIS	Geographic Information System
HRD	Human-resources development
IFSP	Integrated Food Security Programme
INGO	International Non-governmental Organization
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
LAO PDR	Lao People's Democratic Republic
LEAP	Laos Extension for Agriculture Project
LNCCI	Lao National Chamber of Commerce and Industry
MCC	Mennonite Central Committee
MAF	Ministry of Agriculture and Forestry
MCTPC	Ministry of Construction Transport Post and Communication
MIH	Ministry of Industry and Handicraft
NAFES	National Agriculture and Forestry Extension Services
NAFRI	National Agriculture and Forestry Research Center
NTB	Non Tariff Barrier
NTFPs	Non Timber Forest Products
NTM	Non Tariff Measure
OCAA	Oxfam Community Aid Abroad
PAFO	Provincial Agriculture and Forestry Office

PCCI	Province Chamber of Commerce and Industry
PCO	District Commerce Office
PIO	District Industry Office
PTO	District Tax Office
PCTPCO	District Construction Transport Post and Communication Office
QSL	Quaker Service Lao
SAF	Sustainable Agriculture Forum
SIDA	Swedish International Development Cooperation Agency
SOLE	State Own Logging Enterprise
SOFSC	State Own Food Stuff Company
SMS	Subject Matter Specialist
UNDP	United Nation Development Program
UNIDO	United Nation Industrial Development Organization.

CURRENCY EQUIVALENTS

(as of 3 May 2004)

Currency Unit	**-**	**Kip (KN)**
KN1.00	**=**	**$0.00009599**
$1.00	**=**	**KN 10,418**

CHAPTER 1 INTRODUCTION

1.1 Background of the Basic Study

Between 1996 and 2003, the Government of Japan (GOJ) had implemented a project-type technical cooperation project named the Forest Conservation and Afforestation Project (FORCAP) in Vientiane Province, the Lao People's Democratic Republic (Lao PDR). The project established several models for the community-based forest management supporting livelihood and afforestation activities in the model villages in Vientiane province. Evaluating the impact made by FORCAP as positively significant, the Government of Lao PDR (GOL) officially requested GOJ to implement the same type of technical cooperation in the northern provinces of the country to improve a vicious poverty-deforestation spiral in the region.

In response to the request, GOJ dispatched a mission for a preparatory study for the new project on August 16 to September 14, 2003. The mission conducted a field observation and had a series of discussions with GOL about the project such as its scope, components, institutional framework, etc. In the end, the mission together with GOL came to conclusion that JICA would implement a new technical cooperation project that aims to attain the sustainable forest management and assists upland communities in improving their livelihood in six (6) provinces (Vientiane, Luangprabang, Huaphanh, Sayabury, Luangnamtha and Bokeo) in the northern region. The proposed project, which is "Forest Management and Community Support Project (FORCOM)", has started on February 2004 and will have been implemented for five (5) years (until 2009).

As a first step, there was a need to collect detailed information / data at provincial as well as village levels to set a focus of the project. To this end, JICA decided to conduct a basic study by dispatching a study team composed of several technical fields of specialists between March and September 2004.

1.2 Objectives of the Study

1.2.1 Main Objective

The principle objective of the basic study is to gather the information / data related to the study area (provinces and villages) as well as the government offices concerned, which FORCOM require for setting the focus of the project. In particular, the detailed information / data related to the following eight (8) candidate villages were gathered in the study.

a. Pakseng (Pakseng District)
b. Hat Houay (Pakseng District)
c. Samton (Vengkham District)
d. Vangheung (Viengkham District)
e. Pongdong (Nan District)

f. Namtiao (Sayabury District)
g. Namon (Sayabury District)
h. Natak (Sayabury District)

1.2.2 Information / Data to be gathered

Technically, the study is to clarify/produce the following information by the end of the study.

a. Socio-economic condition of the eight (8) candidate villages
b. Village profiles of the eight (8) candidate villages
c. Customs and rules on land and resource uses
d. Market condition of agricultural and non-timber forest products in the six (6) provinces and the eight (8) candidate villages
e. Present land use and vegetation cover of 10 provinces in the northern region and the four (4) priority villages
f. Inventory of the staff of National Agriculture and Forestry Extension Service (NAFES), Provincial Agricultural and Forestry Offices (PAFOs) and District Agriculture and Forestry Offices (DAFOs) of six (6) provinces
g. Training needs of PAFO staff of the six (6) provinces and DAFO staff of four (4) districts which have jurisdiction over the candidate villages
h. Inventory of on-going and implemented training courses / modules
i. Inventory of available trainers / resource persons and materials for training

1.3 Scope of the Study

1.3.1 Components of the Study and its Methodology

The following surveys were undertaken in the course of the study:

a. Household interview survey;
b. Village profile survey;
c. Survey for the use of lands and resources (which is called hereinafter as "Participatory village survey" since the survey will be done by using PRA tools.);
d. Marketing survey;
e. Inventory of the staff of NAFES, PAFOs and DAFOs;
f. Training needs analysis;
g. Inventory of on-going and past training activities including competent resource persons (trainers) and useable training materials;
h. Analysis of satellite images; and
i. Land use and vegetation survey.

The following table shows the methodologies taken for each survey listed above.

Methods for each Survey

Survey	Method
a. Household interview survey	Interview by using a structured questionnaire from
b. Village profile survey	Key informants interview, Transect walking
c. Participatory village survey	Resource map, Social map, Well-being ranking, Key informants interview, Venn diagram, Ranking
d. Marketing survey	Interview survey to key informants at each layer in marketing of farm products
d. Inventory of the staff of NAFES, PAFOs and DAFOs	Collection of lists of staffs of each office
d. Training needs analysis	Questionnaire survey, Interview to key informants, One-day workshop
d. Inventory of on-going and past training activities including competent resource persons (trainers) and useable training materials	Interview to and data gathering at government as well as project offices concerned
d. Analysis of satellite images	Analyses of satellite images (Landsat for a land use map covering 10 provinces and Spot-5 for land use maps of model sites)
d. Land use and vegetation survey	Field validation of satellite images in the field

1.3.2 The Study Area

The target area varies as per survey. The following table indicates the study area for each survey.

Study Area per Survey

Survey area	Survey to be undertaken
National level	(1) Inventory of on-going and past training activities related to agricultural, forestry and fishery sectors, namely: a. Executing organizations / institutions; b. Existing training modules and their contents; and c. Resource persons for training.
National level and 6 provinces (Vientiane, Luangprabang, Sayabury, Huaphanh, Luangnamtha, Bokeo)	(1) Inventory of the staff of NAFES, PAFOs and DAFOs
10 provinces (Vientiane, Xaysomboon, Xiengkhuang, Luangprabang, Sayabury, Huaphanh, Oudomxai Luangnamtha, Bokeo, Phongsaly)	(1) Analysis of satellite images (to prepare a land use / vegetation cover map at a scale of 1/1,000,000)
6 provinces (Vientiane, Luangprabang, Sayabury, Huaphanh, Luangnamtha, Bokeo)	(1) Marketing survey on agricultural products, non-timber forest products (NTFPs) and handicrafts at provincial level (2) Training needs analysis of the staff of PAFOs.
4 districts (Pakseng, Vienkham, Nan, Sayabury)	(1) Training needs analysis of the staff of DAFOs.
8 villages (Pakseng, Hat Houay, Samton, Vangheung, Pongdong, Namtiao, Namon, Natak)	(1) Household interview survey (2) Village profile survey (3) Participatory village survey (4) Market survey on agricultural products, non-timber forest products (NTFPs) and handicrafts at village and district levels
4 priority villages (Hat Houay, Samton, Pongdong, Namon)	(1) Analysis of satellite images (to prepare a land use / vegetation cover map at a scale of 1/10,000) (2) Land use and vegetation survey

1.3.3 Schedule of the Study

The Study was implemented over about seven (7) months from March to September, 2004. Work schedule of the study is outlined as follows:

Schedule of the study

Phase	Schedule	Work items
Preparatory work in Japan	5 days in March 2004	Preparation of Inception Report Preparation of TORs for village surveys
First (1st) field work in Laos	66 days (March 30 – June 3, 2004)	Conduct of the field surveys, such as, i) Village surveys, ii) Marketing surveys, iii) Inventory of staffs, iv) Training needs analysis, and v) Inventory of training courses/
First (1st) home work in Japan	5 days in June 2004	Preparation of Interim Report
Second (2nd) filed work in Laos	30 days in August / September 2004	Land and vegetation survey Preparation of integrated land use maps
Second (2nd) home work in Japan	12 days in September	Preparation of Final Report

1.4 Composition of Final Report

This Final Report consists of two (2) parts, Main Report and Supporting Study Reports (four study reports). Main report summarizes all the study results. Chapter 1 provides an introductory description of the study. Chapter 2 presents a land use map which covers the 10 provinces based on the latest LANDSAT images. Chapter 3 summarizes the present condition of the eight candidate villages based on the results of the village surveys. Chapter 4 describes the present marketing situation of major agricultural and forestry products in the northern region. Chapter 5 summarizes the results of capability assessment and training needs analysis of the staffs of the target PAFOs and DAFOs. Chapter 6 presents the results of inventory of past and on-going training in the country. Chapter 7 discusses potential livelihood development options that the four (4) priority villages might be able to implement. Chapter 8 shows the framework for human resource development as well as proposed training curriculums for the PAFOs and DAFOs. Chapter 9 presents the process of the analysis of satellite images in Japan prior to the commencement of the 2nd field work. Chapter 10 presents the methodology and results of the land use and vegetation survey of the 2nd field work. Chapter 11 presents final outputs of the work. Chapter 12 presents recommendations for monitoring.

On the other hand, the Supporting Study Reports are composed of the following individual reports prepared by each specialist,

a. Study Report on Socio-Economic Surveys of Eight Candidate Villages;

b. Study Report on Marketing Survey of the Basic Study for FORCOM;

c. Study Report on Training Needs Assessment of the target PAFOs and DAFOs; and

d. Study Report on Inventories of Training Courses and Available Resources for Training.

CHAPTER 2 LAND USE MAP COVERING 10 NORTHERN PROVINCES

2.1 Methodology

2.1.1 Outline of Work

Selection of LANDSAT images

The study team purchased the LANDSAT-7 satellite images and have analyzed them to make a land use map covering the 10 provinces in the northern region, namely, Phongsaly, Luangnamtha, Oudomxay, Bokeo, Luangprabang, Huaphanh, Xayabury, Xiengkhuang and Vientiane provinces, and Xaysomboon special region. In the purchase of the LANDSAT images for this purpose, the study team selected the images based on the following selection criteria.

- images should be latest as much as possible;
- images should be with almost 0% of cloud cover to maintain the reliability of analysis; and
- images should be taken at the same season in a year.

In this connection, the study team planned to use the LANDSAT images taken in 2004 at the beginning. However, those taken in 2004 were with clouds beyond the criteria. In contrast to that, the LANDSAT images taken in 2002 were not covered with clouds at all as shown below.

List of Procured LANDSAT-7 Image

Station	Sensor	Acquisition Date	Satellite No.	Path	Row	Cloud Cover (%)
U.S.	ETM+	16Apr2002	7	127	45	0
U.S.	ETM+	16Apr2002	7	127	46	0
U.S.	ETM+	16Apr2002	7	127	47	0
U.S.	ETM+	7Apr2002	7	128	46	0
U.S.	ETM+	7Apr2002	7	128	47	0
U.S.	ETM+	7Apr2002	7	128	48	0
U.S.	ETM+	30Apr2002	7	129	45	0
U.S.	ETM+	7Mar2000	7	129	46	0
U.S.	ETM+	7Mar2000	7	129	47	0
U.S.	ETM+	7Mar2000	7	129	48	0
U.S.	ETM+	21Apr2002	7	130	45	0
U.S.	ETM+	21Apr2002	7	130	46	0

<Note> U.S.: United States; ETM+: Enhanced Thematic Mapper, Plus

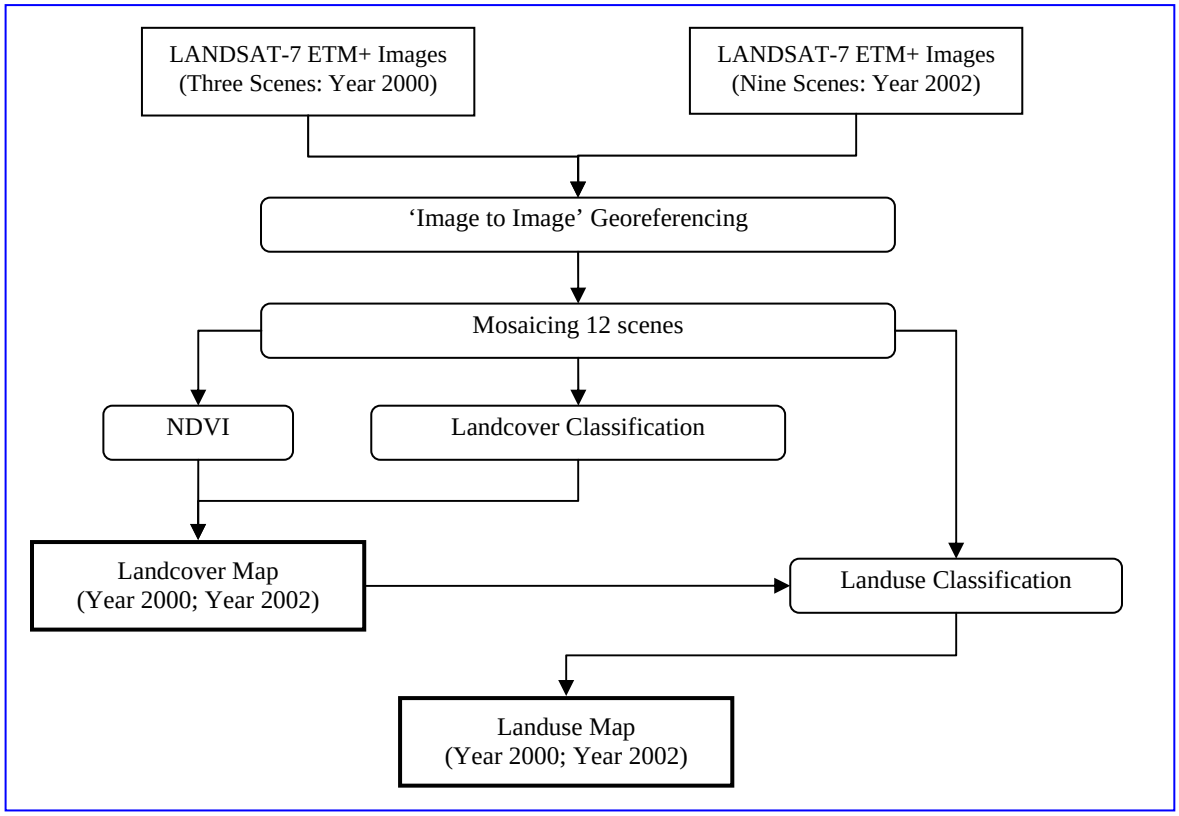
Therefore, the nine (9) LANDSAT-7 images taken in April 2002 were purchased, and three (3) images of LANDSAT images taken in March 2000 were used for the remaining area as substitutes since all the images has clouds covering the certain area among the images taken in 2004.

2.1.2 Steps of Work

The work was composed of the following three steps.

a. Processing of LANDSAT satellite images.
b. Preparation of landcover maps.
c. Preparation of landuse maps.

The work flow for the analysis of LANDSAT images is outlined as follows:



Processing Flow for Landcover and Landuse Map Production

2.2 Present Land Use Maps

The land use map was prepared in GIS Software at a scale of 1/1,000,000 as shown in **Figure 1**. As a result, the present land use was determined based on five (5) land use classes or ten (10) sub-classes at this moment.

Land Use Classification Table

ID (Level I)	ID (Level II)	Land use Class	Definition
1		Water body(W):	
	11		Main river (Wm)
	12		Reservoir (Wr)
2		Forest (F):	
	21		Broad-leaved tree
	22		Bamboo
	23		Orchard
3		Farmland (A):	
	31		Farm land (cultivated)
	32		Farm land (bare soil)
	33		Grassland
4		Residential area or paddy field (R):	
	41		Residential area
	42		Paddy field
5		Cloud	

As a result, the land use conditions of each province are as follows.

Area of Land use Classification in Each Province

(Km^2)

Province ID	Province Name	Total area	Forest	Water	Farmland	Residential/ Paddy field	Cloud/ Error
1	Bokeo province	6,982	6,086	76	697	122	0
2	Huaphanh province	17,502	15,759	23	1,532	188	0
3	Luangnamtha province	9,595	8,610	26	919	39	0
4	Luangprabang province	19,950	17,150	65	2,674	61	0
5	Oudomxay province	11,782	9,888	13	1,839	42	0
6	Phongsaly province	15,453	13,451	37	1,935	31	0
7	Vientiane province	12,577	10,613	440	1,128	393	3
8	Xayaboury province	15,522	12,108	60	3,157	188	9
9	Xiengkhuang province	12,701	10,058	11	2,261	371	0
10	Xaysomboon special region	7,700	7,176	129	335	60	0
11	Vientiane Municipality	3,582	2,075	117	754	636	0

The definition of the classes of the Landsat ETM+ landcover:

The method applied to analyze the Landsat ETM+ was "unsupervise" due to the unavailability of the local samples. The classification process identified four classes including forest, water body, farmland, and residential area or paddy field.

Forest is defined as an area with positive values of NDVI (normalized vegetation index) as the area should have a significant amount of vegetation. Water body includes rivers and lakes with a width of more than 30m due to the pixel size of Landsat ETM+. Farmland or bare land is an area with negative values of NDVI as the area should have a little vegetation compared to forest. Residential area and paddy field are classified together because the spectrum of the images show almost the same signatures and histograms.

The UNEP conducted the landcover assessment on the entire Lao PDR using AVHRR images in 1992/1993, and the results show that forest consist of more than 73% of the total land of the country.

CHAPTER 3 RESULTS OF THE SURVEYS IN THE CANDIDATE VILLAGES

3.1 Village Profile Survey

In order to clarify the socio-economic as well as natural conditions of the eight (8) candidate villages, the study team undertook the village profile survey through a semi-structured interview with village key informants including a village head and some members of village authority. Summary of village profiles of the candidate villages are presented in **Table 1**, and the general features are described in the following sub-sections.

3.1.1 Demography

Demographic data, such as numbers of household, population and composition of ethnic groups of the candidate villages are summarized below.

Population and No. of Household

Village	Nos. of HH.	Population	Ethnic Composition
1. Pakseng	129	715	Lao Loum (49%), Lao Theung (51%)
2. Hat Houay	90	493	Lao Loum (23%), Lao Theung (77%)
3. Samton	77	471	Lao Theung (99.9%)
4. Vangheung	54	292	Lao Loum (81%), Lao Theung (19%)
5. Pongdong	102	526	Lao Loum (100%)
6. Namtiao	59	417	Lao Sung (100%)
7. Namon	247	1,553	Lao Loum (93%)
8. Natak	227	1,275	Lao Loum (94.4%)

Source: Study Report on Socio-Economic Survey of Eight Candidate Villages (JICA)

In three (3) villages, the population of village are composed of two (2) ethnic groups, Lao Loum and Lao Theung, while the rest mainly consist of one (1) ethnic group, which is either Lao Loum or Lao Sung.

3.1.2 Land

The areas of agricultural land and forest land, and the village total area of the eight candidate villages are as follows:

Areas of Agricultural and Forest Lands

Village	Total Village Area (ha)	Agricultural Land (ha)	Forest Land (ha)	Source
1. Pakseng	1,890	400	1,480	PAFO
2. Hat Houay, */	2,912	250	2,652	PAFO
a) Hat Houay	(1,779)	(119)	(1,650)	PAFO
b) Houay Ouang	(1,133)	(131)	(1,002)	PAFO
3. Samton	1,335	223	1,012	PAFO
4. Vangheung	494	138	356	PAFO
5. Pongdong	1,302	223	1,079	PAFO
6. Namtiao	n.a.	70	n.a.	DAFO
7. Namon	2,775	293	2,482	DAFO

8. Natak	6,372	266	6,061	DAFO

Source: Study Report on Socio-Economic Survey of Eight Candidate Villages (JICA)
Note: */ Houay Ouang village was merged with Hat Houay village in 2001.

3.1.3 Infrastructure

(1) Water supply

Among the 8 villages, six (6) villages other than Samton and Vangheung have a gravity-fed water supply system with several faucets, respectively. However, some of the systems can be used only during the rainy season due to the shortage of water. Therefore, the villagers usually fetch water from the rivers in the dry season. Samton village does not have such water supply system because the village is located on the top of a mountain range along National Road No.1 and the villagers use five (5) streams running near the residential area for water sources. In Vangheung village, a gravity-fed water supply system is now under construction.

(2) Accessibility

Distance and time to each village from Luang Prabang, and its road condition are summarized below.

Distance from Luang Prabang and Road Condition

Village	Distance (km)	Time	Road Condition
1. Pakseng	85	2:00	Gravel road, upgraded in 2002 by EU
2. Hat Houay	52	1:00	Gravel road, upgraded in 2002 by EU
3. Samton	202	4:00	National Road No.1 (paved), rehabilitated in 2004
4. Vangheung	190	3:40	National Road No.1 (paved), rehabilitated in 2004
5. Pongdong	63	1:20	No.4-A, paved and gravel, not in good
6. Namtiao	148	4:20	Gravel, bad condition
7. Namon	135	3:50	Gravel, bad condition
8. Natak	113	3:10	Gravel, bad condition

Source: Study Report on Socio-Economic Survey of Eight Candidate Villages (JICA)

Roads to three (3) villages in Xayaboury district are in poor condition, especially in rainy season, while those for Vangheung and Samton are in relatively good condition although they are far distant from Luangprabang.

(3) Electricity

Public electricity is available in Pongdong (installed in 2004) and Natak (installed in 2003) all the day. In Vanheung, it is only 19:00 to 21:00 (PM 7:00 – PM 9:00) that the public electricity supply is available. The other five (5) villages have no public electricity supply at present.

3.1.4 Livelihood

The sources for livelihood are almost similar among the candidate villages. Major products derived from the villages are as follows:

Major Products derived from the Villages

Category	Products
Crops:	rice, sesame, Job's tear, corn, cassava, banana, chili, etc.
Livestock	buffalo, cattle, pig, poultry and goat
NTFPs	paper mulberry, tree bark, tiger grass, bamboo shoot, mushroom, rattan shoot, resin, cardamom, worm in bamboo ("*Me Nomai*"), natural fruits, etc.

3.2 Participatory Village Survey

The participatory village survey was conducted by using the Participatory Rural Appraisal (PRA) tools to clarify i) the present use of lands and other resources, ii) major agricultural and forest products in the village, iii) processing and marketing activities, and iv) customs and rules on land and forest use.

3.2.1 Resource utilization and major products

A resource map was prepared by villagers at each village to clarify the present use of lands and other resources. Based on the resource map, a transect walk was conducted together with some village key informants to validate the present land and resource uses through field observation. The resource maps show types of land use in addition to major land marks, such as roads, rivers and streams, and houses in the villages. On the other hand, the transect gives cross-sectional view of the area and comparative information on different topographic conditions. The resource maps and the results of transect walks at each village are presented in Study Report on Socio-Economic Survey of Eight Candidate Villages.

As a result of the survey, it was found that villagers much depend on various resources available in the village for their livelihood. The survey results further reveals that there are few differences among the 8 candidate villages in major products derived from each land category such as forest, agricultural land, river, and river sides, as summarized in **Table 2**. Some findings are highlighted as follows:

- Four (4) villages of Hat Houay, Pongdong, Namon and Natak have lowland paddy fields.
- Four (4) villages of Pakseng, Samton, Vangheung and Namtiao have no lowland paddy fields at present and the people much depend on slash and burn cultivation as well as forest resources.
- Among the 8 villages, Namtiao village has a huge area (the total village area is officially not available at present) with rich natural resources.
- On the other hand, Vangheung has limited area (a total village area is 494 ha) compared with the other villages and its natural resources are rapidly being depleted in these days.
- Due to decreasing the amount of natural resources by over-exploitation, the people started shifting from collecting natural paper mulberry in the forests to planting them in the gardens as seen in Hat Houay and Natak.

3.2.2 Venn diagram and major products for marketing

Villagers discussed major products/resources for marketing and their importance, and they made a venn diagram of commodities. **Table 3** presents major products/resources for marketing in each village, and its summary is as follows:

Major Products/resources for Marketing

Category	Priority Products/Resources
A. Annual Crop	Rice (8), Sesame (5), Job's tear (5), Dry season vegetables (2), Wet season vegetables (1), Corn (wet season) (1)
B. Tree Crop	Orange (1)
C. NTFPs	Paper mulberry (6), Tiger grass (4), Tree bark (2), Sugar palm (2), Bamboo shoot (1), Rattan shoot (1)
D. Livestock	Pig (6), Poultry (5), Buffalo (3), Cattle (2), Fish (2), Goat (1)
E. Others	Weaving (1)

Note: The number in a parenthesis shows the number of the villages in which the crops rank as best 5.

The listed products/resources were claimed by the participants in one or more than two villages during the discussions. However, some products/resources were not claimed in either Venn diagram preparation or village profile survey. This does not always mean that such plants/crops/animals are not found in the village, but some of them actually exist in the village.

Rice is the most important crop for the villagers for consumption and also as a cash crop. Particularly, the villagers who own their lowland paddy fields can produce surplus rice and sell it to the local markets. Almost all the participants put high priorities on cash crops/NTFPs of "sesame", "Job's tear", "paper mulberry", "tree bark" and "tiger grass" because of their marketability. "Pig and poultry" were ranked as high priorities since such small animals were regarded as marketable commodities with a rather short raising period. Buffalo and cattle are also attractive for the villagers who can afford to raise them. Those large animals are usually sold in the time with a household need, a large amount of expenditures like constructing a house, wedding, buying a hand-tractor or motorcycle, etc.

3.2.3 Social status in the village and dependence on resources

During the social map preparation process, the study team asked participants to clarify themselves based on the well-being perceived in the village. It is very common in this region to classify the wealthiness into three levels like i) "high" or "over sufficient", ii) "medium" or "sufficient", and iii) "low" or "under sufficient". Since such classification was also commonly used in the candidate villages, they classified themselves into the following three levels.

"High" or "Over sufficient" level

In case of villages of Hat Houay, Pongdong, Namon and Natak, villagers grouped into this level have surplus of rice to sell, because of the possession of lowland paddy field. In the villages of Pakseng, Vangheung, Samton and Namtiao (where there is no lowland paddy field), the people of this level are those who can afford to buy rice by other sources of income. In general, they can earn income by selling cash crops (sesame and Job's tear, etc.), NTFPs (paper mulberry, tree bark, etc.) and livestock (pigs and poultry, etc.). Among others, large animals (buffalos and cattle) are very important for the people of this level. Some of them engage in trading of the village products.

"Medium" or "Sufficient" level

Majority of the people of this level grow upland rice under slash and burn cultivation. Most of them don't own lowland rice field or grow lowland rice in very limited area. They sometimes face rice shortage between July and September but food shortage is not so severe because they can harvest such substitutes for rice as bamboo shoots, corn, cassava and fishes in these periods. Some of them can also buy rice from incomes earned by selling other cash crops, NTFPs and livestock such as sesame, Job's tear, paper mulberry, tree bark, pigs and poultry. They normally cannot afford to buy large animals for raising.

"Low" or "Under sufficient" level

The people of this level often face rice shortage for 5 to 6 months. Major reasons for food shortage include:

- limited land for agricultural production;
- limited family labor;
- young married couple family;
- newly migrated family;
- too many children, etc.

Therefore, they collect as many resources as possible from forests such as bamboo shoots, mushrooms, paper mulberry, and tree bark, and grow cassava and corn as substitutes for rice. Further, they earn money by labor in weeding, felling trees in slash and burn farms, and sawing lumber in sawmills. They normally cannot afford the money for raising even small animals like pigs and poultry. It is true that the poor people more depend on selling labor and NTFPs for food security.

