# Part 2: Model Area Development

# CHAPTER 1 BASIC APPROACH

# Part II : Model Area Development

## CHAPTER 1 BASIC APPROACH

### 1.1 Basic Concept for Agricultural Development

The basic concepts for agricultural development in the model areas are summarized as follows:

- The stabilization of the paddy production (to secure the staple food).
- The introduction and promotion of the crop diversification and the integrated farming (The prevention of the production of non-marketable surplus due to monoculture of crops and risk management. To secure income and to improve the nutritional status. The practice of semi-intensive farming by producing and using homemade fertilizer).
- The promotion of household industries and the introduction of new crops (Improvement of income and risk management).

(1) Major issues and concerns that require attention when the plan is defined.

(a) Land Use

The basic policies for the utilization of existing paddy fields are summarized as follows:

- To respect the present condition of land utilization.
- To realize a sustainable and stable agricultural production.
- The paddy production through the maximum use of limited water resources.

In accordance with these basic policies, typical cropping patterns are presented below. These are based on the assumption that even if the facilities to protect flooding will not be constructed, the flooded areas can still be utilized by avoiding floods through farming practices measures.

| Flood | Irrigation | Wet season | Dry season | F/S Areas |
|---|---|---|---|---|
| Affected | Available | Upland crop (unused) | Paddy | TN, V |
| Affected | A Available | Paddy (after flood) | Paddy | TN, V |
| Affected | No | Upland | - | TN, V |
| Non-affect. | Available | Paddy | Paddy | P |
| Non-affect. | No | Paddy | - | P |

TN: Thongharb/Nakhua, V: Vangkhong, P: Phongthang

(b) Crop diversification and integrated farming (including small/cottage industries.)

The main theme of this component is sustainable farming and the improvement of the farmers' living standard and the stabilization of the paddy production with provision for irrigation. At the same time, taking into consideration the specific resources and characteristics of the areas, the introduction of crop diversification schemes and integrated farming was planned. This is to improve the farmers' income and their malfunction and also to disperse the risk. And when the above-mentioned plans are implemented, the items listed below should be pursued:

- Promotion of fish culture using the existing facilities including reservoirs and ponds.
- Promotion of feed crops production and livestock raising (poultry and pig).
- Shifting of crop production from crops without potential for marketing to crops with high marketability and to add value to production by processing (New potential crops will be also targeted).

As to the promotion of mixed farming, to increase the farmers' cash income and to improve their malfunction, small livestock and fish culture will be prioritized.

(c) Reflection on the farmers' intentions

To discuss and reappraise the contents of the project with the beneficiary and program implementers was considered as the basic policy to formulate the plan. In the formulation of the project, the approach to hold PCM workshops and compile the results into PDM was adopted, in order to grasp the farmers' needs from their own perspective. When the PCM was implemented, the investigating team participated just as observers. They concentrated on understanding the requests and needs of the farmers without leading the farmers' opinions to a certain direction and expressing bias against their opinions, consistent with the principles of participatory development.

The PDM prepared by the farmers and executors has reflected the farmers' needs and intentions, however, it was observed that the following points should be given attention.

- Lack of the sound technological ground. (The applied technology, the possible irrigated area, etc.)
- Inadequate examination of the necessary input requirement (The feed production for the animal husbandry).
- Lack of the information due to the narrowly focused-outlook (New technology, new crops, etc).

The Study Team recognized the value of PDM as one of the effective tools for the farmers to express their desires (what they think they can do, what they want to do, etc.). In the elaboration of the plans, the results of PDM were respected and considered, however, it should also identify some alternative options, considering the following issues and concerns outlined below.

- The examination of the scale of development intervention.
- The natural and human resources endowments.
- The topography, soil, water quality and the climatic constraints
- The impact on the environment.
- The financial capability and personnel complement of the executing agency.

## 1.2 Specific Approach for each Component

The characteristics of the plan and approach for each component are as follows:

(1) Paddy production:

The stabilization of paddy production by introducing and improving the irrigation system (introducing double cropping paddy production).

In the area where double cropping after the flood will be introduced, the seedbed will be located outside the paddy fields. The expected effects with the introduction of this double cropping system are the improvement of working efficiency, dispersion of peak water demand and labor requirement and the avoidance of the harvesting in the rainy season.