The numbers of household and the composition of each level in the 8 villages are summarized as follows:

Numbers of HH and the Composition of Each Level

Village	Total HHs	Well-being Level		
		Over Sufficient (High)	Sufficient (Medium)	Under Sufficient (Low)
1. Pakseng	129	10 HHs (8%)	44 HHs (34%)	75 HHs (58%)
2. Hat Houay	90	6 HHs (6.7%)	15 HHs (16.7%)	69 HHs (76.6%)
3. Samton	77	13 HHs (16.7%)	18 HHs (23.1%)	47 HHs (60.2%)
4. Vangheung	54	7 HHs (12.7%)	28 HHs (50.9%)	20 HHs (36.4%)
5. Pongdong	102	26 HHs (25.5%)	33 HHs (32.3%)	43 HHs (42.2%)

6. Namtiao	59	4 HHs (6.8%)	52 HHs (88.1%)	3 HHs (5.1%)
7. Namon	247	46 HHs (18.6%)	181 HHs (73.3%)	22 HHs (8.1%)
8. Natak	227	51 HHs (22.55)	129 HHs (56.8%)	47 HHs (20.7%)

Source: Study Report on Socio-Economic Survey of Eight Candidate Villages (JICA)

3.2.4 Present rules on the management/use of lands and resources

"Land zoning" program had been undertaken in each village by PAFO and DAFO between 1993 and 1997. The staff of PAFO and DAFO together with villagers categorized forests into different forest types such as conservation forest, production forest and protection forest, and their use and management. Some parts of the production forest (*"Pa Phalith"*) were also designated as agricultural production area (*"Din Phalith"*), which can be used for slash and burn cultivation. Normally, a household could get three (3) plots of agricultural production area and was instructed to cultivate those areas under 3-year rotation system.

In terms of management of the lands and resources, the villagers gave through the survey the study team how the management style has changed.

Comparison of Management Style of the Past and Present

Past management style	Present management style
- There were dense forests with big trees. - They were free to select any places for slash and burn cultivation. They used to select big trees to cut in lower percent of slope. - They were free to practice any size of slash and burn cultivation. - Average size was about 0.5 ha for small households and 1.0 ha for large families. - They could get a good production even from planting in small area. - With 50 kg of rice seeds for 1.0 ha, normal yield was 1.5 ton of paddy. - Fallow period was at least 7 years.	- There are no more big and good trees found at present. - All the farming lands were allocated to households with an average size of about 1.0 ha if two labors are available in the household. - Comparing with 10 years ago, weeding work is much harder. On average, 3 to 4 times per season is necessary. - Normal yield at present is about 0.7 to 0.8 ton of paddy per 50 kg of rice seeds for 1.0 ha. - Fallow period is 3 years.

In addition, the following basic rules related to major two forest categories of i) Community Production Forest *"Pa Somsai"* and ii) Conservation Forest *"Pa SaNgouan"* or Watershed Protection Forest *"Pa Ponkanh Len Nam"* were observed through the discussion.

Community Production Forest *"Pa Somsai"*:

- This forest is used for collecting lumber for house construction, materials, fuel woods, NTFPs such as resin, herbal medical root, bamboo shoot, mushroom, tiger grass, cardamom, rattan shoot, tree bark, and paper mulberry, etc.
- Felling of a big tee for house construction has to be authorized by the village authority.
- Large-scaled logging is not allowed unless it is licensed by DAFO through the village authority.

Conservation Forest *"Pa Sa Ngouan"* or Watershed Protection Forest *"Pa Pongkanh Len Nam"*

- These forest are located on the slopes of rivers between two hills.
- No logging, no felling of any trees, no forms of any agriculture, and no livestock raising should be taken place in these areas.
- The village is responsible for preventing these areas from a forest fire.

3.3 Household Interview Survey

Household Interview Survey was conducted to quantitatively clarify the socio-economic condition of households in the candidate villages so as to provide some insights of the villages for livelihood development and establish a set of baseline data to measure the effects of long-term assistance being provided by FORCOM.

The households were sampled at random but to maintain 90 % probability with 10 % confidence. The numbers of sampled households at each village are shown below.

Numbers of Sampled HHs for Household Interview Survey

Village	Total HHs	Sampled HH.
1. Pakseng	129	45
2. Hat Houay	90	39
3. Samton	77	35
4. Vangheung	54	30
5. Pongdong	102	41
6. Namtiao	59	32
7. Namon	247	54
8. Natak	227	52

Source: Study Report on Socio-Economic Survey of Eight Candidate Villages (JICA)

3.3.1 General Information

(1) Number of household member and household age structure

The average numbers of household vary from 5.2 persons in Pongdong to 8.2 persons in Namtiao with an average of 6.4 persons per HH. The percentages of available labour force, whose ages are between 12 and 45 years old, vary from 41.2% in Namtiao to 65.4% in Pongdong. Namtiao seems to have a small percentage of available labour force comparing with those of the other villages. This is because of a high percentage (51.2%) of young people's population (less than 12 years old) in Namtiao.

(2) Education background

The average percentages of "primary school graduated level" including i) drop out of primary school, ii) primary school graduated/attending, and iii) drop out of secondary vary from 41% in Namtiao to 68% in Namon with an average of 56%. The average percentages of "more than secondary graduated level" vary from 5% in Namon to 21% in Pongdong with an average of 14%.

(3) Education background

The average percentages of "primary school graduated level" including i) drop out of

primary school, ii) primary school graduated/attending, and iii) drop out of secondary vary from 41% in Namtiao to 68% in Namon with an average of 56%. The average percentages of "more than secondary graduated level" vary from 5% in Namon to 21% in Pongdong with an average of 14%.

(4) Engaging in farming

The percentages of the people who are engaging in farming vary from 45% in Vangheung to 64% in Namon with an average of 54%.

(5) Occupation

In terms of occupation, almost household members are which ever "farmer" or "student/below school age/no job including housework". Very limited people are "wage worker", "salary worker" or "private business person". The percentages of "farmer" vary from 35% in Vangheung to 53% in Pongdong with an average of 43%.

As for the percentages of the group of "student/below school age/no job including house worker" vary from 44% in Pongdong to 58% in Namtiao with an average of 50%.

(6) Member of organization

Seventy-six percent (76%) to 94% of household members do not belong to any organizations and 5% of household members in Namtiao to 17% in Samton are the members of whichever Women's Union, Youth Organization or Elders Group.

3.3.2 Living Condition

(1) Drinking water

All the villages except for Samton have gravity piped water supply systems on which most of the villagers rely for drinking water. However, due to limited water source availability or distances to the community taps, etc. those who can enjoy sufficient water vary from 50% in Natak to 100% in Pongdong. Since the water supply system in Vangheung is under construction, only 17% of the villagers can use the system at present. Other people including Samton use streams, rivers or dug wells for drinking water.

(2) Fuel for cooking

All the villages mainly use fuel wood for cooking and generally do not have difficulty for collecting such fuel wood. However, about 30% of the villagers of Pakseng, Samton and Vangheung have difficulty for collecting such fuel wood. About 30% of the villagers of Samton, Namon and Natak use Kerosene as a supplementary measure for cooking.

(3) Rice availability and annual paddy production

Rice availability varies among the 8 villages. Samton has the most households who face rice shortage. About 50% of villagers in Samton reply that they have rice shortage for 5.6 months. On the other hand no villagers in Natak have rice shortage and only 2% of the villagers in Namon have rice shortage for 1.0 month.

(4) Availability of major food other than rice

As for the availability of other cereals, root and tube crops, and vegetables, there are no serious shortage problems. As for meat availability, 29% of Pakseng villagers and 18% of Hat Houay villagers reply that they have meat shortage for about 3.0 months. On the other hand the villagers of Namtiao, Namon and Natak do not claim any meat shortage.

As for fish availability, 20% of Pakseng villagers reply that they have fish shortage for about 2.4 months and 10% of Hat Houay villagers for about 1.5 months. On the other hand the villagers of Vangheung, Namtiao, Namon and Natak do not claim any fish shortage.

(5) Availability of facilities

Averages of availability of major facilities in the 8 villages are 52% for radio, 46% for toilet, 42% for bicycle, 23% for VCD, 17% for motorcycle, 15% for sewing machine, 7% for TV in order of high percentage of availability. Samton has the smallest availability of facilities such as 34% for radio, 0% for toilet, 20% for bicycle, 3% for VCD, 3% for motorcycle, 0% for sewing machine, and 3% for TV. On the other hand, Natak has the highest availability of facilities such as 60% for radio, 85% for toilet, 65% for bicycle, 19% for VCD, 21% for motorcycle, 19% for sewing machine, and 17% for TV.

(6) Major diseases

Major diseases for both children and adults are i) cold, ii) dysentery, and iii) malaria in order of importance and high frequency.

(7) Treatment for diseases

For slight diseases, the people generally try to get over a disease by taking medicine and secondary go to see the village health workers. On the other hand, for severe diseases, the people normally go to the provincial hospital and secondary go to the district hospital or to the village health worker depend on the distance/ or availability of those facilities.

3.3.3 Agriculture and Forestry Production

(1) Farmland owned per HH

Average areas of each farmland category owned per HH are 1.18 ha for “Hai-A”, 0.6 ha for “Hai-B”, 0.26 ha for lowland paddy field, and 0.11 ha for orchard/tree plantation respectively with an average area of 2.14 ha per HH. Among these, Namon has the smallest total farmland of 1.39 ha per HH in total, including the largest lowland paddy field of 0.66 ha per HH.

(2) Time required to “Hai” areas

Average walking hours required to “Hai” area vary from 45 minutes in Pongdong and Namtiao to 90 minutes in Pakseng, Hat Houay, Samton and Vangheung, with an average of 75 minutes.

(3) Repeated use of "Hai" area

Almost "Hai-A and Hai-B" areas will be used repeatedly within 1 to 3 or 4 years for slash and burn cultivation except for the Hai-A areas of Hat Houay and Pongdong. The people of Hat Houay and Pongdong reply that about 30% of Hai-A areas will be left as fallow lands even after 4 years.

(4) Used area of "Hai-A and B"

The used areas of "Hai-A and B per HH per year vary from 0.43 ha in Namon to 1.31 ha in Hat Houay with an average of 0.90 ha. The smallest used areas of 0.43 ha in Namon and 0.68 ha in Natak seem to be reasonable due to some available areas of lowland paddy field. However, the largest used area of 1.31 ha in Hat Houay seems to be a little bit too large comparing with 0.33 ha of available lowland paddy field per HH.

(5) Major crops in "Hai"

Major crops in "Hai" are i) upland rice, ii) Job's tear, and iii) sesame in order of production quantity. The average production of upland rice per HH in the 8 villages varies from 682 kg/HH in Hat Houay to 2,459 kg/HH in Namon. The average production of Job's tear in the 6 villages (Job's tear is not a major crop in Vangheung and Natak.) varies from 35 kg/HH in Samton to 922 kg/HH in Pongdong. The average production of sesame in the 6 villages (Sesame is not a major crop in Pakseng and Pongdong.) varies from 2 kg/HH in Namon to 258 kg/HH in Hat Houay.

(6) Major crops in lowland area

Major crops in lowland paddy field are mainly rice. There are four villages, Hat Houay, Pongdong, Namon and Natak, that have lowland paddy fields. In addition, there are very small paddy fields in Namtiao, the villagers of which are now developing such lowland paddy fields. Average production of lowland rice varies from 922 kg/HH in Hat Houay to 1,805 kg/HH in Namon.

(7) Annual paddy production and consumption

In terms of average balance of annual paddy production and consumption per HH, four villages of Pakseng, Hat Houay, Samton and Vangheung have shortage of rice and the other 4 villages of Pongdong, Namtiao, Namon and Natak have surplus of rice. The average balances in each village vary from shortage of 1,061 kg/HH in Vangheung to surplus of 1,073 kg/HH in Namon.

(8) Bearing fruit crop/ fruit tree/ industrial tree

Major bearing fruit crops, fruit trees, and industrial trees are i) pineapple, ii) banana, iii) mango, iv) paper mulberry, and v) teak in order of popularity. The average numbers of those corps/trees are 65 plants/HH of pineapple, 15 plants/HH of banana, 4 trees/HH of mango, 19 trees/HH of teak, and 48 trees/HH of paper mulberry.

In terms of crop or kind of trees by village, there are some findings. As for pineapple, Hat Houay and Pondong produce a lot of pine apple comparing with other villages, such as 133 plants/HH in Hat Houay and 292 plants/HH in Pongdong. As for paper mulberry, the villages of Samton, Vangheung, Namon and Natak plant a lot of paper mulberry trees like 72 trees/HH in Samton, 73 trees/HH in Vangheung, 128 trees/HH

in Namon and 115 trees/HH in Natak. As for teak plantation, Vangheung and Natak plant a lot of teak trees comparing with other villages, such as 68 trees/HH in Vangheung and 74 trees/HH in Natak.

In addition, orange tree plantation (17 trees/HH) in Pongdong and eagle wood plantation (18 trees/HH) in Namon are remarkable activities comparing with the other villages.

(9) Major NTFPs

Major NTFPs are i) paper mulberry, ii) tree bark, iii) tiger grass, and iv) bamboo shoot in order of production quantity.

The average production of paper mulberry per HH in the 8 villages varies from 15 kg/HH in Vangheung to 187 kg/HH in Samton.

The average production of tree bark in the 6 villages (Tree bark is not a major NTFP in Namtiao and Natak.) varies from 2 kg/HH in Vangheung to 177 kg/HH in Hat Houay.

The average production of tiger grass in the 7 villages (Tiger grass is not a major NTFP in Namon.) varies from 7 kg/HH in Natak to 147 kg/HH in Hat Houay.

The average production of bamboo shoot in the 6 villages (Bamboo shoot is not a major NTFPs in Samton and Namtiao.) varies 4 kg/HH in Hat Houay to 117 kg/HH in Natak.

In addition, palm fruit production of 365 kg/HH in Namtiao and 600 kg/HH in Namon, and eagle wood production (32 kg/HH) in Hat Houay are remarkable activities comparing with the other villages.

(10) Major livestock raised

Average numbers of major livestock raised per HH are 0.7 head/HH of cattle, 1.3 head/HH of buffalo, 1.2 head/HH of goat, 3.3 heads/HH of pig, 25.5 heads/HH of chicken, 5.4 heads/HH of duck.

Comparing with those average numbers, the following numbers show remarkable activities for livestock raising like 3.4 heads/HH of cattle in Namtiao, 2.7 heads/HH of buffalo in both Namon and Natak, 6.4 heads/HH of goat in Samton, 5.9 heads/HH of pig in Samton, 34.4 heads of chicken in Namon, 36.7 heads/HH of chicken in Natak, 9.3 heads/HH of duck in Pongdong, and 9.0 heads/HH of duck in Natak.

(11) Major livestock/fish sold

Average numbers/quantities of major livestock/fish sold per HH per year are 0.1 head/HH of cattle, 0.3 head/HH of buffalo, 0.2 head/HH of goat, 0.6 head/HH of pig, 7.7 heads/HH of chicken, 3.5 heads/HH of duck, and 10.1 kg/HH of fish.

Comparing with those average numbers, the following numbers show remarkable activities for livestock/fish selling like 0.7 head/HH of cattle in Namtiao, 1.4 heads/HH of goat in Samton, 26.9 heads/HH of chicken in Natak, 8.6 heads/HH of

duck in Natak, 8.0 heads/HH of duck in Vangheung, and 41 kg/HH of fish in Hat Houay.

3.3.4 Estimated Marketed Volumes of Major Products by Village

Based on the results of the household interview survey, the total marketed volumes of major products from the village were estimated as summarized in the following table.

Estimated Marketed Volumes of Major Products by Village

Major Products sold outside the village (estimated)	(unit)	8 Villages							
		Pak-seng	Hat Houay	Sam-ton	Vang-heung	Pong-dong	Nam-tiao	Na-mon	Na-tak
1) Rice	kg	5,557	6,612	673	-	30,863	11,394	69,956	38,459
2) Job's tear	kg	9,021	15,801	2,191	-	93,522	20,722	9,107	-
3) Sesame	kg	-	23,185	1,740	445	-	2,194	521	6,989
4) Paper mulberry	kg	4,552	7,163	14,430	835	3,670	1,859	20,803	13,611
5) Tree bark	kg	3,535	15,976	7,946	90	873	-	6,138	-
6) Tiger grass	kg	1,563	13,237	1,756	495	896	867	-	1,602
7) Bamboo shoot	kg	1,118	-	-	-	9,088	-	8,489	26,607
8) Palm fruit	kg	-	-	-	-	-	21,507	148,314	-
9) Eagle wood	kg	-	346	227	-	-	203	-	-
10) Mushroom	kg	244	-	-	-	1,488	-	-	2,218
11) Wild vegetables,*/	kg	-	-	-	-	-	675	8,416	2,899
12) Cattle	head	-	2	18	-	-	42	41	9
13) Buffalo	head	17	21	33	-	35	13	142	105
14) Goat	head	4	14	75	15	-	-	-	13
15) Pig	head	33	65	42	23	68	22	224	314
16) Chicken	head	424	796	207	138	183	4	1,418	6,116
17) Duck	head	229	335	9	77	131	-	316	1,951
18) Fish, **/	kg	(1,992)	(3,674)	(9)	(626)	-	24	(439)	(2,576)

Source: JICA Study team

Note: */ Including rattan shoots.

**/ Figures in a parenthesis are products sold within/near the village including district markets.

3.3.5 Income and Expenditure

(1) Source of major income

The interviewees were asked to enumerate major income sources no more than 5, and their annual amounts. Major income sources enumerated by the interviewees were i) livestock, ii) private business, iii) NTFPs, iv) field crops, v) salary, vi) temporary job, vii) remittance, viii) fruit tree, ix) rice, and x) handicraft, in order of average amount of income per HH/year among the 8 villages. However, as shown in the following table, the amounts from each income source vary in each village depending on the village situation. For example, in Pongdong, "field corps" is also one of the major income sources in addition to "livestock" and "private business". On the other hand, in Pakseng, "private business" and "salary" are major income sources in Pakseng and "livestock" is the 3rd major income source. Further, NTFPs are also one of the major income sources in Hat Houay, Namtiao and Namon.

Major Income Sources (Unit: '000 Kip/year/HH)

Major Income	8 Villages								Aver-age
	Pak-seng	Hat Houay	Sam-ton	Vang-heung	Pong-dong	Nam-tiao	Na-mon	Na-tak	
1) Livestock	511	1,427	2,216	1,105	1,872	2,276	2,759	3,230	1,925
2) Private business	2,500	2,489	223	589	1,076	340	616	1,164	1,125
3) NTFPs	265	1,224	812	-	-	1,021	1,218	441	623
4) Field crops	250	490	197	-	1,421	957	379	-	462
5) Salary	1,055	-	182	829	-	-	-	926	374
6) Temporary job	-	-	-	843	-	-	-	394	155
7) Remittance	-	456	-	-	-	704	-	-	145
8) Fruit tree	-	367	-	-	704	-	-	-	134
9) Rice	-	-	-	-	443	-	168	-	76
10) Handicraft	-	-	-	258	-	-	-	-	32

(2) Major cash income

Average annual amounts of major cash income per household among the 8 villages vary from 4,347,000 Kip/year/HH in Vangheung to 7,035,000 Kip/year/HH in Natak with an average of 4,959,000 Kip/year/HH, as shown below.

Major Cash Income per HH (Unit: '000 Kip/year/HH)

Major Income	8 Villages							
	Pak-seng	Hat Houay	Sam-ton	Vang-heung	Pong-dong	Nam-tiao	Na-mon	Na-tak
1) Max.	60,000	34,820	53,800	13,480	28,000	36,900	45,100	26,500
2) Min.	550	208	490	395	500	46,000	935	650
3) Average in the village	5,271	5,132	5,137	4,347	6,898	5,925	6,083	7,035

(3) Items of major expenditure

The interviewees were asked to enumerate items of major expenditure no more than 5, and their annual amounts. Items of major expenditure enumerated by the interviewees were i) food, ii) health, iii) clothes, iv) education, v) social activities, vi) transportation, vii) tax, and viii) fuel/electricity, in order of average amount of expenditure per HH/year among the 8 villages. However, as shown in the following table, the amounts for each expenditure item vary in each village depending on the village situation. For example, in the villages of Namtiao and Namon, which have rather rich natural resources for food production, the expenditure for "health" is higher than that for "food". On the other hand, Vangheung villagers use a big amount of money for food compared with other 7 villages. It suggests that Vangheung people can produce less food using their resources than other 7 villages.

Items of Major Expenditure (Unit: '000 Kip/year/HH)

Major Expenditure	8 Villages								Aver-age
	Pak-seng	Hat Houay	Sam-ton	Vang-heung	Pong-dong	Nam-tiao	Na-mon	Na-tak	
1) Food	1,549	1,257	1,333	2,681	982	423	625	777	1,203
2) Health	505	1,044	569	929	377	706	1,072	503	713
3) Clothes	434	570	377	229	426	472	510	390	426

4) Education	158	352	326	212	234	492	221	381	297
5) Social activities	187	97	230	108	212	-	-	-	104
6) Transportation	-	-	-	-	-	109	-	-	14
7) Tax	-	-	-	-	-	-	80	-	10
8) Fuel/electricity	-	-	-	-	-	-	-	88	11

(4) Major expenditure

Average annual amounts of major expenditure per household among the 8 villages vary from 2,256,000 Kip/year/HH in Natak to 4,320,000 Kip/year/HH in Vangheung with an average of 2,958,000 Kip/year/HH, as shown below.

Major Expenditure per HH (Unit: '000 Kip/year/HH)

Major Expenditure	8 Villages							
	Pak-seng	Hat Houay	Sam-ton	Vang-heung	Pong-dong	Nam-tiao	Na-mon	Na-tak
1) Max.	8,884	14,640	14,400	14,504	23,980	9,700	14,520	10,750
2) Min.	245	270	408	298	573	255	280	200
3) Average in the village	2,888	3,432	2,993	4,320	2,802	2,361	2,609	2,256

(5) Major investment of productive and fixed assets

The interviewees were asked to enumerate major investments of productive and fixed assets in the last year no more than 3, and their annual amounts. Major investments enumerated by the interviewees were i) housing, ii) private business, iii) livestock, iv) transportation means, v) household appliance, and vi) farm machine, in order of average amount of investment per year/HH. Average investment amount among the 8 villages is 1,095,000 Kip/HH and the maximum investment amount of 2,153,000 Kip/HH in Pongdong and the minimum investment amount of 381,000 Kip/HH in Hat Houay as shown below.

Major Investment in the Last Year (Unit: '000 Kip/year/HH)

Major Investment	8 Villages								Aver-age
	Pak-seng	Hat Houay	Sam-ton	Vang-heung	Pong-dong	Nam-tiao	Na-mon	Na-tak	
1) Housing	550	-	-	-	847	-	1,073	818	411
2) Private business	442	1,000	257	223	951	144	528	-	331
3) Livestock	136	183	225	250	355	164	300	200	227
4) Transportation means	-	-				469	-	-	59
5) Household appliance	-	-	118	84	-	-	-	241	55
6) Farm machine	-	98	-	-	-	-	-	-	12
Total	1,128	381	600	557	2,153	777	1,901	1,259	1,095

3.3.6 Utilization of Credit/ Loan

The interviewees, if needed, borrow some money normally from a bank or their relatives. Sometimes they borrow from their friends, neighbours or other systems such as a mutual aid group, trader's credit, a project fund, etc. Major purposes of borrowing money are for i) buying livestock, ii) private business, and iii) medical treatment.

Status of Credit/Loan

Lender / Village	Bank		Relatives		Neighbours/friends		Others, */	
	No.of borro-wers	Average borrowing amount ('000Kip)	No.of borro-wers	Average borrowing amount ('000Kip)	No.of borro-wers	Average borrowing amount ('000Kip)	No.of borro-wers	Average borrowing amount ('000Kip)
1. Pakseng	8	1,725	2	265	-	-	-	-
2. Hat Houay	4	1,125	-	-	1	200	6	380
3. Samton	-	-	8	195	1	50	-	-
4. Vangheung	12	1,275	8	1,273	-	-	1	500
5. Pongdong	1	16,000	9	1,224	1	200	-	-
6. Namtiao	-	-	7	671	-	-	1	1,000
7. Namon	-	-	5	628	-	-	1	732
8. Natak	1	200	3	500	-	-	6	666

Note: */mutual aid groups, trader's credit, project funds, etc.

3.3.7 Extension

Times of visit by the extension staff are one of the indicators for the DAFO staff extension activities. According to the interviewees of the 8 villages, 37 % (of Namtiao) to 77% (of Samton) of the villagers have never received any training or technical advice from DAFO extension staff. The others have received training or technical advice one to four times before.

3.3.8 Participation/ Engagement of Household Members

(1) Home activities

Normally, females are responsible for almost home activities such as fetching drinking water, cooking, washing, sweeping the house, child/elderly care, except for house repair and kitchen gardening, for which males are normally responsible. Namtiao seems to be an exception. Both of male and female are responsible for "child and elderly care".

(2) Farming activities (lowland rice cultivation)

This questionnaires were made concerning lowland rice cultivation. Thus, only the villagers of Hat Houay, Pongdong, Namon and Natak answered the questions. In Hat Houay and Pongdong, males are responsible for almost farming activities. However, transplanting and harvesting are mainly done by females. On the other hand, in Namon and Natak, both male and female are responsible for transplanting, weeding and harvesting.

(3) Slash and burn cultivation activities

Except for Namtiao, males are responsible for almost slash and bur cultivation activities such as slashing, burning, clearing and fencing. On the other hand, in Namtiao, if anything, females (sometimes both of male and female) are responsible for such slash and burn cultivation activities.

(4) Livestock and poultry raising activities

Mostly females are responsible for livestock and poultry raising activities. However, Namtiao is an exception. Both of males and females, if anything, males are

responsible for such animal raising activities.

(5) Fishing activities

Mostly males are responsible for fishing activities. However, Namtiao is an exception. Females are responsible for catching fish in the river.

(6) Forestry activities

For collecting fuel wood, in the 4 villages of Pakseng, Hat Houay, Namtiao and Natak, both of males and females are responsible. However, in the other 4 villages of Samton, Vangheung, Pongdong and Namon, females are mainly responsible for collecting fuel wood.

For collecting NTFPs, in all the villages except for Namtiao, females are mainly responsible. In Namtiao, both of males and females are responsible for collecting NTFPs.

(7) Post-harvest and marketing activities

Post-harvest and marketing activities are mainly responsible by females or both of males and females. However, in the 4 villages of Hat Houay, Pongdong, Namon and Natak, which have lowland paddy fields, threshing activities are responsible by males.

(8) Domestic business activities

Rice mill operation seems to be responsible by males. Trading and shop keeping are handled by both of males and females. However, handicraft business is handled by females.

(9) Communication activities

According to the interviewees, males are responsible for attending village meetings and resolving in-village conflicts, except for Namtiao, where females are responsible for such communication activities. On the other hand, for the political discussion with others, both of males and females are responsible in all the 8 villages including Namtiao.

(10) Religious/ cultural activities

Normally both of males and females are responsible for religious/ cultural activities, except for Namtiao, where females are responsible for such activities.

3.3.9 Activities Wanted to Make Easy

The interviewees were asked to choose up to 5 activities which they want to make easy. There are differences between male and female about works which they want to make easy. Males chose i) slashing, ii) harvest, iii) weeding, iv) plowing, and v) fencing. On the other hand, females chose i) collecting fuel wood, ii) weeding, iii) harvest, iv) child/elderly care, and v) fetching water.

CHAPTER 4 MARKETING SURVEY

4.1 General View of the Marketing System

The survey identified about 183 agriculture and forestry based commodities that are marketed at provincial level. Although many of farm products are consumed by villagers with limited selling in the market, about 43 items are exported to the neighboring countries. Commodities are divided into 5 major groups such as; crops, livestock, timber and wood products, NTFPs, and handicrafts. Because of the low population density, low production, low accessibility, and the lack of rural infrastructure, agriculture marketing in the 6 northern provinces are generally on a small scale and very segmented. Trade flow of agricultural and forestry commodities is clearly divided between the domestic market and the export one.

4.2 Present Marketing Condition

The market flow of agricultural and forestry based commodities varies depending on the types of commodities and is typically related to the accessibility in the area and season of the products.