- Measures for the hardware: Improvement of the irrigation facilities.
- Measures for the software:

  Input
- To supply certified seeds by developing seed producers (The formation of the APGs in which a contact farmer will become the core).
- The improvement of the fertilizer supply system (The improvement of the distribution of fund by APB and timely supply of fertilizers in appropriate amounts).

  Management

- Effective water management by the water management organization.
- Effective extension delivery system (The utilization of TFT system and training for farmers, the extension worker and TFT members).

  Output

- Improvement of the distribution and marketing of excess rice (through the revitalization of FSC and the formation of selling groups).

(2) Promotion of animal husbandry:

Small livestock (pig) and poultry (duck and chicken) will be promoted, initially for home consumption as the mid-term target (in Vangkhong, poultry/chicken production for home consumption will be set up

as short-term target).

Breeding method: The enforcement of vaccination and the introduction of feeding on homemade feed formulation (semi-intensive farming) should be promoted.

- Measures for the hardware: Construction of breeding pens (The utilization of local materials where the farmers will pay the cost by themselves).

- Measures for the software

Input

- The development of farmer breeders (breeding and raising) (The formation of APGs in which a contact farmer will become the core).

- Procurement of funds (by APB).

Management

- Extension of technology for feed crop production (includes the utilization of TFT system, training of farmers, extension workers and TFT members).

- Extension of the appropriate technology for semi-intensive breeding. (includes the utilization of TFT system, training of farmers, extension workers, and TFT members).

- Implementation of vaccination services by volunteers.

Output

- Improvement of the distribution and marketing of farm products through village middleman and the formation of selling groups).

(3) Fish culture:

In the areas where there are existing facilities such as reservoirs and fishponds, fish culture projects will be introduced at the initial stage.

Culture method: Two alternatives will be introduced: (a) No-feeding for culture in reservoirs and (b) With feeding using homemade feed formulation for culture in fish ponds and cages. In addition, fish culture integrated with small livestock production will be examined.

- Measures for the hardware: Rehabilitation of existing facilities.

- Measures for the software:

Input

- Development of farmer breeders for fries (The formation of the APGs in which a contact farmer will become the core).

- Extension of feed crop production technique (includes the utilization of TFT system, training of farmers, extension workers, and TFT members).

- Procurement of funds (by APB).

Management

- Extension of the appropriate technologies on No-feeding culture and with Feeding culture (includes the utilization of TFT system, training of farmers, extension workers, and TFT members).

Output

- Improvement of the distribution and marketing of fish through the village middleman and the formation of sales groups.

(4) Sericulture:

Sericulture will be introduced and promoted. But since the preparation period needed to grow mulberry trees is about three years, sericulture (or mulberry leaf production) will be introduced at the initial stage.

Sericulture method

Sericulture will be implemented during the rainy season when adequate volumes of mulberry leaves can be produced. Silkworm rearing will be conducted three times a year. Polyvoltine or polyvoltine bivoltine silkworm species will be used, both of which have strong resistance against diseases, to be provided by Sericulture Center in Vientiane. The planting stocks for mulberries will also be provided by the center. In areas where mulberries will be produced one farmer will cultivated 20a which is the recommendation for the side job of the paddy farmers by the Center.

There is a high demand for pupae as food and this can be expected to become a good income source.

- Measures for the hardware: Construction of simple silkworm rearing rooms.

- Measures for the software:

Input

- Strengthen the supply of silkworms and the supply of the planting stocks of mulberry (as well as to strengthen the function of Sericulture Center).

- Extension of sericulture/mulberry production technology (includes the utilization of TFT system, and training of farmers, extension workers and TFT members).

- Procurement of funds (by APB).

Management

- Development of sericulture farms as the side job of paddy farmers (The formation of the APGs in which a contact farmer will be the center core).

- Effective extension of appropriate techniques (includes the utilization of TFT system, and training of farmers, extension workers and TFT members).

Output

- Secured distribution and marketing channels (through the enhancement of the performance of village middleman and the formation of sales groups).