4.2.1 Distribution Channels per Group of Commodity

(1) Paddy / Rice

Many collectors who are collecting paddy for public services, town rice mills and import-export companies visit villages and collect paddy at designated assembly points and transport it to rice mills in town. Paddy is milled at rice mills and distributed to public services or retailers in the fresh market. In the area next to urban town, villagers themselves mill their paddy in the village or at district rice mills, and then transport the rice in small quantity to urban markets. Marketing of paddy / rice is strictly regulated by the province through price control.

(2) Cash Crops

Collectors from import-export companies collect crops at designated assembly points and then transport them to factory/company storage or to border points. In case of peas and soy beans, the products are bought without grading at first assembly point and transported to company/factory storage facilities for grading or processing before export.

(3) Vegetables and fruit crops

The distribution channel of vegetables for the local market is seasonal, disorganized and chaotic. There are many small traders and the fresh markets are crowded with many sellers with small quantity of vegetables.

(4) Buffalo and Cattle

Buffalo and cattle are being sold to Thailand at present in addition to sales in the domestic markets. Registered district and provincial middlemen who visit individual farmers to buy the animals and assemble then until they get one or two truck load. The animals are transported by truck and/or by boat next to the border trade port.

In the domestic market flow, the middlemen play a vital role, since it is usually middlemen who buy the animals and transport them to slaughter houses. Slaughtered animals and meat are sold at abattoir gate and then sent to retailers in the market.

(5) Small animal and poultry

Likewise, middlemen who are representatives of animal slaughtering groups buy small animals at farmgate and transport them to the slaughter house. Meat is sold at abattoir gate and send to retailers in the market. In some area, pigs are slaughtered at household and sold in the village or sent to retailers in town. Most of poultry are slaughtered at household and sold in the village or in the district market.

(6) Teak Wood

Registered teak wood collectors buy standing teak trees at farms. After selection of teak trees, they are cut, trimmed into log and transported to sawmill, or wood furniture shops for processing. The sawn wood is sold at sawmill gate or sent to wood shops for further processing into furniture.

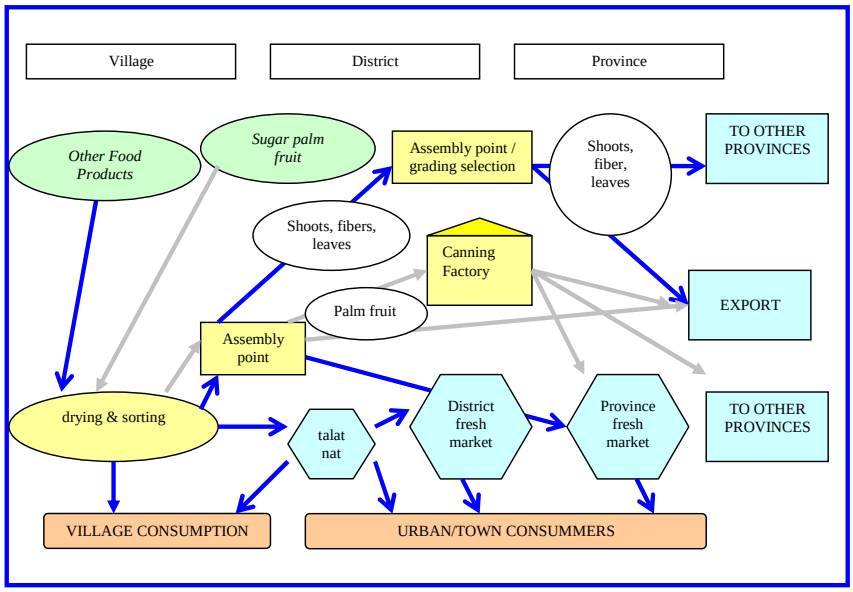
(7) Fuel wood and fence pole

The marketing of fuel wood is simple. The farmers collect the wood from shifting cultivation farms, and transport them to the road side. Fuel wood is sold per transportation load for large wood and by bundle for branches. Fuel wood per bundle is bought by individual middlemen and transported by pick-up or truck load to be sold in town and in the market for household consumption. Factories using fuel wood for boiling visit villages to buy the large wood per truck load and transport them to the factories. Straight branches and trunks are hand-sawn and sold as fence poles.

(8) NTFPs

The distribution channel of NTFPs to the local market is disorganized and chaotic. There are many small traders and fresh markets are full with many sellers with small quantity of the same products. The distribution channel of exportable NTFPs is more organized. Collectors from import-export companies collect and assemble NTFPs at designated assembly points (village, district, road site, river port site). They are transported by truck or barge/boat to the processing factories for processing and then exported or sold in the local market. In case of paper mulberry, raw mulberry fibers

and mulberry pulp is exported and part of mulberry paper is delivered to souvenir shops in town and/or further processed into handicrafts before sending to retail shops.



Distribution Channels for NTFPs

(9) Handicrafts

Handicraft products made of NTFPs, which are mainly household utensils (brooms) and furniture, are produced in small quantities and only in location nearby the main roads and/or district and provincial towns. The distribution channel of fiber / wood based handicraft consists of individual household harvesters and handicraft producers. In some area villagers form handicraft groups that sell their commodities at household gates or transport them to the local market in small quantity. Individual middlemen visit the handicraft producers to collect sizeable quantity of products and transport them to market.

Weaving handicrafts are traditional cotton and silk-based products which are produced individually or in weaving groups. The marketing of weaving handicraft consists of individuals and women's production groups. Weaving cooperatives or handicraft shops make a contract with individuals or production groups and provide them raw materials and the design of products especially for export products.

4.2.2 Marketing of Commodities at Village and District Levels

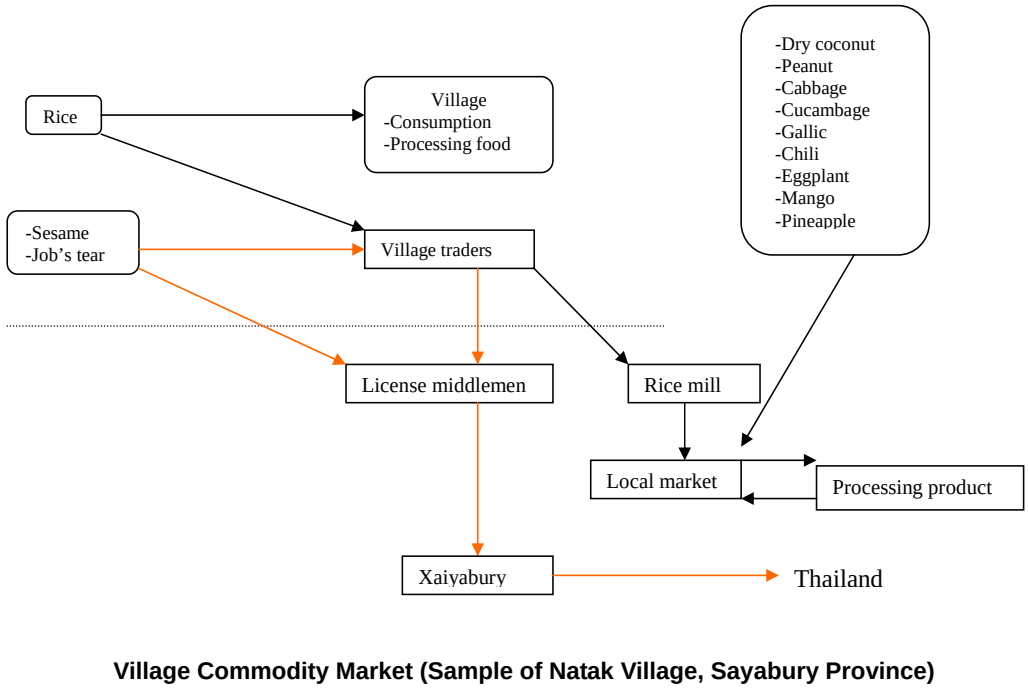
(1) Village and Community Market

As explained in the previous sub-section, the marketing system for agricultural products is not developed. In addition, most of villagers exchange food and commodities under the barter system and money is not really utilized.

To encourage villagers to exchange and sell farm & forest products, district authority in some area, e.g., Pakseng District, organizes rotational markets, which involve many villages. One of the reasons for the introduction of the rotational market system or "talat nat" is because of the poor accessibility during raining season. The

talat nat of Pakseng involves 8 villages, which have to host the market by event turns at a cycle of 10 days. This is a typical market arrangement for the northern part of Laos. During the market day villagers from other villages bring their commodities for selling.

Many district collectors visit the community markets to buy NTFPs and cash crops. In marketing of the products at village level, many villagers function as harvesters/collectors, processors, and sellers. The people would transport commodities in small quantities to nearby markets (talat nat, district / province). For exportable products, village collectors or licensed middlemen play a role of collector. An example of in- and out-flows of products is described in the following diagram.



Village Commodity Market (Sample of Natak Village, Sayabury Province)

(2) District Market

Following decentralization policies of the Government, businesses in trading agriculture and forestry products is bound to register themselves at the district authority. The control and regulation of rice and meat has been transferred from the province to the district authority. District located in the urban area of the provincial town benefit more from the expansion of the market for food and commodities. Remote district such as Viengkham and Pakseng in Luangprabang are struggling hard to develop the market with poor market infrastructure facilities, low population density, and under-developed market institution and organization. The survey also revealed that all of the 4 districts had its market particularities depending on the production and resources available as well as the infrastructure, and cultural/social condition.

4.2.3 Export and Border Trade

The box below defines the commodities exported by each province.

Export by each provinces

Bokeo:
Export to China (medical NTFPs, essence NTFPs, maize, teak wood).
Export to Thailand (cattle, buffalo, maize, wood, cardamom, vegetable, peanuts, beans, peas, job tears, mulberry, sugar palm fruits, tobacco, sesame, ginger, orange).
Luangnamtha:
Export to China (bamboo shoots and worms, medical NTFPs, essence NTFPs, resin, cardamom, sugar cane, maize, vegetable, melon, water melon, wood, rubber).
Export to Thailand (cattle, buffalo, maize, wood, may ketsana, cardamom)
Luangprabang:
Export to Thailand (rice, vegetable, sesame, job tears, mulberry, beans, cardamom, benzoin, resin, jute, sugar palm fruit, handicrafts)
Sayabury:
Export to Thailand (rice, vegetable, sesame, job tears, mulberry, beans, cardamom, benzoin, resin, jute, cotton, sugar palm fruit, tamarind, wood, handicrafts)
Huaphanh:
Export to Vietnam (beans, maize, peanut, ginger, mango, white benzoin, cardamom, bark, palm oil, handicrafts)
Vientiane Province:
Export to Thailand (rice, vegetable, sesame, job tears, mulberry, beans, cardamom, benzoin, resin, jute, sugar palm fruit, wood)

The trade flow for exportable commodities, such as crops, NTFPs, livestock, and for wood and handicraft products is structured and organized with many village and district registered collectors, and provincial whole sellers (in the form of import-export companies). Many collectors at village level are villagers who bring fresh products to assembly points designated by buyers. The registered collectors would handle and transport the products by truck or by boat to factories, or whole seller's (import-export company) storage facilities in the provinces, or directly to the border point in case of perishable products such as sugar cane and sugar palm fruits. Some products such as peas and soybean are graded before exported. Processed products in factories such as pulp from paper mulberry, May Ketsana' essence are directly transported to border points from factories.

The marketing channel is short for perishable products such as sugar palm fruit, sugar cane, melon, water melon, cabbages and etc. The handling of those products is arranged in a way that shipments are channeled across the border within less than one day. The marketing channel for non-perishable products is longer and may contain many exchange point from the village to the province and to the border point.

There are presently 3 level of border exchange points; (i) Official International Border Port such as Boten in Luangnamtha and Huaisay in Bokeo; (ii) Provincial Border Trade Port (each province has one or two points); and (iii) District Border Trade Port (each district has one).

4.2.4 Prices

There are price disparities between provinces, districts and villages, respectively. Such imbalance is related to the low production, the accessibility of the area related to poor access roads and high transportation costs and the government regulations.

(1) Food commodities (Rice and Meat)

Price of food commodities is regulated by the provincial government especially for rice and meat. However, price disparities are recorded in the surveyed area. For example, price of glutinous rice in the 5 villages surveyed in Luangprabang is fixed to 1,200 Kip/Kg, at district level to 1,500 Kip/Kg. However, the price recorded at the free market at the provincial capital ranges from 2,700 to 3,000 Kips.

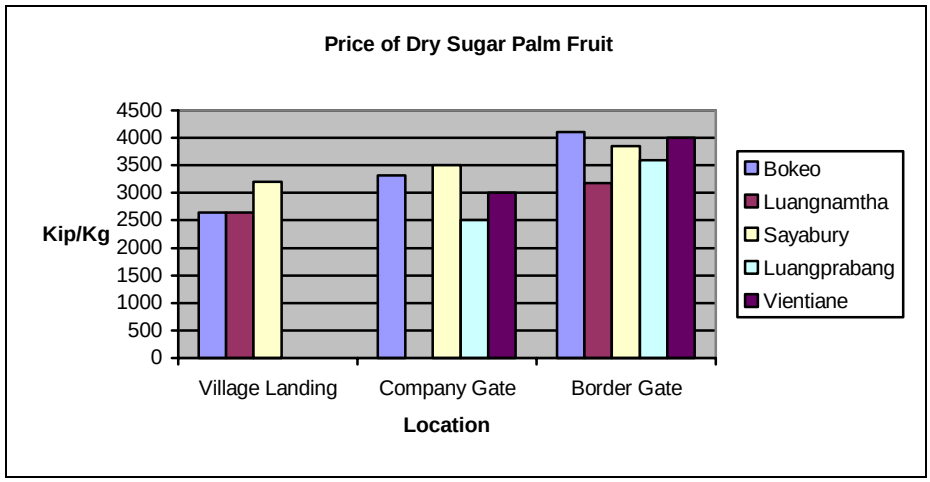
On the other hand, buffalo and cattle meat is also regulated by the provincial government. Price disparity between provinces is not much and is ranging from 20,000 to 25,000 Kip/kg.

(2) Vegetables and other products in local markets

The survey identified higher discrepancies in the local market for vegetables, crops, fruit and NTFPs. For example price of green chili is varying from 4,000 to 7,000 Kip/Kg with almost 25 % discrepancies.

(3) Exportable commodities

In case of NTFPs and Cash Crops for the export market, prices are set by the import-export companies in proportion to the export prices at the different border point. Price is usually set at village assembly point, company storage gates and border point. Due to the different costs for handling and transportation of the goods to the border, price of commodities also varies depending on the provinces. The following chart shows the extent of disparities per trading point in case of sugar palm.



Price of dry sugar palm fruit

4.3 Organization and Infrastructure

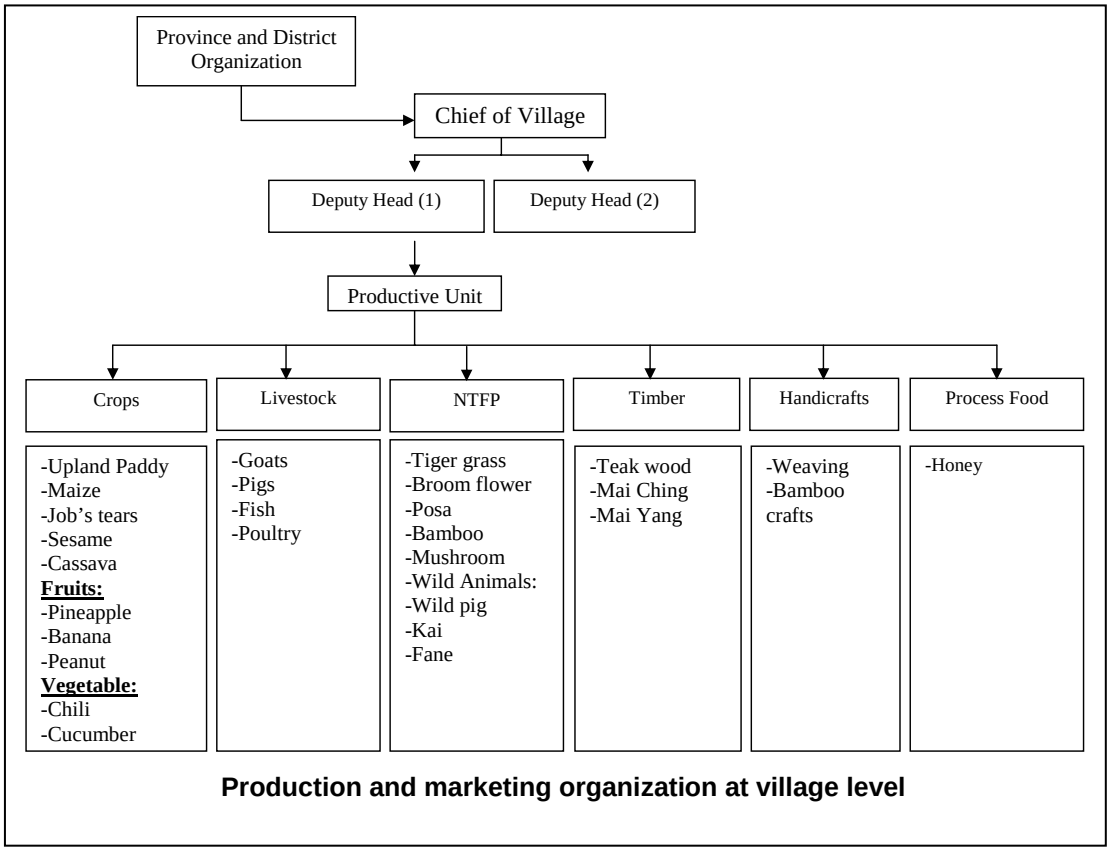
4.3.1 Market Organization

Ministry of Commerce with its line agencies at provincial and district levels is a main and formal organization to regulate marketing. Many other government organizations are involved in the marketing system of Lao PDR as summarized below.

Public Organization for Trade

Organization	Duty	Level
Ministry of Commerce (MOC)	Regulate local trade Regulate international trade and import-export Issue Certificate of Origin Issue Form A and Form D Issue Business License Issue Regulations on trade Regulate price of rice and meat	Central Provincial District Border Port
Ministry of Construction Transport post and Telecommunication (MCTPC), (Road department)	Regulate transport Control the weight of vehicle Issue transport document	Central Provincial Border Port
Ministry of Finance (Tax department)	Regulate tax system Issue tax license Issue export tax document Issue provincial, district business tax	Central Provincial District Border Port
Ministry of Agriculture and Forestry	Issue business license for agriculture and forestry Issue phyto sanitary certificate Veterinary control Phyto sanitation control Issue resource tax document	Central Provincial District Border Port
SOFSC	Regulate price of paddy, rice and meat	Provincial District

Aside from the government organizations above, private enterprise at provincial and district levels are promoted to associate themselves. Therefore each province and each district will have a private association called “Koum” or group. Some of the Koums have an elected president and a board of members, but most of the Koum leaders are designated by the provincial or district authorities. Non formal organization at village level also exists in the form of production group or “Koum phalit”. In some villages the Deputy chief of the village in charge of economics is heading the Koum. The following drawing outlines the non-formal organization of the community market of Pakseng.



Production and marketing organization at village level

4.3.2 Market Infrastructure

The marketing infrastructures comprises access roads and other marketing facilities such as commodity assembly point or landing, market hall facilities at district and provincial levels, wholesale storages and shops, and retail shops. For export commodities additional marketing infrastructure should be taken into account, such as transport facilities, grading and packaging facilities, bounded storage facilities and other logistics and infrastructure facilitating the marketing business such as electricity, telecommunication and others.

(1) Road Infrastructure

The main national roads that are the main routes between provinces and the border trade ports are;

Name of Roads	Route
Road Number 13 North (13N)	From Vientiane Capital, to Vientiane Province (Phonhong/ Vangvieng/ Kasy), to Luangprabang (Phoukhoun/ Luangprabang/ Pak Ou), to Oudomxay (Muong Xai/ Namo), to Luangnamtha (Nateui/ Boten). Road
Road N.3 (3)	Fom Huaisay in Bokeo province to Luangnamtha (Viengphouka/ Namtha/ Boten), which is actually under construction is considered as one the ASEAN Northern corridor linking Thailand and China.
Road N.4B	It links Luangprabang, Sayabury to Namgeun/ Boten District Provincial Border Trade Port.
Road N.1C	It links Luangprabang (Nambak/ Muong Ngoy/ Muong Vienkham) to Huaphan (Viengthong) through the Road N.6 to Xamnua, Huaphan Province.
Road N. 2E	It links Muong Xai of Oudomxai (Muong La / Muong Khoa/ Muong Mai) to the Vietnam Border.

The main national roads specified above have been improved or are being improved. This will improve the trade and marketing of agricultural and forest commodities in the Northern region. However, feeder roads linking district towns and villages are in very poor conditions in general.

(2) River Transport

The Mekong river during the wet season is navigable from Huaisay of Bokeo to Vientiane capital, and therefore facilitates the transportation of commodities from Oudomxay, Luangprabang to Huaisay, which is the official international port linking to the industry in Thailand. Other major rivers utilized for the transportation of commodities are the Namtha (Luangnamtha/ Bokeo), the Nam Ou river (Phongsaly/ Oudomxay/ Luangprabang, the Nam Khan (Luangprabang) and their tributaries.

(3) Market Facilities

In all provincial and district towns, the municipality has constructed market halls to facilitate retailing commodities. The market places, which are in general located next to transport terminal, have been reserved for retailers of agricultural and forest commodities. There are three types of retailers operating within the town marketing system.

- Permanent/professional retailers that have their own stall or shop and sell along the day. They are specialized in one group of commodity. Some time they are engaged into wholesale and distribution to smaller markets.
- Semi-permanent retailers that do not have fixed stall or counter and do not sell along the day. They move to other market (from morning to afternoon markets) after a certain time. They have no specialization and can sell many kind of products at the same time (vegetables, fruits, small animals, NTFPs).
- Non-permanent retailers that do not have stall or counter. They display their commodities on the ground, sell during a short period of time due to small handling quantity. Most of them are farmers who harvest products from farms and NTFPs from forests.

4.4 Constraints in Marketing

In general marketing of agricultural and forestry-based products is constrained by the landlocked situation and the small domestic market because of low population density (20 peoples/sqm). Constraints found at each level are outlined in the following sub-sections.

4.4.1 Village Level

Villagers expressed their concern about the low productivity caused by drought and the reduction of fallow periods in upland area. A decreased NTFPs' production is also reported

due to over exploitation. In some villages, therefore, almost all food-based products are consumed and therefore nothing is left for selling. Other constraints identified by the survey team are:

- Price is not stable and often fluctuated (for paper mulberry, tiger grass, peuak meuak)
- No people come to buy when there is a surplus of production (for sesame and job's tears)
- They can not meet the quantity / volume required by buyers due to lack of land, lack of labor, lack of fund and because of occurrence of drought.
- Assembly point is far from the production areas and commodities are hard to be transported.
- Small animals and poultry are infected by epidemic diseases twice a year and cannot be sold.
- Animal feeds are not sufficient.
- For weaving handicrafts, they lack funds to buy raw materials and the market is limited.

4.4.2 District and Provincial Level

The district collectors and middlemen function as wholesalers as well as sales agents for provincial import-export companies and factories. They expressed the following constraints.

- Accessibility between villages' assembly points and district/provincial towns is in poor condition. Thus the volume of products is limited and the cost of transportation becomes high.
- There is no access to assembly points during the raining season.
- Storage facilities at assembly points and district level are not sufficient.
- Quantity of products is not enough to make the trading profitable.
- Quality of products is low and cannot be graded at assembly point site.
- Price of products is not stable and depending on the provincial companies and / or importing companies in Thailand and China.
- Products sometimes cannot be sold and remains in the storage facilities due to price fall.
- Difficulties in enterprise licensing, taxing at district and provincial level.
- Getting a clearance documents for transportation and exporting is time consuming.
- Too many taxes and levees (from village, district, province, port) are laid on marketing.
- No credit is available for trading.

4.5 Market Conditions in the 8 Candidate Villages

(1) Crops

The production of agricultural and forestry commodities are limited in the 8 villages. The production of food crops such as rice and maize are mostly for household consumption. Food crops traded for getting cash for the households are very limited in quantity. Production of cash crops commodities is also limited in item, like sesame and jobs tear. The trade volume recorded from the survey is very small except for the production of jobs tears in Pondong and sesame in Hat Houay.

There are limitations for the villagers to increase agricultural production due to shorter fallowing period of slash and burn cultivation under the land allocation program. Another factor impacting the production and trade is the price dumping due to dependency on border trade for the cash crops. Further, the poor accessibility in the region especially during the raining season is another constraint that increases the cost of transportation, thus further more reduces the price of commodities at village level.

(2) Livestock

Livestock production especially for large animals is well developed in Luangprabang and Sayabury. The population of buffalo is high in Sayabury but limited in Luangprabang. The limitation for the production of cattle is due to people's eating preference for buffalo meat in the region. The production of small animals such as pig and poultry is remarkable especially in Sayabury. Poultry are mainly produced for home consumption with some small trade between villages.

Overall, the limitations for livestock production are i) limited grazing land for cattle and buffalo, ii) lack of animal feed for small animals, iii) small market consumption for pork and chicken, and iv) poor accessibility of the area.

(3) NTFPs

The survey area counts more than 7 major NTFP commodities, the most tradable ones are paper mulberry, tiger grass, "peuk meuak" (tree bark), sugar palms and bamboo shoots. Food based NTFPs such as bamboo and others are mostly for household consumption with small quantity sold in nearby markets. The NTFPs exploitation area consists of secondary forest coverage, which is limited for most of the village. On the other hands, because of food shortage, those resources may diminish due of over exploitation. According to the results of the survey, about all of the 8 villages population is solely depending on those resources for their subsistence.

Other limitations on the trade of NTFPs are i) price dumping due to the dependency on border trade for the commodities and ii) poor accessibility of the area especially during the raining season.

(4) Handicraft

Namtiao village produces handicraft commodities that are sold in small quantity at the nearby Sayabury market. The production is not directly linked to any supply chains therefore the quantity is limited and quality and design is not up-to market. Poor accessibility is also another limitation for handicraft products promotion.

CHAPTER 5 ASSESSMENT OF PAFOs AND DAFOs

5.1 Inventory of the Staff

A total of 162 staffs belongs to the central office (NAFES) at present, while the number of staff in the provincial offices (PAFOs) ranges from 88 to 216. The staffs in the district offices (DAFOs) are not more than 20, except DAFO Xayaboury which has more or less 50 staffs at present. The numbers of the staff per section are summarized as follows:

Staff Composition

Executive & Admn	Planning	Technical	Forest & refo	Soil & crops	Livestock & fishery	Shifting cultivation	Lao-ADB	Rural dev.	Others <1	Total
20	8	21	13	8	33	12	7	19	21	162

Note: The "Others" consist of the staffs who are contractual and in study leave.
Sources: NAFES

Staff Composition of PAFOs and DAFOs

PAFO	Admn	Crops	Livestock	Forestry	Irrigation	Meteo	Extension	Projects/ Stations	Others <1	Total
Luangnamtha	16	6	13	16	10	3	16	8	n.a.	88
Bokeo	18	8	6	14	20	2	8	12	2	90
Huaphanh	15	13	6	17	11	7	12	22	n.a.	103
Vientiane	23	10	13	45	26	7	20	72	n.a.	216
Luangprabang	24	7	11	16	11	10	36	55	11	181
Xayaboury	25	11	7	23	18	5	9	52	0	150

DAFO	Executive	Admn	Crops	Livestock	Forestry	Irrigation	Others <1	Total
Pakesng	3	2	3	2	3	0	0	13
Nane	2	0	4	3	5	2	0	16
Viengkham	2	3	3	4	3	1	0	16
Xayaboury	2	10	9	9	17	3	0	50

Note: <1: The "Others" are composed of the staffs who take study leave and have no information about his/her section.
Sources: 6 PAFOs and 4 DAFOs

As for the educational attainment of the staff, the majority of them are diploma holders (either medium or high diploma), approximately 60 % of the total staff. There are also some staffs who have higher decrees (Bsc, Msc or Ph. D) especially in NAFES, Vientiane PAFO and Luangprabang PAFO.