(5) Crop Diversification:

The production of homemade feed crops will be encouraged.

The introduction will be connected to the promotion of animal husbandry and fish culture.

Farming Practices: In the flooded areas, maize and soybean for feed will be produced as the alternative crops (before-flood cropping) to paddy. In addition, the feed crops will be introduced as alternative crops in terraces along the rivers.

- Measures for the hardware: Nothing in particular.
- Measures for the software:

Input

- smooth supply of seeds and fertilizers (by APB).

Management

- Extension of appropriate technique (through the utilization of TFT system, training for farmers, extension workers and TFT members).

Output

- The introduction of contract production system through the use of TFT system. The possibility of contract production with a feed production factory can be examined taking profitability potential into consideration.

(a) Introduction of vegetables for wet season cropping.

Vegetable production for the pre-harvest season (wet season cropping) will be introduced as one option to increase income generation.

Farming Practices: The high-row production method and the shelter method to avoid rain damage will be introduced. Vegetables will be produced during wet season when there is a short/limited supply of vegetables in the market.

- Measures for the hardware: Nothing in particular.
- Measures for the software:

Input

- smooth supply of seeds and fertilizers (by APB).

Management

- Extension of the appropriate technologies (through the utilization of TFT system, training of farmers, extension workers and TFT members).

Output

- Secured distribution and sales channels (through the enhancement of the performance of village middleman and the formation of farmer selling groups).

(b) Vegetable production under irrigated conditions

In irrigated paddy fields, vegetable production will be introduced.

- Measures for the hardware: Nothing in particular.
- Measures for the software:

Input

- smooth supply of seeds and fertilizers (by APB).

Management

- Extension of appropriate technologies. (through the utilization of TFT system, training of farmers, extension workers and TFT.)

Output

- Secured distribution and marketing channels. (through the enhancement of the performance of village middleman and the formation of sales groups.)

- Introduction of contract farming. (Assisted by TFT.)

(6) Mushroom culture

As one of the crop diversification plans, mushroom, which can be produced using relatively simple facilities will be introduced. The production techniques for several species of mushrooms have already been established. The extension and training program is being implemented in Agricultural Dissemination Center in Vientiane. Mushroom culture can also contribute to the effective use of sawdust and husks as culture media and can also be used as organic fertilizers after harvesting the mushrooms.

- Measures for the hardware: Simple production facilities and autoclave for sterilization.

- Measures for the software:

Input

- To supply spawn/hypha (to strengthen the function of Agricultural Dissemination Center.)
- To secure material (such as sawdust and husks.)

Management

- Extension of appropriate culture techniques. (through the utilization of TFT system, training of farmers, extension workers and TFT members.)

Output

- Secured distribution and marketing channels. (through the enhancement of the performance of village middleman and the formation of sales groups.)

(7) Agricultural processing:

As a part of the diversification plan, risk management and specialization of products, agricultural processing will be introduced at the initial stage.

Processing approach: Due to the low or lack of market demand for bananas, surplus production is just thrown away. But considering that the technique to dry bananas has already been established and several NGOs have implemented the training program, the production of dried bananas will be promoted.

- Measures for the hardware: Simple facilities to dry and packing device.
- Measures for the software:

Input

- To secure raw material. ( To obtain excess bananas.)

- The procurement of funds. (The use of APB.)

Management

- Development of farmer processors. (The formation of APGs in which a contact farmer will be the core.)

- Extension of the appropriate technologies. (through the utilization of TFT system, training for farmers, extension workers and TFT members.)

Output

- Secured distribution and marketing channels through the enhancement of the performance of village middleman and the formation of sales groups.