Educational Level of Staff

Offices	Ph.D / Master		Bachelor		Diploma		Vocational / Secondary		Unknown <1		Total	
	12	**(7)**	**26**	**(16)**	**101**	**(62)**	**14**	**(9)**	**9**	**(6)**	**162**	(100)
NAFES	0	(0)	5	(6)	47	(53)	7	(8)	29	(33)	88	(100)
Luangnamtha	0	(0)	5	(6)	47	(53)	7	(8)	29	(33)	88	(100)
Bokeo	2	(2)	4	(4)	67	(74)	6	(7)	11	(12)	90	(100)
Huaphanh	2	(2)	4	(4)	70	(68)	12	(12)	15	(14)	103	(100)
Vientiane	3	(1)	30	(14)	98	(45)	8	(4)	77	(36)	216	(100)
Luangprabang	3	(2)	9	(5)	96	(53)	25	(14)	48	(27)	181	(100)
Xayaboury	0	(0)	10	(7)	105	(70)	25	(17)	10	(7)	150	(100)
Pakesng	0	(0)	0	(0)	11	(85)	2	(15)	0	(0)	13	(100)
Nane	0	(0)	1	(6)	10	(63)	5	(31)	0	(0)	16	(100)
Viengkham	0	(0)	0	(0)	10	(67)	5	(33)	0	(0)	15	(100)
Xayaboury	0	(0)	2	(4)	32	(64)	13	(26)	3	(6)	50	(100)

Note: <1: Unknown includes the staffs who did not submit the questionnaire or answer his / her educational attainment.
Data on PAFO Luangprabang are being analyzed still. Those will be clarified in the Final Report.
Sources: 6 PAFOs and 4 DAFOs

5.2 Training Needs Analysis

The study team analyzed training needs of the staff based on the results of the following surveys, namely, i) interview to directors / heads; ii) one-day workshop with managerial staffs; and iii) questionnaire survey to the staff. The following sub-sections describe the results.

5.2.1 Duties and Responsibilities of the Offices

The following MAF's provisions defines the duties and responsibilities of the offices (NAFES, PAFO and DAFO) .

- No. 0685/MAF.01: Roles and Functions of NAFES (2001)
- No. 1928/MAF.99: Roles and Functions of PAFO (1999)
- No. 0172/MAF.02: Roles and Functions of PAFES (2002)
- No. 1929/MAF.99: Roles and Functions of DAFO (1999)

Thee duties and responsibilities of the offices are outlined in **Table 4.**

5.2.2 Past Training Courses attended

Based on the questionnaire survey to the staff, the past training courses that the staff has attended were listed. The results are presented in the Study Report on Training Needs Assessment of the target PAFOs and DAFOs. The following table shows the composition of the staff based on the number of training courses that the staff has attended.

Results of Grouping of the Staffs based on the Number of Training Courses Attended

PAFO	No. of respondents	Group1 (None)	Group 2 (1 time)	Group 3 (2 times)	Group 4 (3 times)	Group 5 (4 times)	Group 6 (5 times)
PAFO							
Luangnamtha	63	**28 (44%)**	11 (18%)	8 (13%)	5 (8 %)	4 (6 %)	7 (11%)
Bokeo	81	**26 (32%)**	17 (21%)	14 (17%)	8 (10%)	3 (4 %)	13 (16%)
Vientiane	165	**61 (37%)**	27 (16%)	28 (17%)	15 (9 %)	15 (9%)	19 (12%)
Huaphanh	90	**37 (41%)**	21 (23%)	13 (14%)	15 (17%)	2 (2%)	2 (2 %)
Luangprabang	142	**49 (35%)**	22 (15%)	26 (18%)	15 (10%)	10 (7%)	20 (14%)
Xayaboury	122	**75 (61%)**	15 (12%)	12 (10%)	7 (6%)	5 (4%)	8 (7%)
Sub-total	663	276 (42%)	113 (17%)	101 (15%)	65 (10%)	39 (6 %)	69 (10%)
DAFO							
Pakseng	11	**5 (46%)**	3 (27%)	3 (27%)	0 (0 %)	0 (0 %)	0 (0 %)
Nane	16	1 (6 %)	1 (6 %)	**5 (31%)**	2 (13%)	**5 (31%)**	2 (13%)
Viengkham	16	**8 (50%)**	6 (38%)	2 (13%)	0 (0 %)	0 (0 %)	0 (0 %)
Xayaboury	48	**19 (40%)**	14 (29%)	4 (8%)	6 (13%)	4 (8%)	1 (2%)
Sub-total	91	29 (32%)	24 (26%)	14 (15%)	8 (9%)	9 (10%)	3 (3%)
Total	754	305 (40%)	137 (18%)	115 (15%)	73 (10%)	48 (6%)	73 (10%)

Source: Study Report on Training Needs Assessment (JICA Study Team)

The majority of the staffs of the offices except Nane DAFO can be grouped into those who have had no training or only one training course. In Nane DAFO, it is only two (2) persons

who are grouped into those groups owing to continuous assistance of the SIDA project. Out of 47 training courses that the staff of Nane DAFO has attended, about 30 courses were organized by SIDA.

On the other hand, the survey also revealed the number of training courses that the staff has participated. A total of 1,130 training courses have been undertaken for the staffs of the 6 PAFOs and 4 DAFOs. All the training courses were classified into nine (9) categories or 57 sub-categories based on the type of training. The results of classification are tabulated in Table 5, and summarized as follows:

Type of Training Courses undertaken

Category	PAFO						DAFO				Total
	LMT	BKO	VTE	HPN	LPB	XYB	PKS	NAN	VNK	XYB	Total
General	8	18	38	2	44	5	0	3	0	5	124
Management	10	31	38	20	59	17	3	11	3	2	194
Agriculture	14	22	58	19	33	14	1	10	2	13	186
Extension	16	22	26	12	37	14	4	6	0	8	145
Forestry	11	19	28	28	35	21	1	8	0	13	161
Irrigation	10	10	39	10	13	20	0	2	2	11	117
Livestock	18	9	32	8	20	17	0	5	3	8	120
Meteo	4	5	9	0	3	4	0	0	0	1	26
Others	2	4	15	12	14	8	0	2	0	0	57
Total	93	140	283	111	259	120	9	47	10	61	1,130
No. of respondents	63	81	165	90	142	122	11	16	16	48	749
Training per staff	1.5	1.7	1.7	1.2	1.8	1.0	0.8	2.	0.6	1.3	1.5

Source: Study Report on Training Needs Assessment (JICA Study Team)

Among nine (9) categories, frequency of “Management” and “Agriculture” are highest, followed by “Forestry”, “Extension”. “General matters” and “Livestock”.

5.2.3 Gaps in Capabilities

More than 80% of respondents (614 respondents) judged that they lacked capability / knowledge for complying with the respective duties. The following table shows the percentage of the staffs who feel the gaps between the capabilities and duties.

Self-analysis on the gap between duties and capabilities

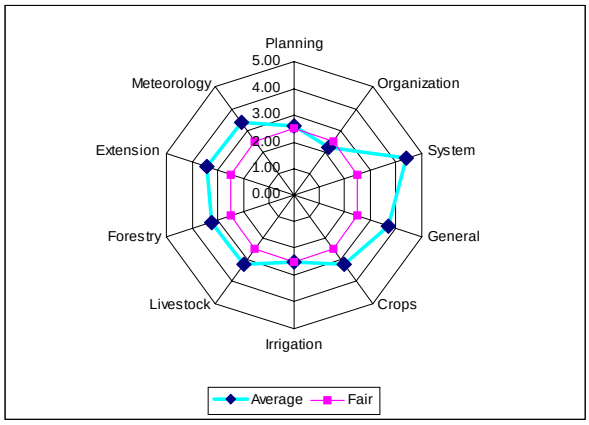
	Very Satisfied	Satisfied / no gap	Bit inadequate	Inadequate / poor	Very poor	No answer
PAFO						
Luangnamtha	0 % (0)	14 % (9)	79 % (50)	3 % (2)	0 % (0)	3 % (2)
Bokeo	0 % (0)	10 % (8)	73 % (59)	9 % (7)	1 % (1)	7 % (6)
Vientiane	1 % (1)	17 % (28)	73 % (120)	4 % (6)	1 % (1)	5 % (9)
Huaphanah	0 % (0)	10 % (9)	84 % (76)	2 % (2)	0 % (0)	3 % (3)
Luangprabang	1 % (1)	13 % (18)	71 % (101)	6 % (9)	1 % (1)	8 % (12)
Xayaboury	0 % (0)	17 % (21)	78 % (95)	1 % (1)	0 % (0)	4 % (5)
Subtotal	0 % (2)	14 % (93)	76 % (501)	4 % (27)	0 % (3)	6 % (37)
DAFO						
Pakseng	0 % (0)	18 % (2)	64 % (7)	18 % (2)	0 % (0)	0 % (0)
Nane	0 % (0)	0 % (0)	94 % (15)	6 % (1)	0 % (0)	0 % (0)
Viengkham	0 % (0)	0 % (0)	94 % (15)	6 % (1)	0 % (0)	0 % (0)
Xayaboury	0 % (0)	8 % (4)	85 % (41)	2 % (1)	0 % (0)	4 % (2)
Subtota;	0 % (0)	7 % (6)	86 % (78)	5 % (5)	0 % (0)	2 % (2)
Total of the Offices	0 % (2)	13 % (99)	77 % (579)	4 % (32)	0 % (3)	5 % (39)

Note: Figures in brackets indicate the number of respondents.

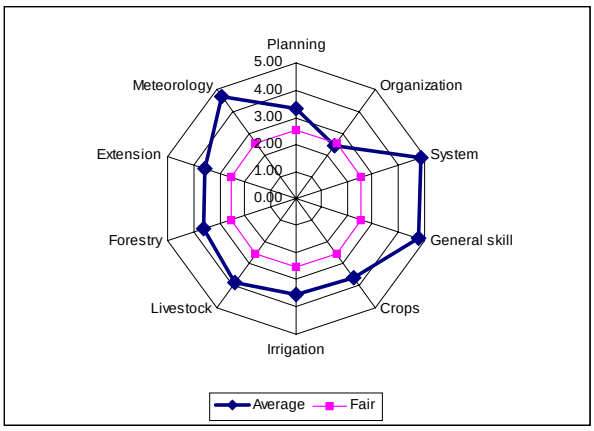
On the other hand, the performance level of the staff in the respective technical sectors was evaluated through the interviews to directors and heads of the PAFOs and DAFOs in accordance with the following 5-point system.

Rating Point	Indication
1	Very satisfied
2	Satisfied
3	Need some improvement
4	Dissatisfied
5	None

The results of evaluation are summarized and illustrated as follows:



PAFOs (except Vientiane Province)



DAFOs

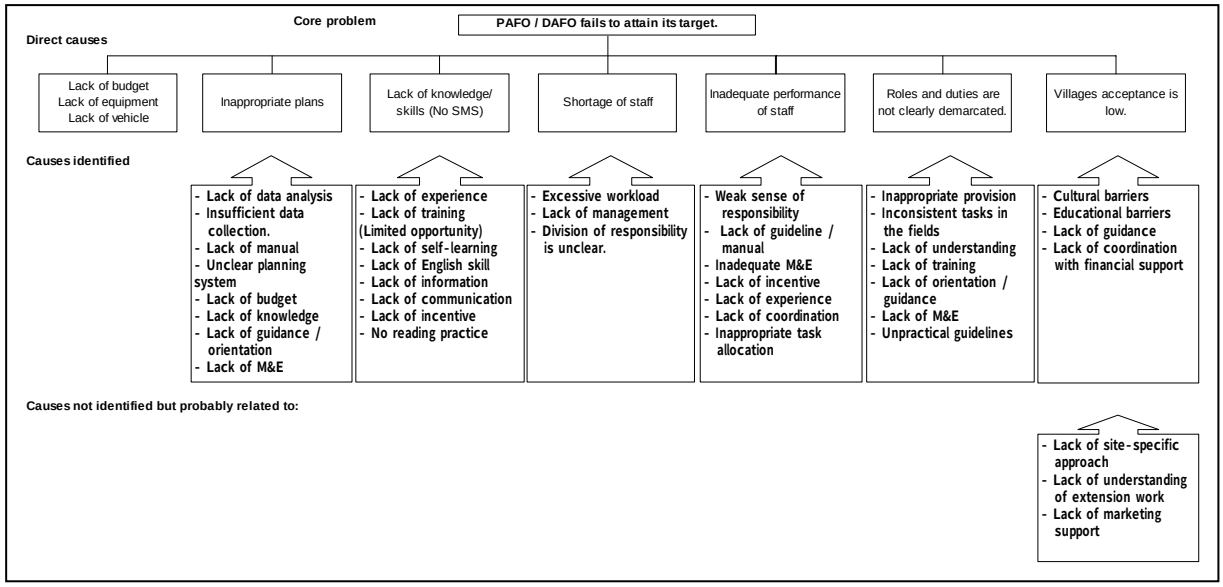
Note: Score 5.0 signifies the highest level of gap.

Directors of PAFOs showed their dissatisfaction with the systems in the office, which should have helped the staff to perform their duties. Besides, general skills (i.e., English and computer skills) and other technical skills of the staff except irrigation were also rated as

"need improvement". The extent of gaps in the capability of DAFOs is more significant than that of PAFOs, although the general trend in the results is similar to each other. The informants of the DAFOs scored higher point (higher gap) to "systems", "general skills" and "technical skills on meteorology" among others.

5.2.4 Problems and Issues on Extension Work

A problem analysis was undertaken through the workshop at each office with the participation of managerial staffs of the offices. In almost all the sessions, "the office (PAFO / DAFO) can not achieve its targets" or "the office can not comply with its tasks" was selected as the core problem of the organization. Further discussions identified six (6) to nine (9) direct causes of the core problem, which include: i) lack of budget; ii) lack of equipment; iii) lack of staff; iv) lack of capabilities / knowledge; v) poor accessibility / lack of vehicles; vi) inadequate performance of staff; vii) inappropriate plans; viii) poor coordination between / among sections; ix) unclear tasks and duties; x) low villager's acceptance; and xi) weak law enforcement. A summarized problem tree is illustrated as follows:



Summarized Problem Tree of PAFO

Furthermore they discussions clarified the following root causes that could result in the direct causes.

i) Capability of the staff
   - lack of training due to lack of opportunities
   - lack of self-learning due to time limitation, limited English skill, limited information written in Laotian and limited reading practice

ii) Quality of plan
   - inadequate data collection and analysis due to lack of knowledge, time

limitation, and lack of manual for data gathering and analysis
- improper planning and lack of M&E due to lack of knowledge, lack of guidelines, and lack of experience

iii) Performance of the staff
- weak sense of responsibility due to lack of salary (incentive), lack of M&E and lack of guidance
- limited coordination among the sections due to unclear division of tasks, inadequate understanding, and lack of guidance
- lack of acceptance due to improper attitude of the staff, lack of understanding of extension work, lack of coordination with market as well as financial support, and lack of consideration of marketing
- lack of knowledge and experience due to lack of training

iv) Low acceptance of extension work
- existence of barriers in villages (language, educational barriers)
- lack of guidance provided to villages
- lack of coordination with financial support

It seems that managerial staffs of the PAFOs and DAFOs could fairly perceive the situation of the organizations. It is noted that, however, many of them just pointed out that the causes of "low villagers' acceptance" were on the villager's side, for instance, "there is a language barrier" or "the educational level of villagers is very low". It is only one DAFO (Xayaboury) that identified "lack of coordination with the district commerce office and Agricultural Promotion Bank (APB)" as one of the causes of ineffective extension work. This tendency indicates that there is a gap between their understanding of the extension work and what the extension work should be. Their stance might be still to merely provide information / materials rather than to solve problems together with farmers.

5.2.5 Training Needs

The training needs were identified separately for the extension workers (PAFES and technical units of DAFO) and for the entire PAFO. In the assessment, the study team assumed the ideal functions of each level of staff, namely, "generalist / community developer" for extension workers in DAFO, "coordinator / community developer" for PAFES, and "subject matter specialists (SMSs)" for technical staffs of PAFO.

a. Subject Matter Specialists / Staff of PAFO

Subject	Gaps in capabilities / Capabilities to be strengthened
General	1) Planning (strategic plan and work plan) 2) Data collection and analysis 3) Administration management 4) Document management 5) English

Subject	Gaps in capabilities / Capabilities to be strengthened
	6) Computer 7) Project cycle management 8) Financial management 9) Socio-economic survey and data analysis 10) Human resource development and management
Technical matters	1) Agriculture (a. Seed multiplication, b. Soil management and improvement, c. Upland crop production and sloping agriculture, d. Pest and disease control, e. Propagation of planting materials of fruit and tree crops, f. Plant quarantine / phyto-sanitation (for border PAFOs), g. Agroforestry management) 2) Irrigation (a. O&M of irrigation systems (transfer of irrigation systems), b. Designing and survey, c. Supervision and inspection of construction works) 3) Livestock (a. Breeding, b. Livestock raising and feeding, c. Veterinary service, d. Fingerling production, e. Fish culture, f. Animal quarantine (for border PAFOs)) 4) Forestry (a. Land use planning and mapping, b. Land allocation, c. Forest inventory and use of equipment, d. Community forestry, e. Seed management, f. Sustainable forest management、g. Silvicultural practice, h. Forest fire protection (mainly for Xayaboury), i. Reforestation, j. NTFPs management) 5) Meteorology (Data collection and analysis)

b. Extension Workers (DAFO and PAFES)

Subject	Gaps in capabilities / Capabilities to be strengthened
General	1) Work planning and management 2) Data collection and analysis 3) Project cycle management (Planning, Implementation, M&E) 4) Financial management (only DAFO) 5) English (only PAFES) 6) Computer skill (only PAFES
Field work	1) Understanding of extension work (concept, objective, mission, goal), 2) Skills of extension work (a. Problem identification, b. Needs assessment, c. Training on trainers, d. Participatory methods / communication skills, e. Community organization, f. Networking), 3) General technical skills on agriculture and forestry (a. Rice production, b. Upland crops, c. Sloping agriculture and land management, d. Land allocation, e. Fruits / industrial crops, f. Livestock raising and veterinary, g. Fish culture, h. Marketing information gathering, i. Livelihood options suitable for the site condition, j. Rural credit / management)

Source: Study Report on Training Needs Assessment (JICA Study Team)

Based on the gaps identified, training courses required for enhancing capacity of the staffs were identified for each level of staff. The identified training courses were further prioritized based on the following viewpoints, namely, i) relevance of training courses to the daily work of the staff; ii) effectiveness of training courses on the respective tasks; iii) consistency of training courses with the activities of FORCOM; and iv) willingness of the staff to have training courses.

The long-listed training courses with the respective priorities are presented in **Table 6**, and summarized as follows:

a. Long-listed Training Courses for Extension Workers

Category	Training course	Target group	Priority
Management	a. Administration management	Managerial staff (of PAFES & DAFO)	Medium-High
	b. Project cycle management	**Managerial staff (of PAFES & DAFO)**	**High**
	c. Planning and data collection	**Managerial staff (of PAFES & DAFO)**	**High**
	d. English language	Managerial staff (of PAFES & DAFO)	Medium-High
	e. Computer skill	Managerial staff (of PAFES & DAFO)	Medium-High
	f. Financial management	Managerial staff of DAFO	Medium
Technical: Extension	**a. Extension system**	**Technical staff (of PAFES & DAFO)**	**High**
	b. Extension techniques (problem identification, needs assessment, TOT, communication skill, community organization, networking)	**Technical staff (of PAFES & DAFO)**	**High**

Category	Training course	Target group	Priority
Agriculture	c. Agriculture techniques (rice farming, upland crops, sloping agriculture, fruits)	Technical staff (of PAFES & DAFO)	Medium-High
Forestry	d. Forestry techniques (land allocation, NTFPs)	Technical staff (of PAFES & DAFO)	Medium
Livestock	e. Livestock techniques (livestock raising, fishery, vaccination)	Technical staff (of PAFES & DAFO)	Medium-High
Community development	f. Others (marketing, rural credit, community development)	Technical staff (of PAFES & DAFO)	Medium-High

b. Long-listed Training Courses for the staff of PAFO

Category	Training course	Target group	Priority
Management	**a. Planning and data collection**	**Managerial staff of sections**	**High**
	b. Administration management	Managerial staff of sections	Medium-High
	c. Document management	Managerial staff of sections and admn	Medium
	d. English language	Technical staff	Medium-High
	e. Computer skill	Technical staff	Medium-High
	f. Project cycle management	**Managerial staff of sections**	**High**
	g. Human resource development	Managerial staff of sections	Medium-High
	h. Financial management	Staff of Planning section	Medium
Technical Agriculture	a. Seed multiplication (rice)	Staff of crop section and research center	Medium-High
	b. Soil management	Staff of crop section	Medium-High
	c. Upland farming & sloping agriculture	**Staff of crop section**	**High**
	d. Pest and disease control	Staff of crop section	Medium-High
	e. Propagation of planting materials	**Staff of crop section**	**High**
	f. Plant quarantine / phyto-sanitation	Staff of crop section	Medium-High
	g. Agroforestry	Staff of crop section	Medium-High
Livestock	a. Breeding (improvement of variety)	Staff of livestock section	Medium-High
	b. Livestock raising	**Staff of livestock section**	**High**
	c. Veterinary service and diagnostics	**Staff of livestock section**	**High**
	d. Fingerling production	**Staff of livestock section**	**High**
	e. Fish culture	Staff of livestock section	Medium-High
	f. Animal quarantine	Staff of livestock section	Medium-High
Forestry	a. Land use planning and mapping	Staff of forestry section	High
	b. Land allocation procedure	Staff of forestry section	Medium-High
	c. Forestry inventory	Staff of forestry section	Medium
	d. Community forestry	Staff of forestry section	Medium-High
	e. Seed management	Staff of forestry section	Medium
	f. Sustainable forest management	**Staff of forestry section**	**High**
	g. Silvicultural practice	Staff of forestry section	Medium
	h. Forest fire protection	Staff of forestry section (for Xayaboury)	Medium-High
	i. Reforestation	Staff of forestry section	Medium
	j. NTFP management	Staff of forestry section	Medium-High
Irrigation	**a. Development planning**	**Staff of irrigation section**	**High**
	b. O&M of irrigation system	Staff of irrigation section	Medium-High
	c. Transfer of irrigation system	Staff of irrigation section	Medium-High
	d. Supervision and inspection of construction	Staff of irrigation section	Medium-High
	e. Designing in computer	Staff of irrigation section	Medium
Meteorology	l. Data collection and processing	Staff of meteorology section	Medium-High

CHAPTER 6 INVENTORY OF TRAINING

6.1 Human Resource Development

(1) General

Human-resources development (HRD)is necessary activity in order to keep the capable staff to continue a sustainable organization. Human-resources development is described as following activities.

i) Preparation of job descriptions which specify the tasks and roles to be carried out by a person filling a particular position and the skills, knowledge, attributes and experiences needs to carry out the tasks and roles;
ii) Identification of the tasks necessary to meet the goals of the organization and the put into effect the functions of individual units within the organization;
iii) Identification of skills, knowledge, attributes and experiences, and allows evaluation of effectiveness of training interventions;
iv) Identification, planning and management of training activities which will provide the identified skills, knowledge, attributes and experiences, either at an individual or organization level; and
v) Career path development, monitoring and counseling.

(2) Human Resource Development Situation in Ministry of Agriculture and Forestry

For the last decade there has been significant attention paid to Human Resource Development in the MAF. Considerable effort has been put into the planning and management for HRD at the Ministry level. There are HRD units in MAF as well as Departments within MAF.

One of the main constraints which hinder agricultural development in the country is the inadequate numbers of high quality or capable staffs at various levels. In the forest sector, new emphasis on biodiversity conservation, community forestry, land-use planning, forest management and extension including NTFP, requires new knowledge and partly different skills from what was needed in the past. The inadequate trained staff is more prevalent at the district level. If local capacity remains weak, there will be confusion on the changing roles under decentralization.

(3) Type of Training

Many of the NAFES, PAFO and DAFO officers are granted opportunities to take part in training courses officially. These are gained through some form of training as follows:

University Courses povide either specialists in particular fields or generalist with a wide range of knowledge and skills which can be applied across a number of fields, usually 3 years.

Intermediate Courses denote training period which lie between university degree courses and short courses, usually of the order of six to twelve months. Such courses are frequently offered by universities or by specialized institutions focus on particular fields.

Short Courses are generally used to provide staff specific skills and knowledge fitted with the wider framework of their work. Short courses can also be used for "refresher" training to bring staff up-to-date with new methods in their work, or may be remedial, in that they address deficiencies in performance, such as may be identified through performance evaluation

On the job training is generally taken to mean putting a person in a job and letting them learn how to do it from colleagues or supervisors. Proper on the job training is a structured process that requires: a clear set of goals and objectives; a program of structured training which involves demonstration/observation, practice, review, and feedback, and evaluation by the participant and supervisors.

Study tours cover range of types of learning experiences, but generally involve a group which visits sites to examine some aspect of observation management.

As mentioned above, a number of trainings have been provided under donor assistance projects. Ordinarily the Government can not provide trainings except the university courses and the Intermediate Courses due to lack of budget. In other word, the Government depends on donor projects for the majority of trainings.

6.2 Reference Project

MAF has a number of donor projects that have training and capacity building components attached to their activities. Most of the projects are sector oriented and it targeting mainly staff at central, provincial and district levels as well as project beneficiaries (villagers) that are involved in the projects. In order to grasp the implemented and on-going projects, the major projects listed per sub-sector under the cooperation of the Permanent Security Office in MAF were investigated.

The major implemented and on-going projects in the field of human resource development are as follows. It is thought that these projects provide us with useful information as the reference projects in the aspect of human resource development.

(1) Lao-Swedish Forestry Programme

This project is an example of project driven from HRD development. The concept is based on the premise that national ownership of bilateral programmes will contribute significantly to sustainability after the programmes have been completed.

(2) Forest Management and Conservation Programme (FOMACOP)

The Forest Management Sub-programme of the FOMACOP aimed at developing a sound partnership for managing forest resources between the state and three possible partners, namely; individuals, organizations, and enterprises.

The FOMACOP has developed forest management guidelines, practices and procedures consolidated/developed and training materials for the forest management practice.

(3) Farmer Irrigated Agriculture Training Project (FIAT)

The project has developed a comprehensible training process and methodology which are strengthening the competence and capacity of the provincial and district staff and agencies to support farmer and farmer's organization. The training process is part of the establishment of an institutional framework for the effective implementation of farmer training and extension. In general, the process was accepted by the provincial and district government staff and by farmer's leaders.

(4) Laos Extension for Agriculture Project (LEAP)

The Laos Extension for Agriculture Project is a project of the Lao-Swiss cooperation, funded by SDC and implemented by Helvetas in order to support the establishment of the national extension system. The goal of LEAP is to support the establishment of a decentralized, participatory, pluralistic and sustainable agricultural extension system that reaches male and female farmers equally.

LEAP has developed the Integrated agriculture extension trainer training curricula which consist of three courses and training materials. The system developed is based on participatory principles and operates on a sustainable basis. The foundation of the system is the so called Village Extension System (VES).

(5) Micro-Project Development through Local Communities

The objective of the programme promoted by Micro-Project Development through Local Communities is to alleviate poverty focusing on institutional strengthening to support development of district and village. The aim of the project is to build capacity of district, village, private sector and civil society based on organisational, human, financial and material resource available.

The human resources development specialist of the project would organize training. Under the component for the human resource development and organization and institution development, a variety of training courses have been carried out until now.

(6) Rural Development in Mountainous Area of Northern Lao PDR

The Integrated Rural Development Programme for the Mountainous Areas in Northern Lao PDR under Lao-German Technical Cooperation began in April 2001 following the completion of the Integrated Food Security Programme (IFSP). The ultimate goal of the project is to improve the beneficiaries' total quality of life in Luang Namtha and Bokeo provinces.

For the sake of sustainability the project follows two basic principles, 1) the participation of villages in their own development process and 2) capacity building at community and government levels.