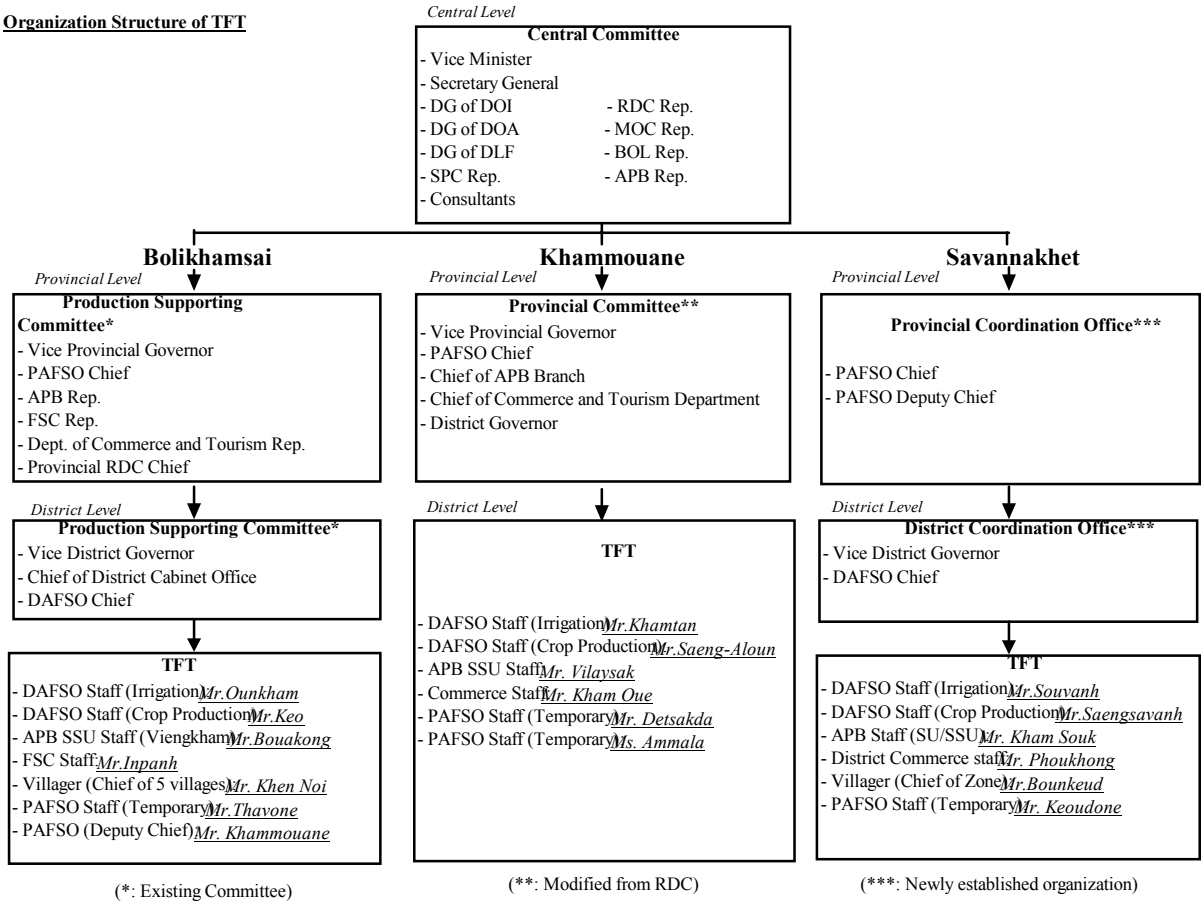
## 1.3 Verification of the TFT Concept

A Task Force Team was set up in each province based on the series of meetings participated by the staff of PAFSO/DAFSO and the staff of other relevant authorities. The organizational structure of TFT and the supervising committee is shown in the following page. In Bolikhamsai Province, a Production Supporting Committee has already been organized and its members include the Vice Provincial Governor, PAFSO Director General, and representatives from APB and FSC. This existing committee is considered quite suitable to act as a supervising committee for the proposed TFT from the viewpoint of the project concept. The Vice Provincial and Vice District Governors are the leaders of Production Supporting Committee at Provincial and district levels. These committees conduct 2-3 regular meetings per year but may call for more meetings as needed. In Khammouane Province, there is a Rural Development Committee who devotes 70% of their tasks to agricultural development. This committee, however, comprises only 3 members including Vice Governor, Planning and Cooperation Service Chief and District Rural Development Committee Chief. This committee was recently modified with the Chief of PAFSO appointed as the deputy of the committee. As for the district level, 26 committees are already existing in Hinboun district. In order to avoid having too many unnecessary committees, it was decided that no new committees can be established the district level. The district level staff will be incorporated in the TFT and shall function as project coordinator. In Savanakhet Province, it was decided not to establish the provincial level committee but rather mobilize the TFT in the district level. Instead, a coordinator was appointed to keep the project going. Since the project is aiming at agricultural development, the Director and the Deputy Director of PAFSO should take the lead in project coordination. Any matters that can be solved by the coordinators should be solved by them, otherwise the coordinators should consult with the related sectors as needed.