6.3 Training Courses

(1) Training/Training Courses held by the Reference Projects

The information regarding past or on going trainings was collected through the interview survey. A list of training courses which consist of the following basic information, namely; - Contents of training, - Methodology applied, - Resource persons used, - Training period, - Place / venue of training, - Training materials / equipment used. Many of the listed training courses are undertaken as an important component of the listed projects. The participatory methods for village/community-based development are generally used as main tools. Aside from the these mentioned projects, there are a number of donor projects which include training and or human resource development components attached to their major activities. The training courses listed in the table cover almost all required subjects. The list of training courses is summarized as follows:

Summary of Training/Training Courses by the Reference Projects

Subject of Training Courses	Nos.	Subject of Training Courses	Nos.
1. Agriculture	18	8.Capacity Development	53
2. Livestock/Fisheries	16	9.Information, Management	9
3. Forestry/NTFP	5	10.Natural Resources	3
4. Irrigation	8	11.Road Transportation	6
5. Health	30	12.Education	11
6. Income generation	10	13. Gender	2
7. Rural Finance	7	14.Detoxication	1
		Total	180

(2) Relevant Training Resources of NGO

Beginning in the early '90's international non-governmental organizations (INGOs) were invited to establish field offices in Lao PDR. The first INGOs to establish field offices were MCC, QLS, CIDSE, and OCAA. Currently, there are nearly 80 INGOs working in Lao PDR with a wide range of development programs. Generally INGOs have introduced and encouraged participatory development approaches in the programs that they support in

partnership with government's agencies. Building local capacity (both INGO staff and local government partner) in participatory development approaches continues to be a priority component of many INGO programmes.

NGOs have mainly used "Capacity-Building Activity" approaches. The most frequent staff trainings among this group of NGOs have been: project management, training of trainers, community development/organizing approaches. Villager training also is an important component of NGO training programs. Counterparts' training done by NGO are available. Currently, Quaker Service Lao (QSL) is setting up a Training Unit offering low cost participatory development training for staff from other NGOs and government's partners. Sustainable Agriculture Forum (SAF) under the umbrella of Canadian Volunteer Organization (CUSO) also provides training courses to the staff from member organizations.

6.4 Training Resources

6.4.1 Resource Persons

Based on the data collected through the interview surveys, a list of the resource persons was prepared as shown in the Supporting Study Report. The list covers the following information on the resource persons. The resource persons listed are more than 100 persons.

a. Specialty / Background
b. Work experience
c. Experience as trainer / lecturer / resource person
d. List of projects / institutions that he/she has made training so far

Unfortunately, almost all resource persons did not have detailed curriculum vitae. Moreover, organizers of trainings have not evaluated resource persons after the completion of training. The resource persons and contact persons are summarized as follows:

Summary of Resource Persons according to Specialty/Institutions

Specialty/Institutions	Nos.	Specialty/Institutions	Nos.
1. Agriculture/Forestry	18	9. Social Science	1
2. Livestock	5	10. Statistic	1
3. Education	11	11.Tourism	2
4. Extension	2	121.Int. Gov. Organization	11
5. Communication	5	13.Project	8
6. Planning/Cooperation	4	14. NGO	17
7. Finance	1	15. Private Company	8
8. Public Health	14		
		Total	108

The following activities are proposed in order to evaluate ability and capacity of resource persons.

a. Asking for preparation of CV of resource persons
b. Evaluation of resource persons (Examination for acceptance based on CV)
c. Evaluation of resource persons and the performance (after Completion of Work)

6.4.2 Collection of Useful Training Materials Available in the Country

The study team collected the training materials used for the on-going or past training courses. The number of training materials are over 160 and they covered wide subjects. The list of the training materials is summarized as follows:

Summary of Training Materials

Subject of Training Materials	Nos.	Subject of Training Materials	Nos.
1. Agriculture	14	11.Public Service Reform	3
2. Forestry	12	12. Rural Development	1
3. NTFP	12	13.Eco-Tourisms	1
4. Livestock	5	14.Health	1
5. Fishery	1	15.Gender	6
6. Environment	3	16. Policy Paper	4
7. Extension	87	17. Project Report	3
8. Land Conservation	1	18. Training	4
9. Management	3	19. Socio Economy	1
10. Organization	1		
		Total	163

A multi-stage, modular, learning-by-doing training system, which had been extensively applied in providing over 12,000 person-days of training of provincial and district staff and villagers by FOMACOP, should be a good example for training of DAFOs, PAFOs and villagers in FORCOM. Training courses of FOMACOP consist of basic units called a module which is a complete lecture unit. The training materials of FOMACOP are useful for preparation of training programs and training materials for FORCOM.

CHAPTER 7 IDENTIFICATION OF LIVELIHOOD DEVELOPMENT OPTIONS

7.1 Concept for Identification

In order to identify the potential livelihood options, the study team assessed existing products and resources in the area focusing on its availability (volume or area planted), marketability (present and future) and relevance to the present livelihood activities. Assumption laid in the concept is that villagers are familiar with existing products / resources and using those familiar products for livelihood activities is easier as well as more realistic for them rather than introducing a completely new products. Thus, this report basically put a light on the on-going and existing activities / technologies which have been already established in the country and available in the locality.

For the identification of livelihood development options, the study team took the following steps.

i) to list major products/resources and/or economic activities in each village
ii) to select possible products / resources that might be developed for livelihood options
iii) to clarify the present conditions of selected products/resources in terms of productivity, process and marketing.
iv) to assess development potential of selected products/resources.
v) to list the possible livelihood development options.

7.2 Development Potential of the Priority Villages

The information of major products/resources and/or economic activities in each village were based on the results of venn diagram preparation and village profile survey. Major products/resources and/or economic activities in the four (4) priority villages are presented in **Table 7**, and summarized as follows:

Major Products / Resources in the Priority Villages

Product/Resource	Hat Houay	Samton	Pongdong	Namon
Products ranked with high priority by villagers	Rice, Sesame, Job's tear, Vegetables, Paper mulberry, Tiger grass, Buffalo	Rice, Paper mulberry, Tree bark, Tiger grass, Buffalo, Cattle, Pig, Goat,	Rice, Job's tear, Orange, Paper mulberry, Bamboo shoot, Rattan shoot, Pig, Poultry	Rice, Sesame, Vegetables, Tree bark, Sugar palm, Pig, Poultry, Fish
Products claimed as major products by villagers	Peanut, Maize, Fruits, Coconut, Lemon, Tree bark, Bamboo and its shoot, Rattan and its shoot, Herbal plants, Bee honey, Natural fruits, Cardamon, *"Me Nomai"*, Mushroom, Pig, Goat, Poultry, Fish, Weaving, Handicraft, Rice wine, Blacksmith	Sesame, Job's tear, Corn, Cassava, Pumpkin, Fruits, Bamboo and its shoot, Rattan and its shoot, Herbal plants, Bee honey, Natural fruits, Cardamon, *"Me Nomai"*, Mushroom, Poultry, Fish, Handicraft, Rice wine, Blacksmith	Sesame, Vegetables, Corn, Tobacco, Chili, Fruits, Tree bark, Tiger grass, Herbal plants, Mushroom, Bamboo, *"Me Nomai"*, Buffalo, Cattle, Fish, Weaving, Embroidery, Handicraft, Rice wine, Blacksmith	Job's tear, Corn, Cassava, Sweet potato, Paper mulberry, Tiger grass, Bamboo and its shoot, Rattan and its shoot, Herbal plants, Cardamon, Natural fruits, *"Me Nomai"*, Mushroom, Buffalo, Cattle, Rice, wine, Blacksmith

Furthermore, the study team evaluated the present condition (including constraints) and development potentials of the products/resources listed in each village. The results are tabulated in **Tables 8 to 11**. Some present constraints are highlighted as follows:

a. Productivities of crops, especially upland crops are unstable and low in general due to i) the situation of being easily affected by weather (lack of irrigation systems and drought), ii) low soil fertility because of the progress of soil erosions, and iii) no input supply to maintain soil fertility, etc.
b. Technical support from DAFOs in introducing improved farming technology for lowland rice, upland crops and fruit trees is very limited.
c. Many natural resources are being exhausted recently due to poor resource management. Depleting resources further accelerates the exploitation of resources.
d. Prices of cash crops and NTFPs (e.g., paper mulberry, sesame, Job's tear, etc.) often fluctuate. Although farmgate prices are mainly influenced by the international market situation, farmers are normally isolated from market information or not given proper explanation by middlemen about the price setting mechanism as well as the marketing situation.
e. Animal epidemic diseases often cause serious damage to animal raising activities.

7.3 Possible Livelihood Development Options

Based on the present condition and development potential of listed crops/resourced in the aforementioned section, the possible livelihood development options for each village are long-listed in **Tables 12 to 15**, and summarized as follows:

Possible Livelihood Development Options

Option	Target group	Outline	Necessary inputs
A. Annual crops			
Improvement of rice production	Lowland rice farmers	To increase the productivity of rice through improvement of farming technology and input supply	Training on improved farming practice and IPM Training on water management Farm input supply (improved variety seeds and fertilizer) on credit
Cash Crop Production	Lowland rice farmers	To increase the productivity of cash crops in the irrigated paddy field in the dry season	Support for organizing farmers production group Training of improved farming practice and IPM Provision of market information Training of group purchase and selling Loan arrangement
Sustainable Upland Farming	Upland farmers	To establish practical/simple upland farming technology in the existing slash and burn cultivation area	Support for organizing farmers production group Farm input supply (improved variety seeds, seedlings for hedge rows and fertilizer) Loan arrangement

B. Tree crops			
Fruit Tree Plantation	Upland farmers	To increase the productivity of fruit tree crops and promote marketing of products	Support for establishment of village nurseries Training on improved farming practice and IPM Loan arrangement
C. NTFPs			
Plantation Promotion	Upland farmers	To sustain the production of Paper Mulberry and Bark Tree	Support for organizing farmers production group Support for establishment of village nurseries and gardens Training on improved farming practice
Mushroom Culture	Upland farmers and land less farmers	To introduce mushroom culture and promote marketing of products	Support for organizing farmers production group Training on mushroom culture practice Supply of materials and inputs
Resource Management	All Farmers	To introduce resource management practice	Training on resource management
D. Livestock			
Animal Bank	All Farmers	To promote large animal raising through revolving anima system	Training on animal vaccination Support for organizing farmers group for revolving system Provision of seed animals
Native Chicken Raising	Upland farmers and land less farmers	To promote native chicken raising	Support for organizing farmers group for revolving system Training on proper chicken raising system Training on management of micro credit system Provision of seed money for micro credit
Aquaculture	Aquaculture farmers and land less farmers	To promote aquaculture through the effective use of existing fishponds	Support for organizing farmers group for revolving system Training on proper aquaculture technique Training on management of micro credit system Provision of seed money for micro credit
E. Others			
Weaving promotion	All farmers	To promote weaving activities and marketing of the products	Support for organizing women's group Training on design of the products fitting market demand Training on management of micro credit system Provision of seed money for micro credit

It is noted that almost all the options need to be linked with a credit scheme to enable villagers to be recipients / beneficiaries of the options. The study team believes such integration of technical and financial supports to be effective in ensuring the accountability of beneficiaries as well as maintaining the sustainability of the options.

7.4 Recommendations

The possible livelihood development options listed in the aforementioned section shall be prioritized for further identification. The following indicators could be used for evaluation of the options.

a. Villagers' willingness to participate in the project (option) should be high. (Therefore, the farmers should understand their burden that the beneficiaries should shoulder in the implementation of the project.)
b. The options should be easy enough to adopt in other villages.
c. Initial investment (input) should be reasonable.
d. The project can benefit villagers (beneficiaries) as much as possible.
e. There would be any external organizations, which can support the project technically, financially and institutionally in addition to PAFOs and DAFOs, that the priority villages can develop a linkage with.

It is also recommended that villagers together with DAFOs and PAFESs should prepare an implementation plan of the identified livelihood option with the assistance of FORCOM. It could help them to understand the activities of the identified livelihood option and also give a good venue for the staff of DAFOs and PAFESs to work with villagers as "community developers". Furthermore, the plan to be prepared can be used for the basis of monitoring and evaluation of the identified livelihood project later on.

CHAPTER 8 FORMATION OF TRAINING CURRICULUM

8.1 Basic Concepts

The following concepts were taken into account in formulating a framework for human resource development program for extension workers as well as SMSs of the target PAFOs / DAFOs.

a. The goal of the capacity enhancement should be in line with the national strategy on the agricultural and forestry extension service, in which the staff of DAFO / PAFES should have the capability to work as Farming System Extension Workers (generalists) and that of PAFO will function as SMSs.

b. Capacity building should be continuous and systematic under a clear vision of what the trainee should be after training. (Needless to say, the vision should be shared by both sides of training providers and receivers.) It is considered that a comprehensive approach is more effective in enhancing the capability of staff. Therefore, several types of training, such as short-term training, long-term training or studying, on-the-job training, etc., should be bought in training curriculums.

c. The level of trainees' acceptance should be taken into account before preparation of training curriculums. In short, the curriculums should be fitted to his / her daily work and concerns. The results of the workshops and questionnaire survey will give some hints on this matter.

d. A principal goal of human resource development program is to grow capable staffs who could be the core of the extension work on the technologies / techniques demonstrated in the model sites to other villages. Secondary, the program also aims to strengthen / enhance the capability of the target PAFOs and DAFOs so that the offices could perform their duties and tasks satisfyingly.

e. It is also important to provide trained staffs a venue where they can practice the trained techniques / skills.

f. The curriculums should be realistic and reasonable considering available human resources in the country as well as time and budgetary limitation of the project. In addition, the curriculums should take a balance of theory and practice so that trainees can acquire genuine skills.

8.2 Training Programs

In order to enable the extension staff of PAFOs and DAFOs who will support FORCOM projects, substantial technical training support should be provided. The technical training of the extension workers will be largely conducted through practical learning in the field rather

than through classroom lecture of theory. Technical training will be provided for the SMSs who will support extension workers in respect of technique.

Initially, a workshops as orientation will be conducted through trainers and trainees. Through the workshop, both of them will be able to acquire a clear understanding of the FORCOM objective as well as the necessity of the trainings for themselves.

Drafted Training Curriculums for Human Resource Development Program

a. Curriculums for Extension workers

Name of Course	Target	Objective	Skills to be transferred	Duration	Methodology
Training for Extension Workers - Basic course 1 -	Technical staff of DAFO and PAFES	to provide necessary basic knowledge and skills to work as extension workers	Extension system Tools for extension Communication skill Monitoring and evaluation Training of trainers	Weakly course for 1 month	Lecture discussion, workshop, and field exercise training
Training for Extension Workers - Basic course 2 -	Technical staff of DAFO and PAFE	to provide facilitation skills for participatory approach	Problem identification Needs assessment Participatory method Community organization	Weakly course for 1 month	Lecture discussion workshop, and field exercise training
Training for Extension Workers - Basic course 3 -	Technical staff of DAFO and PAFES	to provide basic skills on agriculture, Livestock and forestry sector	Rice production Upland farming Fruit tree production NTFP management Livestock raising Veterinary service Fish culture Rural financial management Other site specific matters	Weakly course for 3months (Curriculum depends on the situation of sites.)	Lecture and field hands-on training
Venue	Vientian NAFES meeting room, Luangprabang PAFO Offices, Luanprabang North Agriculture and Forestry Research Center, Luangprabang Northern Agriculture & Forestry Extension Training Center				
Materials	LEAP Textbook NAFES/CETDU, Manual for Extension FIAT, Guidebook FOMACOP, Textbook SAF, Training Materials MPDLC/RDMA				
Resource persons	Master trainers of CETDU/NAFES, Specialists PPC, Trainers QSL, Specialists NAFRI, SMS PAFO				

b. Curriculums for Subject Matter Specialists

Name of Course	Target	Objective	Skills to be transferred	Duration	Methodology
Common Training					
Organization of on-farm trials	Technical staff of PAFO (crop & extension sections)	to develop the skills in planning, organizing and managing a program of pilot farms, field trial and demonstration	Basic principles of field trial Selection of site and design layouts Procedure of input requirement and cost estimation Preparatory work in the field Method of observation and sampling Analytical techniques and reporting	1 or 2 week course for 6 month	Lecture and hands-on / exercise training in research / training center / on-the-job training
Technical training on Subject Matter					
Training for SMS - Upland farming -	Technical staff of PAFO (crop & extension sections)	to strengthen technical skills / knowledge as SMSs	Sloping agriculture Upland development Fruit tree promotion Pest and disease control Marketing	1 or 2-weak course for 6 months	Lecture and hands-on / exercise training in research / training center
Training for SMS - Livestock -	Technical staff of PAFO (livestock & extension sections)	to strengthen technical skills / knowledge as SMSs	Livestock raising Vaccination Major diseases Marketing	1 or 2-weak course for 6 months	Lecture and hands-on / exercise training in research / training center
Training for SMS - Fishery -	Technical staff of PAFO (livestock & extension sections)	to strengthen technical skills / knowledge as SMSs	Fish culture Fingerling production Disease management Marketing	1 or 2-weak course for 6 months	Lecture and hands-on / exercise training in research / training center

Training for SMS - Community development -	Technical staff of PAFO (crop and extension sections)	to strengthen technical skills / knowledge as SMSs	Community development Rural credit Animal banking Conflict solving	1 or 2-weak course for 6 months	Lecture and field practice (OJT) in the fields
Training for SMS - Forestry -	Technical staff of PAFO (Forestry and extension sections)	to strengthen technical skills / knowledge as SMSs	Land use planning Mapping Forest & resource management Monitoring and evaluation	1 or 2-weak course for 6 months	Lecture and field practice (OJT) in the fields
Venue	Luangprabang PAFO Offices, Luanprabang North Agriculture and Forestry Research Center, Luangprabang Northern Agriculture & Forestry Extension Training Center, Vientian Plant Protection Center, Vientiane Living Aquatic Resource Research Center				
Materials	Manual for Extension FIAT, Guidebook FOMACOP, Textbook SAF, Training Materials MPDLC/RDMA, Training Handbooks QSL, Training materials for lecture, Guidebooks				
Resource Persons	Specialists PPC, Trainers QSL, Specialists NAFRI (Research Centers), Specialist Lao-IRRI, Specialist MPDLC/RDMA, Specialist EU Livestock Project, National University of Laos, Technical Agriculture School, Consultant Private Companies				

c. Curriculums for Management

Name of Course	Target	Objective	Skills to be transferred	Duration	Methodology
Management Skills Development Training	Managerial staff of DAFO and PAFO	to improve project management skills of key staffs	Project cycle management (Planning and M&E) Reporting Financial management	1 ~ 2 years	Lecture (basic) On-the-job training
Finance and Accounting Training	Managerial staff of DAFO and PAFO	to improve finance and accounting skills of key staffs	Budget layout and schedules Record keeping Accountability methods Contract arrangement	1 ~ 2 years	Lecture On-the job training
Venue	Luangprabang PAFO Offices, Luanprabang North Agriculture and Forestry Research Center, Luangprabang Northern Agriculture & Forestry Extension Training Center, Vientian National Organization for Studies of Policy and Administration				
Materials	Manual and Guidebook LSFP, Manual FIAT, Training Material of GPAR, Training Material of APB				
Resource Persons	Specialist NAFES, Specialist GPAR, Specialist APB, Specialist NGO				

d. Optional training for improvement

Name of Course	Target	Objective	Skills to be transferred	Duration	Methodology
Training for Managers	Managerial staff of PAFO	to strengthen analytical / strategic thinking	Resource management Rural development Agricultural development	1 ~ 2 years	Scholarship for study abroad
Training on Administration & Management	Staff of PAFO	to improve the management of office and data	Document management Work management Work planning Monitoring and evaluation	6 months	Lecture (basic) and OJT
Training on Computer skill	Staff of PAFO	to improve documentation and data management and processing	Use of MS Word Use of MS Excel	3~6 months	Lecture and exercise
Training on English skill	Staff of PAFO	to improve information gathering as well as communication skills	English skill	3~6 months	Lecture and exercise
Venue	University Foreign Countries, Vientian NAFES meeting room, Luangprabang PAFO Offices, Luanprabang North Agriculture and Forestry Research Center, Luangprabang Northern Agriculture & Forestry Extension Training Center, Vientian National Organization for Studies of Policy and Administration				
Materials	Textbooks on the market, Manual and Guidebook LSFP, Manual Training Material MPLDC/RDMA, Training Material NGO				
Resource Persons	English Translator Project Office, English Translator Computer Operator MPLDC/RDMA, NGO Project Staffs				

CHAPTER 9 ANALYSIS OF SATELLITE IMAGES

9.1 Purchase of the Latest Satellite Images covering the Priority Villages

The Study team procured SPOT HRV/HRG and Aster satellite images covering the following four (4) villages in June 2004, which were identified as priority villages among the eight (8) candidate villages in the 1st field work.

a. Hat Houay (Pakseng District)
b. Samton (Vengkham District)
c. Pongdong (Nan District)
d. Namon (Sayaboury District)

Sattelite	Instrument	Acquisition Date	Level	Center(N)	Center (E)	Cloud Cover (%)
SPOT2	HRV1	09Oct2000	2A	N019.31'05"	E101.51'28"	0
SPOT5	HRG2	06May2000	2A	N030.30'56"	E102.59'51"	0
SPOT5	HRG2	22Dec2000	2A	N020.0'59"	E102.10'47"	0
ASTER	VNIR	04Mar2004	AST4A01Z	N19.15'	E101.48'	0
ASTER	VNIR	02Mar2004	AST4A01Z	N19.47'	E101.56'	0
ASTER	VNIR	11Mar2004	AST4A01Z	N20.25'	E102.57'	0
ASTER	VNIR	02Nov2000	AST4A01Z	N20.16'	E102.27'	0

9.2 Prime Objectives of the Analysis

The prime objectives of the analysis consist of the following two components:

1) To identify and understand the present conditions of the landuse/landcover of the four priority villages.

2) To prepare the basic digital data (images and GIS data) for the future forest management activities, e.g. monitoring programs.

Especially, the data preparation for the future use is as crucial as the landuse mapping as forest management is to be conducted in an efficient and consistent manner initiating from the priority villages to expand to the other areas in future. Otherwise, the management activities will be quite time-consuming.

The digital data prepared include 1) digital elevation models (DEM) extracted from ASTER (30m resolution), 2) contour lines (both 5m and 20m extracted from DEM), 3) slope in degrees (30m resolution), 4) boundary of the villages (both polygon and polyline), and other topographic information derived from ASTER and SPOT.

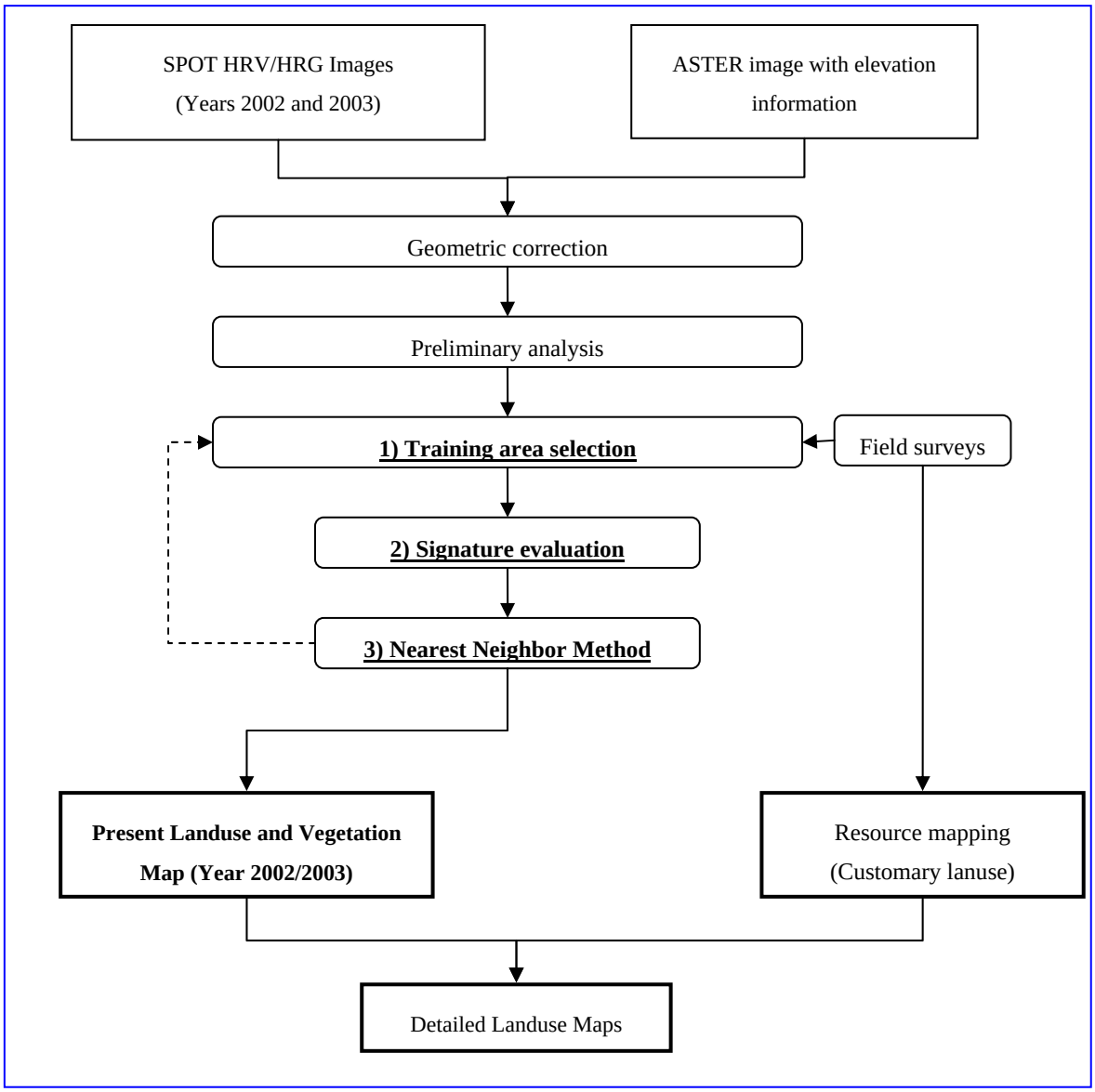
CHAPTER 10 LAND USE AND VEGETATION SURVEY

10.1 Methodology

SPOT HRV1 (ground resolution 20 m) and SPOT HRG2 (ground resolution 10 m) data acquired in June 2004 was used as an input of RGB band layers and ASTER image acquired in April 2004 (ground resolution 30 m) was used as an input of slope data.

Microcomputer software used in the analysis were eCognition Elemetnts 4.0 (for image analysis), ArcView 3.2a plus its extensions such as Spatial Analyst and Image Analyst (GIS data base digitizing and grid data manipulation). SPOT data were geo-referenced to the UTM value based on the selected ground control points (GCP's).

Schematic diagram of the methodology of digital image analysis is shown below.



10.1.1 Classification of Land Use

Based on the digital analysis of the SPOT data, a preliminary landuse/landcover classification was done. Following are the classes.

- Forests (Natural / Secondary / Plantation)
- Shifting cultivation (Slash and burn area)
- Fallow land
- Paddy field
- (Orchard)
- Road and Populated area
- River

The definition of "Forest" follows FAO's Definition used in Forests Resources Assessment 2000, as the term includes natural forests and forest plantations, which is land with a tree canopy cover of more than 20%. Forests are determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m.

Orchard and forest have been merged together because of their similar brightness values, whereas agricultural land is included in shifting cultivation due to its overlapping terminology.

10.1.2 Method of Analysis

SPOT usually contains 3 (for SPOT HRV) or 4 (for SPOT HRG) layers or bands each of which has its distinct information on the density of reflection on its spectral wave length. The analysis also includes Normalized Vegetation Index (NVI) defined as (Band3 – Band2)/(Band3 + Band2). Slope image derived from ASTER digital elevation model (DEM) is also applied to the analysis layers. "The Layer Mixing" (a set of layers or bands for the analysis) therefore includes 5 to 6.

SPOT HRV (3 bands) or SPOT HRG (4 bands)	Infrared red (Band3) , red (Band2), and green (Band1)
Normalized Vegetation Index (NVI)	White area represents high vegetation density, whereas black area characterizes low density of vegetation. Water body or bare land like road/populated area shows little NVI, whilst an area of vegetation has high value.
Slope image derived from ASTER DEM	Essential especially for paddy field. As usual, paddy prevails in flat areas with low slope degrees, whilst shifting cultivation prevails in rather steep areas.

The classification is mainly performed by Nearest Neighbor Method (supervise) using eCognition Elements 4.0. This software is quite excellent in terms of preliminary data setting and fuzzy classification.

Through the field investigations in August 2004, lots of information were collected, including samples of classification for the image analysis. Samples include the areas of forest, fallow land, shifting cultivation, and paddy field to which Nearest Neighbor Method is applied to analyze the whole priority villages. SPOT False Color Images are presented in **Figures 2, 10, 17 and 24**. Normalized Vegetation Indexes are presented in **Figures 3, 11, 18 and 25**. ASTER Slope Images are presented in **Figures 4, 12, 19 and 26**.

10.1.3 Collection of Social/Customary Information of Present Land Use

Originally, the Study team was supposed to use QuickBird satellite images as base maps for this survey. However, blank maps with 5-meter counter line, which were derived from SPOT image analyses, were used as base maps, since QuickBird was replaced with SPOT-5 due to the difficulty of shooting images within the contract period and the images from SPOT-5 was difficult for villagers (informants) to identify the land use condition.

Therefore, the Study team used significant time to interpret the blank map and to put major landmarks (such as rivers, mountains, foot paths) into the blank map at first. After putting major spatial information, the informants were asked to put customary information with regard to the land use on the blank map. Finally, the Study team together with villagers prepared present land use / category map, which consists of social and customary information of land use, at each prioirty village.

10.1.4 Collection of Existing Land Allocation Maps

At the same time, the Study team collected existing land allocation maps of the model villages at the DAFOs concerned. The land allocation maps were traced in the blank maps separately from the customary information obtained from villagers. The land allocation map generally gives the following information.

a. Boundary of village (based on the DAFO's judgment);
b. Land classification based on the categories stated in the Forestry Law; and
c. Other major land uses, such as paddy fields, orchards, settlements, and school.

10.1.5 Integration of the Information

Finally, the Study team integrated the information gathered in the activities described in Sections 10.1.3 and 10.3.3 with the vegetation cover and land use maps described in Section 10.1.2 by using GIS software. Fallow lands are determined both by the presence of trees and the absence of other predominant land uses.

10.2 Results of the Surveys

10.2.1 Present Land Use and Vegetation Cover

Present vegetation and land use conditions of the priority villages are determined as shown in **Figures 5, 13, 20 and 27** as a result of the land validation survey. The area distribution of each land type is also determined as summarized below.

Area Distribution of Present Land Use

Land type	Hat Houay		Samton		Pongdong		Namon, 1/		Namon, 2/	
	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)
Forest	2,138	71.5%	901	50.8%	694	47.5%	6,660	73.2%	5,426	71.0%
River	18	0.6%	-	-	-	-	47	0.5%	36	0.5%
Road/Populated area	8	0.3%	11	0.6%	21	1.4%	50	0.5%	50	0.7%
Fallow land	456	15.3%	442	24.9%	408	27.9%	1,437	15.8%	1,270	16.6%
Shifting cultivation	306	10.2%	419	23.6%	271	18.6%	611	6.7%	583	7.6%
Paddy field	49	1.6%	-	-	68	4.6%	171	1.9%	170	2.2%
Grass land	13	0.4%	-	-	-	-	114	1.2%	109	1.4%
Total	2,988	100.0%	**1,774**	100.0%	**1,462**	100.0%	**9,092**	100.0%	**7,647**	100.0%

Note: 1/ Boundary shown in the Land Allocation Map by DAFO, 2/ Boundary claimed by the villagers

The definitions of the classification categories except the already-mentioned "Forest" as follows:

(1) Slash and burn area:
An area of "Shifting cultivation" is evident on SPOT false color images showing blue. Due to the fact that an area of shifting cultivation contains smaller NVI than forest and fallow land, usually less than 0.6.

(2) Fallow lands:
An area of "Fallow land" is between "Forest" and "Shifting cultivation". According to the FAO definition, Forest is an area with crown cover of more than 20% and tree height of more than 5m. Fallow land is therefore an area with crown cover of less than 20% or tree height of less than 5m, usually more than 2-3 years left after shifting cultivation.

(3) Paddy fields:
Although each of the SPOT bands or the combination of the three/four bands shows the similar color on the images for both shifting cultivation and paddy field, the layer of slopes shows a distinguishable character for paddy field. Values of slope are relatively low, usually, less than 10 degrees.

(4) Grass land:
Grass land usually shows a similar signature of the spectrum to that of shifting cultivation or paddy field as its characteristic is self-explained. Grass land is, however, an area where no agricultural activities are taken place, especially along the rivers or streams.

The example of histograms of DN values for each of the classification categories is shown below.

Pongdong	SPOT1		SPOT2		SPOT3		NVI		Slope	
Land type	Mean	STD	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Forest	55.5-68.4	2.23	29.5-40.7	1.49	123.3-200.4	16.94	0.5-0.7	0.03	6.0-47.8	7.57
Slash and burn area	66.2-95.1	4.61	38.6-70.3	6.37	111.4-188.5	14.10	0.3-0.6	0.06	3.6-28.7	4.59
Fallow land	66.5-72.8	1.27	35.3-41.6	1.17	184.6-220.8	8.51	0.6-0.7	0.02	8.9-25.1	4.19
Paddy field	67.1-98.2	5.28	36.8-74.2	7.55	124.6-193.1	13.23	0.3-0.6	0.08	3.1-15.1	2.69
River	72.5-81.9	3.03	44.0-57.3	4.35	96.3-135.8	11.21	0.3-0.5	0.08	2.2-12.2	3.40
Road/Populated area	70.0-100.7	6.71	45.5-82.4	7.68	131.2-180.6	14.05	0.2-0.6	0.08	4.3-12.4	2.39
Total										
Namon	SPOT1		SPOT2		SPOT3		NVI		Slope	
Land type	Mean	STD	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Forest	56.4-67.0	2.18	28.0-35.9	1.41	110.6-195.3	15.80	0.6-0.7	0.03	6.0-44.1	5.84
Slash and burn area	60.6-96.0	7.15	31.5-78.0	8.44	123.4-194.7	14.04	0.3-0.6	0.06	2.6-32.6	5.72
Fallow land	64.4-78.6	2.33	32.5-46.9	2.10	171.3-209.9	9.06	0.6-0.7	0.02	6.7-30.2	4.58
Paddy field	69.0-94.0	6.17	37.5-73.2	8.17	136.8-192.9	12.33	0.3-0.6	0.07	2.8-22.8	2.69
Total										

10.2.2 Social and Customary Information on Land Use

"Customary Land Use Maps" that contain the social and customary information of land use in the model villages are presented in **Figures 6, 14, 21 and 28**. In all the priority villages, the major land uses are:

a. Paddy field ("*Na*");
b. Area where villagers can use for slash and burn cultivation ("*Din Phalith*");;
c. Reserved area for future development ("Din He");
d. Grazing land;
e. Community production forest or forest where villagers can cut trees for domestic purposes but can not operate slash and burn cultivation ("*Pa Somsai*");
f. Conservation forest ("*Pa SaNgouan*"); and
g. Watershed protection forest ("*Pa Ponkanh Len Nam*")

In general, there is a tendency that villagers try to maintain forests in the upper reach of the rivers important for the villages especially for rice farming. On the other hand, forests in the area where they can hardly cultivate due to steepness and/or soil condition are maintained as either conservation forests or community forests. Other areas are generally used for slash and burn cultivation or kept as a reservation area.

10.2.3 Existing Land Allocation Maps

The Study team was able to collect the land allocation maps of the following villages:

- Namon
- Pondong
- Hat Houay (but only the northern part)

The land allocation maps collected at those villages are shown in **Figures 7, 22 and 29**. The distribution of land classification in each village is summarized as follows:

Area by Land Classification

Land Classification	Hat Houay, 1/ (as of 1997) (Northern Part)	Pongdong, 2/ (as of 1997)	Namon, 3/ (as of 1996)
A. Agricultural Land			
1) Lowland paddy field	8.82	27	57.03
2) Upland agricultural land	113.49	195.6	192.38
3) Garden	8.30	-	-
4) New open paddy field	-	-	43.75
B. Forest Land			
1) Conservation Forest *"Pa SaNgouan"*	62.80	18	212.50
2) Watershed Protection Forest *"Pa Pongkanh"*	303.36	209	993.75
3) Community Production Forest *"Pa Somsai"*	87.60	103.5	230.38
4) Rehabilitation Forest *"Pa Feumfu"*	466.68	92	-
5) Reserved area *"Din He"*	24.40	642	-
6) Degraded Forest "Pa sutsom"	44.80	-	
6) Others	13.52	14	-
Total Village Area	1,133	1,302 (*)	2,775 (*)

Source: 1/ DAFO of Pakseng district (10 Aug 2004), Land Allocation Map for B. H. Ouan
2/ DAFO of Nan district (06 May 2004)
3/ DAFO of Sayaboury district (13 May 2004)

Note: (*)/ There seem to be some discrepancies among the figures above. However, they are just presented as officially recorded.

For Samton and the remaining (southern) part of Hat Houay, the land allocation maps have not been prepared yet.

10.2.4 Preparation of Detailed Land Use Maps

Detailed land use maps are presented in **Figures 8, 15, 23 and 30**. These maps were prepared by overlaying the customary information of land use on the vegetation and land use maps.

10.3 Preparation of Recommended Land Use Maps

The Study team prepared "Recommended Land Use Maps" of Hat Houay and Samton,

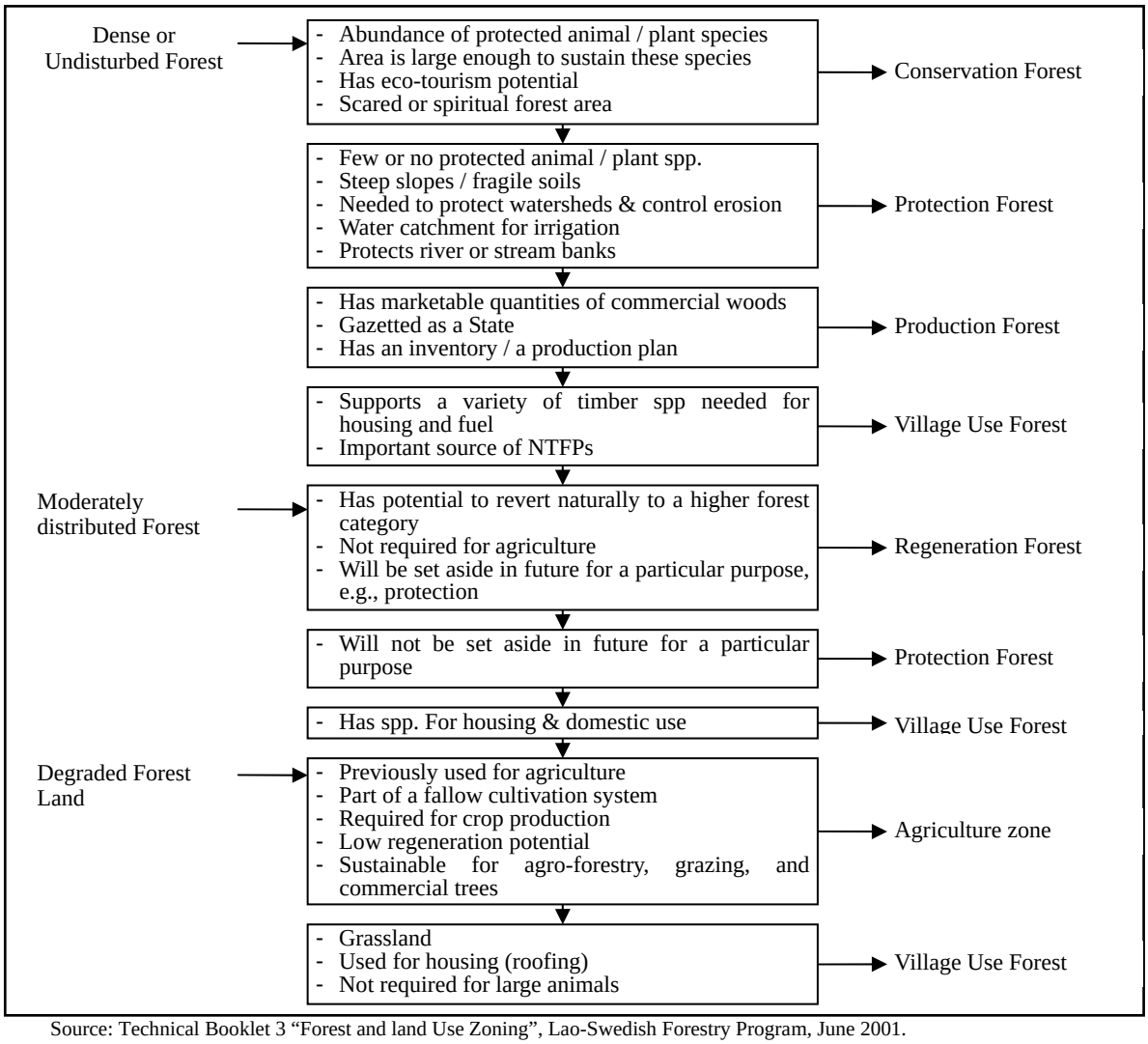
as shown in **Figures 9 and 16,** considering the MAF's guideline on land allocation[1] and the procedures prepared by the Lao-Swedish Forestry Program[2] as described below.

a. Recommendation of MAF

Slope range (%)	Recommended land use
0 – 12 %	Agricultural land
12 – 25 %	Grazing land, Fruit trees, Upland / Cash crops
25 – 36 %	Slash and burn, Fruit trees, Upland / Cash crops, Tree plantation
36 – 45 %	Can be used for slash and burn if necessary, Fruit trees under agroforestry system
> 45 %	Forests

Source: MAF's Guideline No. 0822 (August 1996)

b. Land Use Zoning Decision Process



Source: Technical Booklet 3 "Forest and land Use Zoning", Lao-Swedish Forestry Program, June 2001.

[1] MAF's Guideline No. 0822, "Guideline on Land Use and Management of Land Allocation, August 1996

[2] Technical Booklet 3 "Forest and land Use Zoning", Lao-Swedish Forestry Program, June 2001.

However, the available information is quite limited. The following are the information / data that are available and can be used for classification so far.

i) Slope
ii) Present vegetation cover
iii) Present land use including customary information
iv) Soil type based on the soil map of Luangprabang at a scale of 1: 250,000

The information of soil types of the area is too vague to use for land use planning at village level. Therefore, the land use was classified based on the information listed above from i) to iii). Under such situation, the Study team evaluated the areas taking the following two (2) steps.

Step 1: Consideration of present land category

If the area is recognized by villagers as Conservation, Protection, or Community (Production) forests, the present category shall be maintained as it is. If the area is classified as other categories, the subsequence step shall be taken.

Step 2: Consideration of importance of the area, slope, and present land use

The remaining area shall be evaluated in terms of the importance of the area, its slope and present land use as summarized below.

Area	Slope	Present land use	Recommended land use
Located in water catchment for irrigation	> 45	Forests	Protection forest
		Others (Farms / Fallow land)	Regeneration forest
	36 - 45	Forests	Protection forest
		Others (Farms / Fallow land)	Regeneration forest / Agroforestry
	25 - 36	Forests	Protection / Production forest
		Others (Farms / Fallow land)	Agroforestry / Agriculture
	< 25	Forests	Village use forest / Production forest
		Others (Farms / Fallow land)	Agriculture
Located in other areas	> 45	Forests	Conservation forest
		Others (Farms / Fallow land)	Regeneration forest
	36 - 45	Forests	Production forest
		Others (Farms / Fallow land)	Agroforest
	25 - 36	Forests	Village use forest / Production forest
		Others (Farms / Fallow land)	Agroforestry / Agriculture / Grazing land
	< 25	Forests	Village use forest / Production forest / Reserved area
		Others (Farms / Fallow land)	Agriculture / Grazing land

CHAPTER 11 FINAL OUTPUTS OF THE WORK

In accordance with the Contract between JICA and Nippon Koei Co., Ltd. the following outputs were prepared in the 2nd Home Work in Japan and submitted to JICA at the end of the work.

a. Final Report
b. Landsat image covering the northern 10 provinces
c. SPOT images of the priority villages shot in 1990
d. Present land use and vegetation maps of the priority villages
e. Detailed land use maps of the priority villages
f. Present land use and vegetation maps with land categories demarcated by the land allocation program (Namon, Pongdong and part of Hat Houay)
g. Recommended land use maps (Samton and Hat Houay)
h. SPOT images of the priority villages with 5-meter counter line
i. Blank maps of the priority villages with 5-meter counter line
j. Electrical data of satellite images in compiled in ArcView

CHAPTER 12 RECOMMENDATIONS FOR MONITORING

Through the activities related to the satellite image and GIS analysis and field investigations in Lao P.D.R and the provinces concerned, the following two recommendations have arisen for the FORCOM project:

1) **Necessity of an integral monitoring framework using satellite image and GIS analysis,**
2) **Necessity of the capacity building of both NAFES and PAFO with regard to GIS/image analysis and monitoring activities.**

The Procurement of both SPOT and ASTER images usually has their minimum coverage area. Although the project for the basic study procured three scenes of SPOT satellite images and four scenes of ASTER images so far, the area of the model villages combined is relatively small. In other words, only a fraction of the images has been analyzed so far. Considering the model villages as "initiation sites", the analysis concept and methodology should be extended to other areas in future or in the course of the FORCOM project by the counterpart.

Analyzing the detailed landuse maps, it is found that some parts of the forests designated as conservation or protection forest areas on the allocation maps have been used for agricultural purposes. If the local counterparts, especially, NAFES and PAFO can identify the landuse/landcover situations of other villages or districts by analyzing the rest of the SPOT images procured for this project, the potential of the monitoring capacity will be developed in a manner.

The basic study follows the following process:

1) Derive digital elevation model (DEM) from ASTER images
2) Derive slope images from DEM
3) Geometric correction of SPOT and ASTER images
4) Collecting samples through field investigations
5) Signature analysis using eCognition Elements
6) Apply Nearest Neighbor Method as a classification process

It is necessary to introduce new technological concepts and techniques such as digital satellite image processing to the local counterparts through the extensive training courses and field assessment activities. How to derive digital elevation model and apply watershed analysis using DEM. How to analyze satellite images using eCognition Elements and its background concepts.

Forest Cover Monitoring Project (FCMP) was initiated by the Mekong River Commission (MRC). To ensure the homogeneity of the forest cover information in all FCMP countries, the forest and land cover classification system was developed and used in all four

FCMP countries. The threshold of 20% of crown density is used to differentiate between forest and non-forest areas same as the methodology used for this project. The monitoring activities of the FORCOM have to include the coordinating activities with the organizations concerned such as MRC, NAFRI, and STEA for the integrity of the forest monitoring activities.

The concept of monitoring is getting quite essential for the public information as websites to disseminate the project objectives as well as outputs/outcomes. Satellite images and GIS products are often used on websites to show the public the importance of the projects for forest conservation.

Tables

Table 1 Summary of Village Profile for 8 Candidate Villages (1/2)

Province		Luangprabang					Xayaboury		
District		Pakseng		Viengkham		Nan	Xayaboury		
Village		**Pakseng**	**Hat Houay**	**Samton**	**Vangheung**	**Pongdong**	**Namtiao**	**Namon**	**Natak**
Survey Date		Apr 22-24	Apr 25-27	Apr 29-May 01	May 02-04	May06-08	May 10-12	May 13-15	May 17-19
Social Data	Household	129	90	77	54	102	59	247	227
	Population	715	493	471	292	526	417	1,553	1,275
	Ethnic group	Lao Loum: 49% Lao Theung: 51% Lao Sung: 0%	Lao Loum: 23% Lao Theung: 77% Lao Sung: 0%	Lao Loum: 0.08% Lao Theung: 99.92% Lao Sung: 0.00%	Lao Loum: 81% Lao Theung: 19% Lao Sung: 0%	Lao Loum: 100% Lao Theung: 0% Lao Sung: 0%	Lao Loum: 0% Lao Theung: 0% Lao Sung: 100%	Lao Loum: 93% Lao Theung: 6.8% Lao Sung: 0.2%	Lao Loum: 94.4% Lao Theung: 5.3% Lao Sung: 0.3%
	History	The village was built more than 100 years ago. Two villages ware combined in 1975.	The village was built in 1846. In 2001, Houay Ouang village merged into the village.	After constructing of National Road No.1, 8 households migrated the village. In middle of 1980's many households migrated.	The village was built in 1971. In 1981-82, the villagers stopped accepting new comers.	The village was built 90 years ago. Since then, no significant migration was done.	In 1990, 5 families moved from Houay Ken (Sayaboury dist.). In 1994, they established new village at present location and have been accepting a few new comers every year.	The village was built in1530 by 3 families. 100 years ago, a canal was constructed for fire prevention and is used for irrigation now. Since 1997, Lao Theung from Pakseng migrated to the village.	The village was built in 1887. In 1960s, the total household number was only 20-30 HHs. After Sayaboury-Hong Sa road was constructed in 1995, migration into the village began and still is going on.
	Village organization other than formal one	none	Water management unit, Farmers' organization, Village financial organization..	Water management unit, Forest management unit, Farmers management unit.	Forest management unit, Farmers' management unit.	Water management unit, Forest management unit.	Water management unit.	A village fire fighting organization with 53 members.	Water management unit, Rice field owners groups.
Land	Topography	The village is located at the confluence of two rivers. The habitat area is surrounded by mountains, the elevation of which is around 350 m a.s.l. There is no paddy filed.	The village is surrounded by mountains. There are two paddy field areas. The main road and Nam Suang river cross southeast of the village. The habitat area is located in around 320 m a.s.l.	The habitat area is located in around 800 m a.s.l. along National Road No.1. Two streams flow through the bottom of valleys parallel to the habitat area.	The habitat area is on the Nam Seng river bank, with around 430 m a.s.l. Nam Seng river and Houay Noy stream flow from north to south through the village. There is a little flat land along Houay Noy stream, which can be develop as lowland paddy field.	The village is located in mountainous area. The habitat area is located along Road 4-A with around 580 m of a.s.l. Houay Fa stream and Pongong stream have water throughout the year. Some rive fields are located along the rivers.	The village is located in steep mountains with deep forest and covers huge area. The elevation of the habitat area is around 390 m a.s.l. Road Sayaboury-Hong Sa goes through the village and Nam Met river runs along.	The village is surrounded by mountain range. Nam Ping river and two streams flow through habitat area. Irrigated rice fields spread along the rivers. The habitat area is located at around 520 m a.s.l.	The village is located in basin surrounded relatively lo hills and mountains. A big river Nam Hung runs through the village and paddy field spreads along it. The habitat are is located at around 360 m a.s.l.
	Total Area (ha)	1,890 (PAFO)	2,912 (PAFO)	1,335 (PAFO)	494 (PAFO)	278 (PAFO)	Not available	2,775 (DAFO)	6,327 (DAFO)
	Agricultural Land (ha)	400 (PAFO)	250 (PAFO)	223 (PAFO)	138 (PAFO)	106 (PAFO)	70 (DAFO)	293 (DAFO)	266 (DAFO)
	Forest Land (ha)	1,480 (PAFO)	2,652 (PAFO)	1,012 (PAFO)	356 (PAFO)	169 (PAFO)	Not available	2,482 (DAFO)	6,061 (DAFO)

Table 1 Summary of Village Profile for 8 Candidate Villages (2/2)

Village		Pakseng	Hat Houay	Samton	Vangheung	Pongdong	Namtiao	Namon	Natak
Infrastructure	Water Supply	A gravity-fed piped water supply at the district hospital but most of villagers use water of the river.	There is a gravity-fed piped water supply system	The villagers use water of five streams. Nearest stream is within 10 minutes' walk.	The villagers use water from the river. New gravity-fed water supply system is under construction.	There is a gravity-fed water supply system with 6 faucets.	There is a gravity-fed water system with 5 faucets, constructed with assistance of CESVI in 2003.	There is a gravity-fed water supply system with 16 faucets. Well maintained by the villagers.	There is a gravity-fed water supply system with 9 faucets. Well maintained by the villagers.
	Road	The road to LPB was upgraded with the assistance of EU in 2002.	The road to LPB was upgraded with the assistance of EU in 2002.	In 1976, National Road No.1 was constructed. The road was rehabilitated in 2004.	In 1976, National Road No.1 was constructed. The road was rehabilitated in 2004.	National road 4-A was constructed in 1989-1992. The road is not in good condition and will be repaired in 2005.	Road Xayaboury-Hong Sa was constructed in 1995. Bad condition. It will be upgraded in a few years with ADB finance.	Road Xayaboury-Hong Sa was constructed in 1995. Bad condition. It will be upgraded in a few years with ADB finance.	Road Xayaboury-Hong Sa was constructed in 1995. Butt villagers still use old road as it is shorter (only 6 km to Xayaboruy city.)
	Electricity	none	none	none	Public electricity is available from 7 to 9 pm using a big generator.	Just came to the village in early 2004.	Micro-hydropower generators in Nam Met supply electricity to 11to12 HHs.	Micro-hydropower generators in Nam Ping supply electricity to 24 to25 HHs. 4 HHs have gasoline generators.	Public electricity came in 2003 but is now supplied only 48 HHs due to high installation cost.
Livelihood	Major crops	Upland rice, Sesame, Job's tear, Corn, etc.	Lowland rice, Upland rice, Sesame, Job's tear, etc.	Upland rice, Corn, Cassava, Sesame, Job's tear, etc.	Upland rice, Corn, Sesame, Cassava, etc.	Lowland rice, Upland rice, Job's tear, Orange, etc.	Upland rice, Corn, Job's tear, Sesame, etc.	Lowland rice, Upland rice, Job's tear, Sesame, Corn, Cassava, Sweet potato, etc.	Lowland rice, Upland rice, Corn, Job's tear, Sesame, Cotton, Vegetables, etc.
	Livestock (heads)	Buffalo (20), Cattle (10), Pig (300), Poultry (1,174), Turkey (50), Goat (35)	Buffalo (103), Cattle (0), Pig (97), Poultry (1,388), Goat (47)	Buffalo (74), Cattle (36), Pig (190), Poultry (764)	Buffalo (7), Cattle (0), Pig (150~200), Poultry (700~800), Goat (6)	Buffalo (116), Cattle (0), Pig (50~60), Poultry (2,500), Turkey (150)	Buffalo (20), Cattle (170), Pig (100~150), Poultry (about 1,000), Turkey (2), Elephant	Buffalo (427), Cattle (45), Pig (623), Poultry (6,044), Goat (5), Elephant (2)	Buffalo (374), Cattle (1), Pig (344), Poultry (7,560), Goat (15), Horse (3), Elephant (2)
	NTFPs	Paper mulberry, Tree bark, Tiger grass, Bamboo shoots, Mushroom, etc.	Paper mulberry, Tree bark, Tiger grass, Bamboo shoots, Mushroom, etc.	Paper mulberry, Tree bark, Tiger grass, Cardamon, Bamboo shoots, Mushroom,	Paper mulberry, Tree bark, Tiger grass, Bamboo shoots, Mushroom, etc.	Paper mulberry, Tree bark, Worm in bamboo, Bamboo shoots, Mushroom,	Paper mulberry, Sugar palm, Eagle wood, Bamboo shoot, Mushroom,	Paper mulberry, Sugar palm, Cardamon, Bamboo shoot, Mushroom,	Paper mulberry, Bamboo shoot, Mushroom, Resin, etc.
	Other activities	Fishing, Weaving, Embroidery, etc.	Fishing, Aquaculture, Weaving, etc.	Fishing, etc.	Fishing, Weaving, etc.	Weaving, Embroidery, Bamboo basket, etc.	Fishing, Embroidery, etc.	Fishing, Aquaculture, etc.	Fishing, Aquaculture, Weaving,
Remarks		No lowland paddy field.	There is a small irrigation system. Total lowland paddy field is 14.3 ha.	No lowland paddy field.	No lowland paddy field.	Total lowland paddy field is 27 ha and 12 ha of irrigated rice cultivation in the dry season.	Rich in NTFPs. 12 ha of potential land for paddy field.	148 ha of lowland paddy field, but no dry season irrigation system.	110 ha of lowland paddy field, but no dry season irrigation system.