The member list of the TFT is shown in the following Table including the basic information for each personnel. Most technical staff reached senior high school and there is a few English-speaking staff. The TFT was established as an inter-sectoral group. But it seems the TFT is not capable to understand the real need of farmers nor has the capability to judge the feasibility of each proposed project. As

already mentioned in Master Plan, the TFT should be supported by qualified technical staff and/or SMS, and by the committees at the provincial and national level.

The study on the formulation of model area development plan provided a venue to demonstrate the practice of participatory planning, starting from screening the model areas. Since the TFT is considered as key actor for future project implementation, the TFT team was simulated to participate in the survey activities together with the study team. Survey activities have therefore been carried out in order to verify the efficiency of TFT and also to modify the malfunction by expecting that this study can be a basis for the Lao government to undertake future development independently.



**Curriculum Vitae of the Member of Task Force Team**

| Name | Organization/Positi | Date of | Domicile | Language | Licence | Education | Career | Training Received |
|---|---|---|---|---|---|---|---|---|
| Mr. Thavone Mahavong | Irrigation Engineer Bolikhamsai **PAFSO** | 06/08/1960 | Paksan Tai V. Paksan D. Bolikhamsai | French English | High School of Irrigation | Senior High | Irrigation Survey and Private company PAFSO | Small Scale Pumping Station Flood Prevention Water resource dev. |
| Mr. Khammouane | Chief of Crop Production Bolikhamsai **PAFSO** | 08/01/1962 | Anonsonxai V. Paksan D. Bolikhamsai | Bulgary | High School of Agriculture | Senior High | Extension worker Rural staff | Silk production Agricultural production RRA |
| Mr. Oukham Souttavant | Irrigation Engineer Pakkading **DAFSO** | 11/02/1967 | Nam Ngieb V. Paksan D. Bolikhamsai | | Certificate of Irrigation, Tatthong | Tatthong Irrigation | Head of Irrigation DAFSO | Irrigation Technic |
| Mr. Keo Xasengbong | Crop Production Pakkading **DAFSO** | 12/03/1969 | Don V. Paksan D. Bolikhamsai | | High School Farmer and training | Junior High | Extension worker | Agricultural Fruit tree project Farmer training |
| Mr. Bouakong Souliyathai | Acting Head Pakkading **APB** | 05/05/1973 | Mixai V. Paksan D. Bolikhamsai | | | Senior High | APB staff | Bank Technical at Dongdok |
| Mr. Inpanh Lomany | Staff of Food Supply Company (**FSC**) | 08/01/1975 | Anonsonxai V. Paksan D. Bolikhamsai | | Accounting | Senior High | Accountant | |
| Mr. Khen noi | Revolutionary Party Member, Nam Dua **Village** | 10/08/1940 | Nam Dua V. Pakkading D. | | | Primary Level | Teacher | Political Seminar |