Table 2 Major Products by Land Category

No.	Resources	Products	Remarks, */
1.	- Conservation Forest: - Protection Forest: - Community Production Forest	Bamboo Bamboo shoot Mushroom Rattan Construction materials (poles and timber) Herbal medical root Paper mulberry Tree bark Tiger grass Cardamon Benzoin Resin Worm in bamboo *"Me nomai"* Winding plant Sugar palm Rattan shoot Wild vegetable Small animals (birds, rats, snakes, frogs, Honey Buffalo (grazing) Cattle (grazing)	 Allowed only in Community Namtiao, Namon
2.	Lowland Paddy Field	Rice Garlic (dry season irrigated) Onion (dry season irrigated) Lettuce (dry season irrigated) Cabbage (dry season irrigated) Long beans (dry season irrigated) Buffalo (grazing) Cattle (grazing)	 Hat Houay Hat Houay Hat Houay Hat Houay Hat Houay Hat Houay, Pongdong, Namon, Natak Hat Houay, Pongdong, Namon, Natak
3.	Upland Agricultural Land -Slash and Burn - Fallow Land	Rice Sesame Job's tear Corn Peanut Cassava Tobacco Vegetables Buffalo (in fallow land) Cattle (in fallow land) Goat (in fallow land) Pig (in fallow land) Poultry	 Pongdong
4.	Upland Agricultural Land -Garden/Orchard	Orange Mango Jackfruit Coconut Paper mulberry	Pongdong Natak, Namon, Hat Houay
5.	Streams	Fish Small shrimp Crab Shell	
6.	Riversides	Dry season vegetable Paper mulberry Tiger grass Tree bark	

Note: */ Clear differences among the 8 villages, and/or remarkable explanations.

Table 3 Major Products/Resources for Marketing

Major Products/Resources	Pakseng	Hat Houay	B. Samton	Vangheung	Pongdong	Namtiao	Namon	Natak
A. Annual Crop								
1. Rice	O	O	O	O	O	O	O	O
4. Sesame	O	O	*	*	*	O	O	O
5. Job's tear	O	O	*	*	O	O	*	O
6. Dry season vegetables	*	O	-	*	*	*	O	*
7. Wet season vegetables	*	-	-	*	*	*	O	*
8. Peanut	-	*	-	-	-	*	-	-
9. Corn (dry season)	-	*	-	-	-	-	-	-
10. Corn (wet season)	O	-	*	*	*	*	*	*
11. Cassava	-	-	*	*	-	*	*	-
12. Pumpkin	-	-	*	-	-	-	-	-
13. Tobacco	-	-	-	-	*	-	-	-
14. Chili	*	-	-	*	*	-	-	*
15. Pineapple	*	-	-	-	-	*	-	-
16. Banana	*	-	-	-	-	-	-	*
17. Ginger	-	-	-	-	-	*	-	-
18. Eggplant	-	-	-	-	-	-	-	*
19. Cabbage	-	*	-	-	-	-	-	*
20. Garlic	-	*	-	-	-	-	-	*
21. Onion	-	*	-	-	-	-	-	*
22. Sugar cane	-	-	-	-	-	-	-	*
23. Sweet potato	-	-	-	-	-	-	*	-
B. Tree crop								
1. Orange	-	-	-	-	O	-	-	-
2. Fruit tree (mango, Jack fruit, etc.)	-	*	*	-	*	*	-	*
3. Coconut	-	*	-	-	-	-	-	-
4. Lemon	-	*	-	-	-	-	-	-
C. NTFPs								
1. Paper mulberry	O	O	O	O	O	*	*	O
2. Tree bark	*	*	O	*	*	-	O	-
3. Tiger grass	O	O	O	O	*	*	*	*
4. Bamboo shoot	*	*	*	*	O	*	*	*
5. Sugar palm	-	-	-	-	-	O	O	-
6. Rattan shoot	-	*	*	-	O	*	*	*
7. Herbal medical root	*	*	*	*	*	*	*	-
8. Mushroom	*	*	*	*	*	*	*	*
9. Natural fruits	*	*	*	*	-	*	*	-
10. Bee honey/nest/egg	*	*	*	*	-	*	-	-
11. Bamboo	*	*	*	*	*	*	*	*
12. Rattan	-	*	*	-	-	*	*	*
13. Resin	*	-	-	-	-	-	*	*
14. Benzoin	*	-	-	*	-	*	-	-
15. Eagle wood	*	-	-	-	-	*	-	-
16. Cardamon	-	*	*	-	-	*	*	-
17. *"Me Nomai"(Bamboo Larvae)*	*	*	*	*	*	*	*	-
D. Livestock								
1. Buffalo	*	O	O	*	*	*	*	O
2. Cattle	*	-	O	-	*	O	*	-
3. Pig	*	*	O	O	O	O	O	O
4. Poultry	*	*	*	O	O	O	O	O
5. Goat	*	*	O	*	-	-	-	*
6. Fish	*	*	*	O	*	*	O	*
E. Others								
1. Weaving	*	*	-	O	*	-	-	*
2. Embroidery	*	-	-	-	*	*	-	-
3. Bamboo handicraft	*	*	*	*	*	*	-	-
4. Rice wine	*	*	*	*	*	*	*	*
5. Blacksmith	*	*	*	*	*	-	*	*

Note:

O/ Ranked within 5th priority by whichever a male or female group during Venn diagram preparation.

*/ Claimed as major products/resources/economic activities during village profile survey, or claimed during Venn diagram preparation but not ranked as a high priority.

-/ Not claimed by either Venn diagram preparation nor village profile survey, but it does not always mean that such plants/crops/animals are not found in the village.

Table 4 Roles and Functions of the Offices

No.0685/MAF.01: Roles and Functions of NAFES (2001)

a. to implement the agriculture and forestry extension and dissemination in accordance with agriculture and forestry strategic guidelines and development plans;
b. to study and elaborate regulations, provisions, and policies with regard to agriculture and forestry extension;
c. to transfer and disseminate results / outputs of the agriculture and forestry research to farmers to improve productivity and at the same time to feed back farmer's comments and suggestions to research institutions;
d. to organize training for provincial and district extension staff, village extension workers, and farmers to upgrade their knowledge and capability in adopting appropriately new technologies;
e. to timely deliver and disseminate information related to the production techniques in each season through several types of media and by organizing study visits or establishing demonstration farms;
f. to formulate an agriculture and forestry extension strategy based on the potentials of each region and the agriculture and forestry development plans set by MAF;
g. to establish an agriculture and forest extension network;
h. to upgrade the capability of the staff and implement the policies; and
i. to cooperate / coordinate with foreign countries and international organizations.

No.1928/MAF.99: Roles and Functions of PAFO (1999)

a. to publicize and disseminate, supervise, guide and facilitate the implementation of agriculture and forestry strategic plans;
b. to collect and provide agricultural and forestry information to promote economic investments on agriculture, livestock and fishery, irrigation and forestry development;
c. to research and study the measures / means of food production and formulate a strategy for the promotion of agricultural and forestry production;
d. to disseminate techniques of plant and animal breeding;
e. to coordinate with other sectors in establishing and supporting agriculture and forestry production groups, water users groups or associations;
f. to supervise and facilitate the conservation of natural resources;
g. to construct and manage small and medium scale irrigation systems;
h. to research and develop policies and regulations to reduce sifting cultivation, illegal logging and exploitation of forestry resources,
i. to encourage and facilitate the implementation of tree planting and protect all types of existing natural forests from further exploitation;
j. to encourage and support the operation of schools, service centers, stations, and projects assigned by MAF.

No. 0172/MAF.02: Roles and Functions of PAFES (2002)

a. to develop and implement agriculture and forestry extension works in accordance with the agriculture and forestry strategic and development plans;
b. to elaborate agriculture and forestry extension strategic plans and projects based on the local conditions;
c. to organize short and long term training courses, technical seminars and workshops, experience and information exchange meetings for extension staff;
d. to coordinate with other sectors in establishing agriculture and forestry production groups, water users groups or associations;
e. to widely publish and disseminate agriculture and forestry technical information to farmers by means of manuals, radio and television programs, publicity boards, field visit and training, etc.;
f. to establish extension network for agriculture and forestry production and provide technical services to farmers focusing on targeting production areas for commodity production;
g. to actively cooperate with organizations and projects dealing with the extension works in the local area;
h. to establish networks for agricultural and forest production which could be connected with household agro-processing, handicraft and processing factories;
i. to collect, compile agriculture and forestry production data and information in each season, as well as information related to production organizations, marketing, prices of agriculture and forest products in the area.

No. 1929/MAF.99: Roles and Functions of DAFO (1999)

a. to develop and implement plans, programs, projects, instructions and regulations issued by MAF and/or PAFO;
b. to conduct surveys on agriculture and forestry, socio-economic data collection to create a data base or statistic for agricultural and forestry production planning in the responsible district;
c. to manage the use of agricultural and forest lands in accordance with laws and regulations;
d. to provide extension support and technical services in the fields of agriculture, animal husbandry, aqua-culture, veterinary, irrigation and forestry to production units / farmers;
e. to support and instruct farmers in organizing their production and increase the productivity by using intensive farming systems, new high yield crops and animal genetic resources;
f. to conduct regular inspection for protecting, preventing, and solving pathologic cases of animals, fishes and crops;
g. to transfer / hand over the existing irrigation facilities to farmer's group for full management and use and support farmer's initiatives in constructing simple irrigation schemes;
h. to organize, direct and command concrete measures for reducing illegal logging and shifting cultivation; and
i. to create favorable conditions for the agricultural and forestry production as well as business entities to operate their activities.

Table 5 Number of Training Courses that the Staffs of PAFOs and DAFOs have attended

Category	Sub-category	PAFOs							DAFOs					Total
		LMT	BKO	VTE	HPN	LPB	XYB	Subtotal	PKG	NAN	VKM	XYB	Subtotal	
General	Computer	3	8	12	1	21	2	47	0	2	0	2	4	**51**
	Language	5	10	18	1	20	3	57	0	1	0	2	3	**60**
	Others	0	0	8	0	4	0	12	0	0	0	1	1	**13**
	Sub-total	8	18	38	2	45	5	116	0	3	0	5	8	**124**
Management	Management	5	4	2	5	13	7	36	0	7	1	1	9	**45**
	Accounting	1	4	11	2	5	0	23	0	1	0	0	1	**24**
	Political	0	6	3	0	5	0	14	1	0	1	0	2	**16**
	Project management	2	15	15	10	17	5	64	1	2	0	0	3	**67**
	Statistics and data collection	0	0	4	0	1	2	7	1	1	0	1	3	**10**
	Data and document management	0	1	2	0	10	1	14	0	0	0	0	0	**14**
	Reporting	2	1	1	2	8	2	16	0	0	1	0	1	**17**
	Others	0	0	0	1	0	0	1	0	0	0	0	0	**1**
	Sub-total	10	31	38	20	59	17	175	3	11	3	2	19	**194**
Agriculture	Crops and general agriculture	1	1	15	0	1	5	23	0	2	0	0	2	**25**
	Fruit / tree crops	2	2	6	7	6	3	26	1	3	2	7	13	**39**
	Pest and disease control	2	1	7	0	4	1	15	0	0	0	0	0	**15**
	Land and soil management	2	3	3	2	0	0	10	0	0	0	1	1	**11**
	Rice production	5	5	12	8	16	4	50	0	3	0	4	7	**57**
	Sloping agricutlrue	0	8	7	1	2	0	18	0	2	0	0	2	**20**
	Phyto-sanitation	1	0	0	0	0	0	1	0	0	0	0	0	**1**
	Agricultural development	1	0	2	1	1	1	6	0	0	0	0	0	**6**
	Mushroom	0	2	1	0	2	0	5	0	0	0	1	1	**6**
	Others	0	0	5	0	1	0	6	0	0	0	0	0	**6**
	Sub-total	14	22	58	19	33	14	160	1	10	2	13	26	**186**
Extension	Extension methods / training	8	10	9	5	17	6	55	1	3	0	3	7	**62**
	Credit	0	2	0	0	3	0	5	0	0	0	0	0	**5**
	Participatory / community dev	6	5	14	5	13	4	47	3	2	0	4	9	**56**
	Rural development	0	3	3	0	3	3	12	0	0	0	0	0	**12**
	Marketing	0	0	0	1	0	0	1	0	0	0	0	0	**1**
	Others	2	2	0	1	1	1	7	0	1	0	1	2	**9**
	Sub-total	16	22	26	12	37	14	127	4	6	0	8	18	**145**
Forestry	Forestry low / regulations	0	0	1	0	0	0	1	0	0	0	0	0	**1**
	Forest / resource management	1	0	5	3	4	4	17	0	2	0	2	4	**21**
	Forestry inventory / survey	2	0	7	4	1	0	14	0	0	0	0	0	**14**
	Community forestry	0	2	3	3	2	1	11	0	0	0	0	0	**11**
	Protection / conservation	0	4	2	2	2	6	16	0	0	0	7	7	**23**
	Land use and mapping	1	2	0	9	10	4	26	1	4	0	1	6	**32**
	Seed / seedling management	1	7	2	3	1	0	14	0	2	0	1	3	**17**
	Reforestation / plantation dev.	5	4	3	3	12	4	31	0	0	0	0	0	**31**
	Watershed management	0	0	5	1	1	2	9	0	0	0	1	1	**10**
	Sivicultural practice	1	0	0	0	0	0	1	0	0	0	0	0	**1**
	Others	0	0	0	0	2	0	2	0	0	0	1	1	**3**
	Sub-total	11	19	28	28	35	21	140	1	8	0	13	21	**161**
Irrigation	General	0	0	3	1	1	0	5	0	0	0	0	0	**5**
	Survey & design	7	2	1	3	1	0	14	0	0	0	2	2	**16**
	O&M and water management	1	2	16	1	3	2	25	0	2	1	0	3	**28**
	Irrigation development	1	1	9	1	6	11	29	0	0	0	3	3	**32**
	Supervision of construction	1	0	6	1	1	7	16	0	0	0	6	6	**22**
	Computer (esp for designing)	0	4	0	2	0	0	6	0	0	0	0	0	**6**
	Pump irrigation	0	1	2	1	1	0	5	0	0	1	0	1	**6**
	Others	0	0	2	0	0	0	2	0	0	0	0	0	**2**
	Sub-total	10	10	39	10	13	20	102	0	2	2	11	15	**117**
Livestock	General	0	1	0	1	0	2	4	0	1	2	0	3	**7**
	Fishery development	7	2	12	3	5	4	33	0	2	0	2	4	**37**
	Animal raising	8	0	6	0	7	5	26	0	0	0	6	6	**32**
	Animal feed / forage production	0	0	7	1	1	1	10	0	1	0	0	1	**11**
	Veterinary	3	4	6	3	7	3	26	0	1	1	0	2	**28**
	Meat inspection	0	2	1	0	0	1	4	0	0	0	0	0	**4**
	Others	0	0	0	0	0	1	1	0	0	0	0	0	**1**
	Sub-total	18	9	32	8	20	17	104	0	5	3	8	16	**120**
Meteo		4	5	9	0	3	4	25	0	0	0	1	1	**26**
Others	Drug control	0	3	0	3	0	3	9	0	0	0	0	0	**9**
	Gender	1	0	8	1	6	4	20	0	1	0	0	1	**21**
	Environment	0	0	4	1	0	0	5	0	1	0	0	1	**6**
	Others	1	1	3	7	8	1	21	0	0	0	0	0	**21**
	Sub-total	2	4	15	12	14	8	55	0	2	0	0	2	**57**
Total		**93**	**140**	**283**	**111**	**259**	**120**	**1,004**	**9**	**47**	**10**	**61**	**126**	**1,130**

Table 6 Long Lists of Training Courses by the Office (1/2)

A. Extension Workers

	Items	Relevance <1	Impact <2	Consistency	Acceptance	Priority
1	**PAFES**					
1.1	**Management**					
(1)	Administrative management	M (3)	M-H (4)	L-M (2)	H (5)	**M-H (14)**
(2)	Project cycle management	H (5)	H (5)	H (5)	H (5)	**H (20)**
(3)	Planning and data collectio & analysis	H (5)	H (5)	M (3)	M-H (4)	**H (18)**
(4)	English language	M-H (4)	H (5)	M (3)	H (5)	**M-H (17)**
(5)	Computer skill	M-H (4)	H (5)	M (3)	H (5)	**M-H (17)**
(6)	Financial management	L-M (2)	M (3)	L-M (2)	M-H (4)	**M (11)**
1.2	**Technical training**					
(1)	Extension system	H (5)	H (5)	H (5)	H (5)	**H (20)**
(2)	Extension techniques	H (5)	H (5)	H (5)	H (5)	**H (20)**
(3)	Agriculture techniques	M (3)	L-M (2)	M-H (4)	M-H (4)	**M (13)**
(4)	Forestry techniques	M (3)	M (3)	M (3)	M-H (4)	**M (13)**
(5)	Livestock techniques	L-M (2)	L-M (2)	M-H (4)	M-H (4)	**M (12)**
(6)	Others	M (3)	M-H (4)	M-H (4)	M (3)	**M-H (14)**
2	**DAFO**					
2.1	**Management**					
(1)	Administration management	H (5)	M-H (4)	L-M (2)	H (5)	**M-H (16)**
(2)	Project cycle management	H (5)	M-H (4)	H (5)	H (5)	**H (19)**
(3)	Planning and data collectio & analysis	H (5)	H (5)	M - H (4)	M-H (4)	**H (18)**
(4)	English language	L-M (2)	L-M (2)	M (3)	H (5)	**M (12)**
(5)	Computer skill	L-M (2)	L-M (2)	M (3)	H (5)	**M (12)**
(6)	Financial management	M-H (4)	M-H (4)	L-M (2)	M (3)	**M (13)**
2.2	**Technical training**					
(1)	Extension system	H (5)	H (5)	H (5)	H (5)	**H (20)**
(2)	Extension techniques	H (5)	H (5)	H (5)	H (5)	**H (20)**
(3)	Agriculture techniques	H (5)	M - H (4)	M-H (4)	H (5)	**H (18)**
(4)	Forestry techniques	H (5)	M - H (4)	M (3)	M-H (4)	**M-H (16)**
(5)	Livestock techniques	H (5)	M - H (4)	M-H (4)	H (5)	**H (18)**
(6)	Others	H (5)	H (5)	M-H (4)	L-M (2)	**M-H (16)**

Note: <1: "Relevance" means the relevance of training courses to the daily work / tasks of the staff.
<2: "Impact" is to be judged by the effectiveness of the training on the respective works.
<3: "Consistency" is based on the consistency of training with project activities of FORCOM.
<4: "Acceptance" is judged by the willingness of the staff based on the results of questionnaire survey as well as workshop.

Table 6 Long Lists of Training Courses by the Office (2/2)

B. Subject Matter Specialists (PAFO)

	Items	Relevance <1	Impact <2	Consistency	Acceptance	Priority
1	**Management**					
(1)	Planning and data collectio & analysis	H (5)	H (5)	M (3)	H (5)	**H (18)**
(2)	Administrative management	H (5)	M-H (4)	L (1)	H (5)	**M-H (16)**
(3)	Document management	M-H (4)	M-H (4)	L (1)	M-H (4)	**M (13)**
(4)	English language	M-H (4)	H (5)	M (3)	H (5)	**M-H (17)**
(5)	Computer skill	M-H (4)	H (5)	M (3)	H (5)	**M-H (17)**
(6)	Project cycle management	H (5)	H (5)	H (5)	H (5)	**H (20)**
(7)	Human resource development	M-H (4)	M-H (4)	M-H (4)	M (3)	**M-H (15)**
(8)	Financial management	M-H (4)	M-H (4)	L (1)	M-H (4)	**M (13)**
2	**Technical training**					
2.1	**Agriculture**					
(1)	Seed multiplication	M-H (4)	M-H (4)	M (3)	M-H (4)	**M-H (15)**
(2)	Soil management	M (3)	M (3)	M-H (4)	M-H (4)	**M-H (14)**
(3)	Upland farming & sloping agriculture	H (5)	M-H (4)	H (5)	M-H (4)	**H (18)**
(4)	Pest and disease control	M-H (4)	M-H (4)	M (3)	M-H (4)	**M-H (15)**
(5)	Propagation of planting materials	H (5)	H (5)	H (5)	M-H (4)	**H (19)**
(6)	Plant quarantine / phyto-sanitation	H (5)	H (5)	L (1)	M-H (4)	**M-H (15)**
(7)	Agroforestry	M-H (4)	M-H (4)	M-H (4)	M (3)	**M-H (15)**
2.2	**Livestock**					
(1)	Breeding (Improvement of variety)	M-H (4)	M-H (4)	M (3)	M-H (4)	**M-H (15)**
(2)	Livestock raising	H (5)	M-H (4)	H (5)	M-H (4)	**H (18)**
(3)	Veterinary service and diagnostics	H (5)	H (5)	H (5)	H (5)	**H (20)**
(4)	Fingerling production	H (5)	H (5)	M-H (4)	H (5)	**H (19)**
(5)	Fish culture	M-H (4)	M-H (4)	H (5)	M-H (4)	**M-H (17)**
(6)	Animal quarantine	M-H (4)	H (5)	L (1)	M-H (4)	**M-H (14)**
2.3	**Forestry**					
(1)	Land use planning and mapping	H (5)	H (5)	M-H (4)	H (5)	**H (19)**
(2)	Land allocation procedure	H (5)	M-H (4)	M-H (4)	M (3)	**M-H (16)**
(3)	Forestry inventory	M (3)	M-H (4)	L-M (2)	M-H (4)	**M (13)**
(4)	Community forestry	M-H (4)	H (5)	M-H (4)	M (3)	**M-H (16)**
(5)	Seed management	M-H (4)	M (3)	L-M (2)	M-H (4)	**M (13)**
(6)	Sustainable forest management	H (5)	H (5)	M-H (4)	M-H (4)	**H (18)**
(7)	Silvicultural	M-H (4)	M-H (4)	L-M (2)	M (3)	**M (13)**
(8)	Forest fire protection (for Xayaboury)	M-H (4)	H (5)	L-M (2)	H (5)	**M-H (16)**
(9)	Reforatation	M (3)	M-H (4)	L-M (2)	M-H (4)	**M (13)**
(10)	NTFP management	M (3)	H (5)	H (5)	M-H (4)	**M-H (17)**
2.4	**Irrigation**					
(1)	Development planning	H (5)	H (5)	M-H (4)	M-H (4)	**H (18)**
(2)	O&M of irrigation system	H (5)	H (5)	L-M (2)	H (5)	**M-H (17)**
(3)	Transfer of irrigation system	H (5)	H (5)	L-M (2)	H (5)	**M-H (17)**
(4)	Supervision and inspection of construction	H (5)	M-H (4)	L (1)	M-H (4)	**M-H (14)**
(5)	Design in computer	M-H (4)	M (3)	L (1)	H (5)	**M (13)**
2.5	**Meteorology**					
(1)	Data collection and processing	H (5)	H (5)	L (1)	H (5)	**M-H (16)**

Note: <1: "Relevance" means the relevance of training courses to the daily work / tasks of the staff.
<2: "Impact" is to be judged by the effectiveness of the training on the respective works.
<3: "Consistency" is based on the consistency of training with project activities of FORCOM.
<4: "Acceptance" is judged by the willingness of the staff based on the results of questionnaire survey as well as workshop.

Table 7 Major Products/Resources in the 4 Priority Villages

Major Products/Resources	Priority Villages			
	B. Hat Houay	B. Samton	B. Pongdong	B. Namon
A. Annual Crop				
1. Rice	O	O	O	O
4. Sesame	O	*	*	O
5. Job's tear	O	*	O	*
6. Dry season vegetables	O	-	*	O
7. Wet season vegetables	-	-	*	O
8. Peanut	*	-	-	-
9. Corn (dry season)	*	-	-	-
10. Corn (wet season)	-	*	*	*
11. Cassava	-	*	-	*
12. Pumpkin	-	*	-	-
13. Tobacco	-	-	*	-
14. Chili	-	-	*	-
15. Sweet potato	-	-	-	*
B. Tree crop				
1. Orange	-	-	O	-
2. Fruit tree (mango, Jack fruit, etc.)	*	*	*	-
3. Coconut	*	-	-	-
4. Lemon	*	-	-	-
C. NTFPs				
1. Paper mulberry	O	O	O	*
2. Tree bark	*	O	*	O
3. Tiger grass	O	O	*	*
4. Bamboo shoot	*	*	O	*
5. Sugar palm	-	-	-	O
6. Rattan shoot	*	*	O	*
7. Herbal medical root	*	*	*	*
8. Mushroom	*	*	*	*
9. Natural fruits	*	*	-	*
10. Bee honey/nest/egg	*	*	-	-
11. Bamboo	*	*	*	*
12. Rattan	*	*	-	*
13. Resin	-	-	-	*
14. Cardamon	*	*	-	*
15. *"Me Nomai"(Worm in Bamboo)*	*	*	*	*
D. Livestock				
1. Buffalo	O	O	*	*
2. Cattle	-	O	*	*
3. Pig	*	O	O	O
4. Poultry	*	*	O	O
5. Goat	*	O	-	-
6. Fish	*	*	*	O
E. Others				
1. Weaving	*	-	*	-
2. Embroidery	-	-	*	-
3. Bamboo handicraft	*	*	*	-
4. Rice wine	*	*	*	*
5. Blacksmith	*	*	*	*

Note:

O/ Ranked within 5th priority by whichever a male or female group during Venn diagram preparation.

*/ Claimed as major products/resources/economic activities during village profile survey, or claimed during Venn diagram preparation but not ranked as a high priority.

-/ Not claimed by either Venn diagram preparation nor village profile survey, but it does not always mean that such plants/crops/animals are not found in the village.

Table 8 Development Potential of Proposed Crops/Resources (Hat Houay)

Products/Resources	Present Conditions			Development Potential	
	Productivity	Processing	Marketing	Production	Marketing
A. Annual Crop					
1. Rice	- The total area of lowland paddy field in the village is limited. (14.3 ha) - Irrigation system was constructed with assistance of Quaker in 1991 - Improved technology for lowland rice cultivation is not yet introduced. - According to the village head, the average yield of lowland rice is 3 ton/ha in the wet season, 5 ton/ha in the dry season, which seem to be too high and should be confirmed.		- Price (milled rice) is high (3,000 Kip/kg) in July to September and low (1,500 Kip/kg) in January.	Medium	Medium
2. Sesame and Job's tear	- Easily affected by weather and plant diseases. - Protection/measurement for soil erosion is not yet properly introduced in sloping land. - Agricultural inputs are not introduced, thus the soil fertility is decreasing.	- Drying process by the villagers is not sufficient.	- Price fluctuation of sesame and Job's tear. Sesame = 5,400~7,000 Kip/kg. - The price of Job's tear in the village is 1,000 Kip/kg.	Medium	High
3. Dry season vegetables	- Irrigation water is limited. - Many kinds of cash crops such as peanut, garlic, onion, lettuce, cabbage and long beans are planted in irrigated paddy fields during the dry season.		- Peanut, onion and garlic are sold to the middleman, and other crops are mainly consumed in the village.	Medium	Medium
B. Tree crop					
1. Fruit tree	- Such fruit trees as Jackfruit, coconut, mango, lemon and tamarind are planted only in the habitat area, thus the production is small.		- 3,000 Kip/fruit for Jackfruit, 2,000 Kip/fruit for coconut, 2,000 Kip/kg for mango, 2,000 Kip/kg for tamarind	Medium	Medium
C. NTFPs					
1. Paper mulberry and tree bark	- Natural resources like paper mulberry and tree bark are being exhausted. - About 40% of paper mulberry is collected in natural forest and the other 60% is grown in gardens. - The villagers started to collect and sell "tree bark" in 2000.	- Drying process by the villagers is not sufficient.	- Price fluctuation of paper mulberry.	Medium	High
2. Mushroom	- The villagers collect many kinds of wild mushrooms in the forest during the rainy season.			Low	Medium
D. Livestock					
1. Buffalo and Cattle	- Suffer from animal diseases due to no vaccination, or improper/insufficient vaccination is practiced. - Suitable grass land and a certain extent of land is needed. - A certain amount of money is needed for newly investment.		- Only one middle man, living in Hat Houay, handles all agricultural products/NTFPs and livestock from the village.	Medium	High
2. Pig	- Suffer from Hog cholera. - Raising pig is hard work and time consuming. For feeding pigs, growing feed crops like corn and cassava is needed.			Medium	Medium
3. Poultry	- Suffer from chicken cholera in April and May.			Medium	Medium
4. Goat	- No long experience to raise goats. - Shortage of grass in the dry season. Goats eat crops in slash and burn cultivation area. Fencing is needed.			Medium	Medium
5. Fish	- Number (amount) of fishes in the river decreased significantly. - Now, five (5) households grow fishes in their ponds. In former Houay Ouang village area, 15~16 households used to grow fishes for several years. But all of them have quitted after flood in 2001. Fishpond facilities seems to be primitive.			Medium	Low
E. Others					
1. Weaving	- Women in 42 households weave textile throughout the year, but the net profit for weaving is very small.		- Design of textile should be improved for more value-added	Medium	Medium

Table 9 Development Potential of Proposed Crops/Resources (Samton)

Products/Resources	Present Conditions			Development Potential	
	Productivity	Processing	Marketing	Production	Market
A. Annual Crop					
1. Sesame and Job's tear	- Easily affected by weather and plant diseases. The yields very from 40 to 300 kg/ha depending on weather. - Protection/measurement for soil erosion is not yet properly introduced in sloping land. - Agricultural inputs are not introduced, thus the soil fertility is decreasing.	- Drying process by the villagers is not sufficient	- Price fluctuation of sesame and Job's tear.	Medium	High
C. NTFPs					
1. Paper mulberry and tree bark	- Natural resources like paper mulberry and tree bark are being exhausted. - About 80% of paper mulberry is collected in natural forest and the other 20% is grown in gardens. - Plantation of "tree bark" is just at trial stage by DAFO.	- Drying process by the villagers is not sufficient.	- Prices change up and down all the time. Paper mulberry = 2,500 to 3,000 Kip/kg, Tree bark = 4,500 Kip/kg	Medium	High
2. Mushroom	- The villagers collect many kinds of wild mushrooms in the community production forest during the rainy season.			Low	Medium
D. Livestock					
1. Buffalo and Cattle	- Suffer from animal diseases due to no vaccination, or improper/insufficient vaccination is practiced. - Suitable grass land and a certain extent of land is needed. - A certain amount of money is needed for newly investment.			Medium	High
2. Pig	- Suffer from Hog cholera. Almost all pigs died from epidemics at the habitat area along the road in February 2004 but not so many have died at pastures near Houav Sa Nvao. - Raising pigs is hard work and time consuming. For feeding pigs, growing corn and cassava is needed.			Medium	Medium
3. Poultry	- Suffer from chicken cholera in April and May.			Medium	Medium
4. Goat	- No long experience to raise goats. Except cooperative growing by Lao Women's Union, the villagers began to raise goats just last year (2003). - Cooperative goats raising by Lao Women's Union of the village - Shortage of grass in the dry season. Goats eat crops in slash and burn cultivation area. Fencing is needed.			Medium	Medium

Table 10 Development Potential of Proposed Crops/Resources (Pondgong)

Products/Resources	Present Conditions			Development Potential	
	Productivity	Processing	Marketing	Production	Market
A. Annual Crop					
1. Rice	- The total area of lowland paddy field in the village is limited. (27 ha) - Improved technology for lowland rice cultivation is not yet introduced. - Rats damage has increased for last several years. - The average yield of lowland rice is 2.5 ton/ha in the wet season, 3 ton/ha in the dry season.		Price (milled rice) is high (2,500 Kip/kg) in July to September and low (1,800 Kip/kg) in October, and (1,700 Kip/kg in) November.	Medium	Medium
2. Job's tear	- Easily affected by weather and plant diseases. Average yield is about 2.0 ton/ha. - Protection/measurement for soil erosion is not yet properly introduced in sloping land. - Not long experience. Villagers began to grow Job's tear as cash crop in 1999. - Agricultural inputs are not introduced, thus the soil fertility is decreasing.	- Drying process by the villagers is not sufficient.	- Price fluctuation of Job's tear.	Medium	High
3. Dry season vegetables	- They mainly grow rice in irrigated paddy field in the dry season, not grow cash crops, which need less water for growing.			Medium	Medium
B. Tree crop					
1. Orange and other fruit tree	- Many trees are damaged by plant diseases. - No technical assistance are provided by DAFO. - Many trees need to be renewed.			Medium	High
C. NTFPs					
1. Paper mulberry	- Natural paper mulberry are being exhausted. - Almost all paper mulberry is collected in natural forest. Five (5) households started to grow paper mulberry in their gardens (2.5 ha) in 2003.	- Drying process by the villagers is not sufficient.	- Price fluctuation of paper mulberry. Paper mulberry = 3,000 Kip/kg	Medium	High
2. Mushroom	- The villagers collect many kinds of wild mushrooms in the forest during the rainy season.			Low	Medium
D. Livestock					
1. Buffalo	- Suffer from animal diseases due to no vaccination, or improper/insufficient vaccination is practiced. - Suitable grass land and a certain extent of land is needed. - A certain amount of money is needed for newly investment.			Medium	High
2. Pig	- Suffer from Hog cholera. - Raising pigs is hard work and time consuming. For feeding pigs, growing feed crops like corn and cassava is needed. - Pigs kept in the habitat area tend to easily suffer from epidemic diseases and die.			Medium	Medium
3. Poultry	- Suffer from chicken cholera in April and May.			Medium	Medium
4. Fish	- Number (amount) of fishes in the river decreased significantly. - There are one village common fishpond and 19 private owned fishponds, all of which are for household consumption due to small amount of production.			Medium	Low
E. Others					
1. Weaving and Embroidery	- Weaving is widely conducted by female, and commercial embroidery is also conducted by female. This commercial embroidery just began in 2003.		- Middlemen bring sample and all the materials. It takes one month to complete a sheet of embroidery, with a value of 38,000 Kip/sheet.	Medium	Medium

Table 11 Development Potential of Proposed Crops/Resources (Namon)

Products/Resources	Present Conditions			Development Potential	
	Productivity	Processing	Marketing	Production	Market
A. Annual Crop					
1. Rice	- The area of lowland paddy field is limited (148 ha) compared with a total of 247 households in the village. - Improved technology for lowland rice cultivation is not yet introduced. - The average yield of lowland rice varies from 1.0 ton/ha when damaged by diseases, insects/rats or water deficient, to 4.0 ton/ha when good weather and enough water available.		- Price (milled rice) is high (3,500 Kip/kg) from August to October and no price (nobody buy rice) in November and December.	Medium	Medium
2. Sesame and Job's tear	- Easily affected by weather and plant diseases. - Protection/measurement for soil erosion is not yet properly introduced in sloping land. - Agricultural inputs are not introduced, thus the soil fertility is decreasing.	- Drying process by the villagers is not sufficient.	- Price fluctuation of sesame and Job's tear. - The price of Job's tear in the village is not stable, 500 Kip/kg in 2002 and 1,000 Kip/kg in 2003.	Medium	High
C. NTFPs					
1. Paper mulberry	- Natural paper mulberry is being exhausted. - About 50% of paper mulberry is collected in natural forest and the other 50% is grown in gardens.	- Drying process by the villagers is not sufficient.	- The price of paper mulberry in the village is not stable, 2,500 Kip/kg in 2003 and 1,500 Kip/kg in 2004.	Medium	High
2. Sugar palm	- Sugar palm is presently not available in a short distance due to over harvest. Resource management should be introduced before sugar palm being exhausted.	- After harvesting, boiling, crushing and chemical treatment is necessary before transporting to the factory.	- The price of sugar palm in the village is 2,500 Kip/kg.	Medium	High
3. Mushroom	- The villagers collect many kinds of wild mushrooms in the forest during the rainy season but no market for selling.			Low	Medium
D. Livestock					
1. Cattle	- Suffer from animal diseases due to no vaccination, or improper/insufficient vaccination is practiced. - Suitable grass land and a certain extent of land is needed. - A certain amount of money is needed for newly investment.			Medium	High
2. Pig	- Suffer from Hog cholera. - Raising pigs is hard work and time consuming. For feeding pigs, growing feed crops like corn and cassava is needed. The villagers think raising pigs does not pay.			Medium	Medium
3. Poultry	- Suffer from chicken cholera in April and May.			Medium	Medium
4. Fish	- Number (amount) of fishes in the river decreased significantly. - Ten (10) households have fish ponds for family consumption, due to small amount of production.			Medium	Low

Table 12 Possible Livelihood Development Options (Hat Houay) (1/2)

Option	Outline	Inputs
A. Annual crop		
1. Improvement of Rice Production	- Target group: Lowland rice farmers - Target crop: Lowland rice - Objective: To increase the productivity of rice through improved technology. - Activity-1: Technical improvement of rice cultivation through IRRI package such as i) proper application of fertilizer, ii) proper application of improved variety seeds, and iii) introduction of IPM, etc. - Activity-2: Strengthening of Water User's Group	- Training on IRRI package and IPM by DAFO to the farmers through demonstration farms. - Training on irrigation water management by DAFO to the farmers. - Material supply: Improved variety seeds for demonstration
2. Cash Crop Production	- Target group: Lowland rice farmers - Target crops: Peanut, garlic, onion, cabbage, chili, etc. - Objective: To increase the productivity of cash crops in the irrigated paddy filed in the dry season. - Activity-1: Technical improvement of growing cash crops including proper application of seeds and fertilizer, and management of irrigation water. - Activity-2: Strengthening of Water User's Group	- Training of the farmers' group by DAFO in improving dry season cash crop cultivation through demonstration farms. - Provision of market information from DAFO to the farmers.
3. Sustainable Upland Farming	- Target group: Upland farmers - Target crops: Sesame, Job's tear, corn, etc. - Objective: Establishment of practical/simple sustainable upland farming technology in the existing slash and burn cultivation area in order to sustain productivities of upland crops. - Activity-1: Organization of "sustainable upland farming" group based on the farmers' need in the village and their initiative. - Activity-2: Introduction of practical/simple SALT (Sloping Agricultural Land Technology) such as i) hedge row establishment, ii) mulching, and iii) application of organic manure or chemical fertilizer, etc.	- Training of the farmers' group by DAFO in establishing sustainable upland farming through demonstration farms. - Material supply to the demonstration farms such as seedlings for hedge rows.
B. Tree crop		
1. Fruit Tree Plantation	- Target group: Upland farmers - Target crops: Mango, Jack fruit, tamarind, lemon, etc. - Objective: Increase of production and promotion of marketing of fruit tree crops. - Activity-1: Organization of "fruit tree plantation" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Introduction of establishment of village nursery for fruit tree seedlings.	- Training of the farmers by DAFO in preparing village nurseries.
C. NTFPs		
1. Paper Mulberry Plantation	- Target group: Upland farmers - Objective: Sustainable production of paper mulberry. - Activity-1: Organization of "paper mulberry plantation" farmers' group based on farmers' need and their - Activity-2: Establishment and extension of paper mulberry gardens and shifting from collecting natural paper mulberry to planting paper mulberry in a sustainable way.	- Training of the farmers' group by DAFO in establishing paper mulberry gardens, including site visits to successful/advanced farmers related to paper mulberry plantation.
2. Bark Tree Plantation	- Target group: Upland farmers - Objective: Sustainable production of tree bark. - Activity-1: Organization of "bark tree plantation" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Establishment and extension of bark tree gardens and shifting from collecting natural tree bark to planting bark tree in a sustainable way.	- Training of the farmers' group by DAFO in establishing bark tree gardens, including site visits to successful/advanced farmers related to bark trees.
3. Mushroom Culture	- Target group: Upland farmers and land less farmers - Target crop: Mushroom - Objective: Introduction of mushroom culture for marketing promotion - Activity-1: Organization of "mushroom culture" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Training of technology on mushroom culture through a demonstration unit and extension such technology to the villagers.	- Training of the farmers' group by DAFO in establishing a demonstration unit for mushroom culture. - Supply of materials for a demonstration unit.

Table 12 Possible Livelihood Development Options (Hat Houay) (2/2)

Option	Outline	Inputs
D. Livestock		
1. Animal Bank	- Target group: All farmers - Target animals: Buffalo, cattle, pig and goat. - Objective: To promote large animal raising in the village through revolving animal system. - Activity-1: Organization of "animal bank" farmers' group based on the farmers need in the village and their initiative. - Activity-2: Provide seed animals to the first group farmers, young animals of which will be revolved to the second group farmers after having calves, piglets and kids. - Activity-3: Management of revolving activities of provided seed animals by the farmers group. - Activity 4: Establishment of sustainable vaccination system in the village level from financial as well as technical points of view. - Activity-5: Monitoring and follow-up of revolving activities of provided seed animals by DAFO.	- Training of village veterinary volunteers on animal vaccination. - Training of the villagers' group in management of animal revolving system by DAFO. - Provision of seed animals.
2. Native Chicken Raising	- Target group: Upland farmers and landless farmers - Target animals: Chicken - Objective: To promote native chicken raising through micro-credit system. - Activity-1: Organization of "chicken raising" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Management of seed money by the farmer's group. - Activity-3: Monitoring and follow-up of the chicken raising farmers' group activities by DAFO.	- Training of the farmers' group in micro credit system and its management by DAFO. - Triaging of the farmers' group in proper chicken raising system by DAFO. - Provision of seed money for micro credit.
3. Aquaculture	- Target group: Aquaculture farmers and landless farmers - Objective: To promote aquaculture by extending fishponds through micro-credit system. - Activity-1: Organization of "aquaculture" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Construction of low-cost fish ponds or rehabilitation of the existing fish ponds - Activity-3: Management of seed money by the farmer's group. - Activity-4: Monitoring and follow-up of the aquaculture farmers' group activities by DAFO.	- Training of the aquaculture farmers' group in micro credit system and its management by DAFO. - Triaging of the farmers' group in proper fish raising system by DAFO. - Provision of seed money for micro credit.
E. Others		
1. Weaving promotion	- Target group: All farmers - Objective: To promote weaving activities and marketing of the products. - Activity-1: Organization of "weaving" group based on the women's need in the village and their initiative. - Activity-2: Management of seed money by the women's group. - Activity-3: Monitoring and follow-up of the weaving group activities by DAFO cooperation with the district LWU (Lao Women's Union)	- Training of the weaving women's group in micro credit system and its management by DAFO cooperation with the district LWU. - Training of the women's group in designing market oriented products as well as marketing of those products by cooperation with related NGOs, etc.

Table 13 Possible Livelihood Development Options (Samton)

Option	Outline	Inputs
A. Annual crop		
1. Sustainable Upland Farming	- Target group : Upland farmers - Target crops : Sesame, Job's tear, corn, etc. - Objective: Establishment of practical/simple sustainable upland farming technology in the existing slash and burn cultivation area in order to sustain productivities of upland crops. - Activity-1: Organization of "sustainable upland farming" group based on the farmers' need in the village and their initiative. - Activity-2: Introduction of practical/simple SALT (Sloping Agricultural Land Technology) such as i) hedge row establishment, ii) mulching, and iii) application of organic manure or chemical fertilizer, etc.	- Training of the farmers' group by DAFO in establishing sustainable upland farming through demonstration farms. - Material supply to the demonstration farms such as seedlings for hedge rows.
C. NTFPs		
1. Paper Mulberry Plantation	- Target group: Upland farmers - Objective: Sustainable production of paper mulberry. - Activity-1: Organization of "paper mulberry plantation" farmers' group based on farmers' need and their initiative. - Activity-2: Establishment and extension of paper mulberry gardens and shifting from collecting natural paper mulberry to planting paper mulberry in a sustainable way.	- Training of the farmers' group by DAFO in establishing paper mulberry gardens, including site visits to successful/advanced farmers related to paper mulberry plantation.
2. Bark Tree Plantation	- Target group: Upland farmers - Objective: Sustainable production of tree bark. - Activity-1: Organization of "bark tree plantation" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Establishment and extension of bark tree gardens and shifting from collecting natural tree bark to planting bark tree in a sustainable way.	- Training of the farmers' group by DAFO in establishing bark tree gardens, including site visits to successful/advanced farmers related to bark trees.
3. Mushroom Culture	- Target group: Upland farmers and landless farmers - Target crop: Mushroom - Objective: Introduction of mushroom culture for marketing promotion - Activity-1: Organization of "mushroom culture" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Training of technology on mushroom culture through a demonstration unit and extension such technology to the villagers.	- Training of the farmers' group by DAFO in establishing a demonstration unit for mushroom culture. - Supply of materials for a demonstration unit.
D. Livestock		
1. Animal Bank	- Target group: All farmers - Target animals: Buffalo, cattle, pig and goat. - Objective: To promote large animal raising in the village through revolving animal system. - Activity-1: Organization of "animal bank" farmers' group based on the farmers need in the village and their initiative. - Activity-2: Provide seed animals to the first group farmers, young animals of which will be revolved to the second group farmers after having calves, piglets and kids. - Activity-3: Management of revolving activities of provided seed animals by the farmers group. - Activity 4: Establishment of sustainable vaccination system in the village level from financial as well as technical points of view. - Activity-5: Monitoring and follow-up of revolving activities of provided seed animals by DAFO.	- Training of village veterinary volunteers on animal vaccination. - Training of the villagers' group in management of animal revolving system by DAFO. - Provision of seed animals.
2. Native Chicken Raising	- Target group: Upland farmers and land less farmers - Target animals: Chicken - Objective: To promote native chicken raising through micro-credit system. - Activity-1: Organization of "chicken raising" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Management of seed money by the farmer's group. - Activity-3: Monitoring and follow-up of the chicken raising farmers' group activities by DAFO.	- Training of the farmers' group in micro credit system and its management by DAFO. - Training of the farmers' group in proper chicken raising system by DAFO. - Provision of seed money for micro credit.

Table 14 Possible Livelihood Development Options (Pongdong) (1/2)

Option	Outline	Inputs
A. Annual crop		
1. Improvement of Rice Production	- Target group : Lowland rice farmers - Target crop : Lowland rice - Objective : To increase the productivity of rice through improved technology. - Activity-1: Technical improvement of rice cultivation through IRRI package such as i) proper application of fertilizer, ii) proper application of improved variety seeds, and iii) introduction of IPM, - Activity-2: Strengthening of Water User's Group	- Training on IRRI package and IPM by DAFO to the farmers through demonstration farms. - Training on irrigation water management by DAFO to the farmers. - Material supply: Improved variety seeds for
2. Cash Crop Production	- Target group : Lowland rice farmers - Target crops : Peanut, garlic, onion, cabbage, chili, etc. - Objective : To increase the productivity of cash crops in the irrigated paddy filed in the dry season. - Activity-1: Technical improvement of growing cash crops including proper application of seeds and fertilizer, and management of irrigation water. - Activity-2: Strengthening of Water User's Group	- Training of the farmers' group by DAFO in improving dry season cash crop cultivation through demonstration farms. - Provision of market information from DAFO to the farmers.
3. Sustainable Upland Farming	- Target group : Upland farmers - Target crops : Sesame, Job's tear, corn, etc. - Objective: Establishment of practical/simple sustainable upland farming technology in the existing slash and burn cultivation area in order to sustain productivities of upland crops. - Activity-1: Organization of "sustainable upland farming" group based on the farmers' need in the village and their initiative. - Activity-2: Introduction of practical/simple SALT (Sloping Agricultural Land Technology) such as i) hedge row establishment, ii) mulching, and iii) application of organic manure or chemical fertilizer,	- Training of the farmers' group by DAFO in establishing sustainable upland farming through demonstration farms. - Material supply to the demonstration farms such as seedlings for hedge rows.
B. Tree crop		
1. Fruit Tree Plantation	- Target group: Upland farmers - Target crops: Orange, mango, Jack fruit, etc. - Objective: Increase of production and promotion of marketing of fruit tree crops. - Activity-1: Organization of "fruit tree plantation" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Introduction of establishment of village nursery for fruit tree seedlings.	- Training of the farmers by DAFO in preparing village nurseries.
C. NTFPs		
1. Paper Mulberry Plantation	- Target group: Upland farmers - Objective: Sustainable production of paper mulberry. - Activity-1: Organization of "paper mulberry plantation" farmers' group based on farmers' need and their - Activity-2: Establishment and extension of paper mulberry gardens and shifting from collecting natural paper mulberry to planting paper mulberry in a sustainable way.	- Training of the farmers' group by DAFO in establishing paper mulberry gardens, including site visits to successful/advanced farmers related to paper mulberry plantation.
2. Mushroom Culture	- Target group: Upland farmers and land less farmers - Target crop: Mushroom - Objective: Introduction of mushroom culture for marketing promotion - Activity-1: Organization of "mushroom culture" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Training of technology on mushroom culture through a demonstration unit and extension such technology to the villagers.	- Training of the farmers' group by DAFO in establishing a demonstration unit for mushroom culture. - Supply of materials for a demonstration unit.

Table 14 Possible Livelihood Development Options (Pongdong) (2/2)

Option	Outline	Inputs
D. Livestock		
1. Animal Bank	- Target group: All farmers - Target animals: Buffalo, cattle, pig and goat. - Objective: To promote large animal raising in the village through revolving animal system. - Activity-1: Organization of "animal bank" farmers' group based on the farmers need in the village and their initiative. - Activity-2: Provide seed animals to the first group farmers, young animals of which will be revolved to the second group farmers after having calves, piglets and kids. - Activity-3: Management of revolving activities of provided seed animals by the farmers group. - Activity 4: Establishment of sustainable vaccination system in the village level from financial as well as technical points of view. - Activity-5: Monitoring and follow-up of revolving activities of provided seed animals by DAFO.	- Training of village veterinary volunteers on animal vaccination. - Training of the villagers' group in management of animal revolving system by DAFO. - Provision of seed animals.
2. Native Chicken Raising	- Target farmers: Upland farmers and land less farmers - Target animals: Chicken - Objective: To promote native chicken raising through micro-credit system. - Activity-1: Organization of "chicken raising" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Management of seed money by the farmer's group. - Activity-3: Monitoring and follow-up of the chicken raising farmers' group activities by DAFO.	- Training of the farmers' group in micro credit system and its management by DAFO. - Training of the farmers' group in proper chicken raising system by DAFO. - Provision of seed money for micro credit.
3. Aquaculture	- Target group: Aquaculture farmers and land less farmers - Objective: To promote aquaculture by extending fishponds through micro-credit system. - Activity-1: Organization of "aquaculture" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Construction of low-cost fish ponds or rehabilitation of the existing fish ponds - Activity-3: Management of seed money by the farmer's group. - Activity-4: Monitoring and follow-up of the aquaculture farmers' group activities by DAFO.	- Training of the aquaculture farmers' group in micro credit system and its management by DAFO. - Training of the farmers' group in proper fish raising system by DAFO. - Provision of seed money for micro credit.
E. Others		
1. Weaving and Embroidery promotio	- Target group: All farmers - Objective: To promote weaving activities and marketing of the products. - Activity-1: Organization of "weaving and embroidery" group based on the women's need in the village and their initiative. - Activity-2: Management of seed money by the women's group. - Activity-3: Monitoring and follow-up of the weaving and embroidery group activities by DAFO cooperation with the district LWU (Lao Women's Union)	- Training of the weaving women's group in micro credit system and its management by DAFO cooperation with the district LWU. - Training of the women's group in designing market oriented products as well as marketing of those products by cooperation with related NGOs, etc.

Table 15 Possible Livelihood Development Options (Namon)

Option	Outline	Inputs
A. Annual crop		
1. Improvement of Rice Production	- Target group: Lowland rice farmers - Target crop: Lowland rice - Objective: To increase the productivity of rice through improved technology. - Activity-1: Technical improvement of rice cultivation through IRRI package such as i) proper application of fertilizer, ii) proper application of improved variety seeds, and iii) introduction of IPM, etc. - Activity-2: Strengthening of Water User's Group	- Training on IRRI package and IPM by DAFO to the farmers through demonstration farms. - Training on irrigation water management by DAFO to the farmers. - Material supply: Improved variety seeds for demonstration
2. Sustainable Upland Farming	- Target group: Upland farmers - Target crops: Sesame, Job's tear, corn, etc. - Objective: Establishment of practical/simple sustainable upland farming technology in the existing slash and burn cultivation area in order to sustain productivities of upland crops. - Activity-1: Organization of "sustainable upland farming" group based on the farmers' need in the village and their initiative. - Activity-2: Introduction of practical/simple SALT (Sloping Agricultural Land Technology) such as i) hedge row establishment, ii) mulching, and iii) application of organic manure or chemical fertilizer, etc.	- Training of the farmers' group by DAFO in establishing sustainable upland farming through demonstration farms. - Material supply to the demonstration farms such as seedlings for hedge rows.
C. NTFPs		
1. Paper Mulberry Plantation	- Target group: Upland farmers - Objective: Sustainable production of paper mulberry. - Activity-1: Organization of "paper mulberry plantation" farmers' group based on farmers' need and their initiative. - Activity-2: Establishment and extension of paper mulberry gardens and shifting from collecting natural paper mulberry to planting paper mulberry in a sustainable way.	- Training of the farmers' group by DAFO in establishing paper mulberry gardens, including site visits to successful/advanced farmers related to paper mulberry plantation.
2. Resource Management	- Target group: Upland farmers - Target crops: Sugar palm - Objective: Introduction of resource management practice in the community level. - Activity-1: Organizing workshop and training through participatory process to reach common understanding for resource management and to establish necessary rules. - Activity-2: Practicing the rules and its monitoring. - Activity-3: Trial for plantation of sugar palm.	- Training of the villagers by DAFO in resource management through participatory process.
3. Mushroom Culture	- Target group: Upland farmers and landless farmers - Target crop: Mushroom - Objective: Introduction of mushroom culture for marketing promotion - Activity-1: Organization of "mushroom culture" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Training of technology on mushroom culture through a demonstration unit and extension such technology to the villagers.	- Training of the farmers' group by DAFO in establishing a demonstration unit for mushroom culture. - Supply of materials for a demonstration unit.
D. Livestock		
1. Animal Bank	- Target group: All farmers - Target animals: Buffalo, cattle, pig and goat. - Objective: To promote large animal raising in the village through revolving animal system. - Activity-1: Organization of "animal bank" farmers' group based on the farmers need in the village and their initiative. - Activity-2: Provide seed animals to the first group farmers, young animals of which will be revolved to the second group farmers after having calves, piglets and kids. - Activity-3: Management of revolving activities of provided seed animals by the farmers group. - Activity 4: Establishment of sustainable vaccination system in the village level from financial as well as technical points of view. - Activity-5: Monitoring and follow-up of revolving activities of provided seed animals by DAFO.	- Training of village veterinary volunteers on animal vaccination. - Training of the villagers' group in management of animal revolving system by DAFO. - Provision of seed animals.
2. Native Chicken Raising	- Target group: Upoland farmers and landle farmers - Target animals: Chicken - Objective: To promote native chicken raising through micro-credit system. - Activity-1: Organization of "chicken raising" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Management of seed money by the farmer's group. - Activity-3: Monitoring and follow-up of the chicken raising farmers' group activities by DAFO.	- Training of the farmers' group in micro credit system and its management by DAFO. - Training of the farmers' group in proper chicken raising system by DAFO. - Provision of seed money for micro credit.
3. Aquaculture	- Target group: Aquaculture farmers and land less farmers - Objective: To promote aquaculture by extending fishponds through micro-credit system. - Activity-1: Organization of "aquaculture" farmers' group based on the farmers' need in the village and their initiative. - Activity-2: Construction of low-cost fish ponds or rehabilitation of the existing fish ponds - Activity-3: Management of seed money by the farmer's group. - Activity-4: Monitoring and follow-up of the aquaculture farmers' group activities by DAFO.	- Training of the aquaculture farmers' group in micro credit system and its management by DAFO. - Training of the farmers' group in proper fish raising system by DAFO. - Provision of seed money for micro credit.