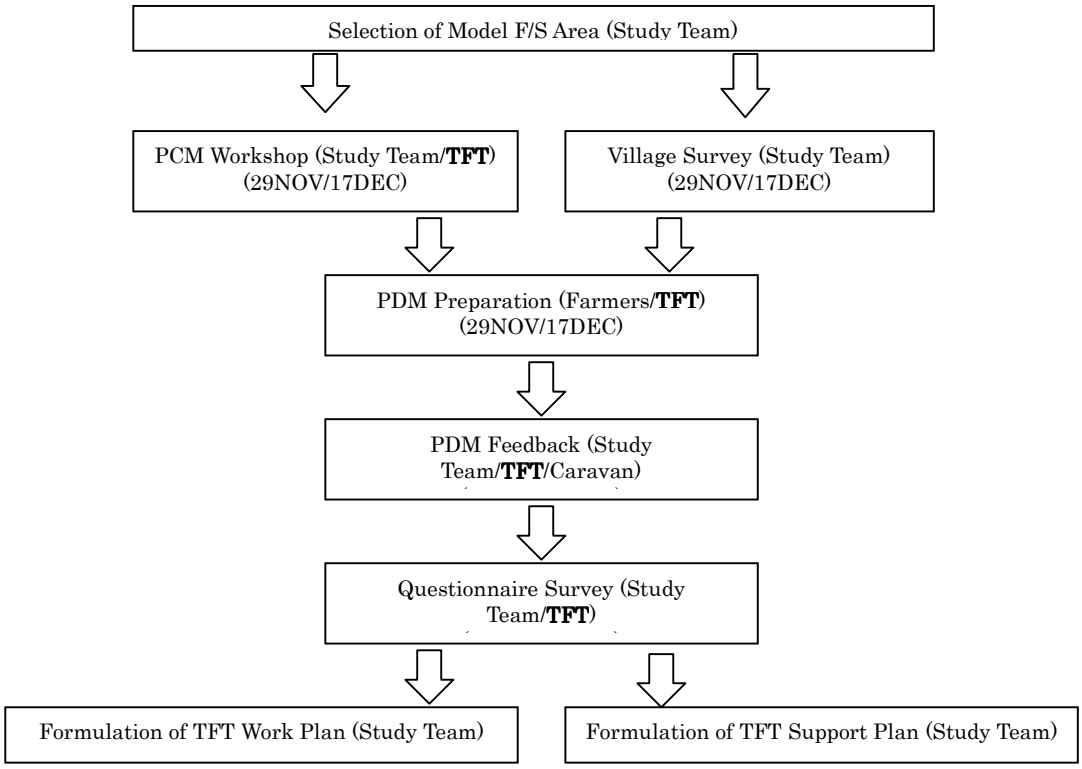
**(Hinboun/Khammouane)**

| Name | Organization/Positi | Date of | Domicile | Language | Licence | Education | Career | Training Received |
|---|---|---|---|---|---|---|---|---|
| Mr. Detsakda Manikha | Irrigation Engineer Khammouane **PAFSO** | 30/12/1973 | Som Saat V. Thakhek D. Khammouane | Basic English | High School of Irrigation | High School | Irrigation Survey and Construction | Data Collection Assistance for JICA Pumping Station Management |
| Ms. Ammala Seng Souliya | Crop Production Khammouane **PAFSO** | 06/01/1966 | Chomphet V. Thakhek D. | | BSc Crop Production | Nabong Agricultural College | Extension Worker in PAFSO | TOT FIAT Participatory Planning |
| Mr. Khamthan | Irrigation Hinboun **DAFSO** | 05/08/1959 | Na Kha Nay V. Xaibouly D. Savannakhet | | Irrigation college certificate | High School | Canal Weir construction Construction of Route 9 & 12 | Agricultutral Statistics |
| Mr. Seng Aloun Hom Sombat | Crop Production Hinboun **DAFSO** | 15/05/1972 | Kham Keo V. Hinboun D. Khammouane | | High School Agricultural Diploma | High School | Forestry worker | Farmer Field School |
| Mr. Vilaysak Inthalangsy | Head of Zone Hinboun District **APB** | 20/10/1963 | Na Muang V. Thakhek D. Khammouane | | | High School | Bank Officer | Vocational training on accounting and banking |
| Mr. Kham Oui Keokhamphan | Head of District **Commerce** Office | 12/12/1949 | Van Pia V. Hinboun D. Khammouane | | | Class -6 | Primary health and sanitary | Political theory Health care |

**(Xaithouthong/Savannakhet)**

| Name | Organization/Positi | Date of | Domicile | Language | Licence | Education | Career | Training Received |
|---|---|---|---|---|---|---|---|---|
| Mr. Keoudone Souriya | Statistics and Staff of **PAFSO** | 01/01/1974 | Phonsavangtai Khantabouli D. Savannakhet | | | High School of Irrigation | Irrigation Design | Farmer School |
| Mr. Souvane | Irrigation staff of Xaiphouthong **DAFSO** | 15/06/1966 | Phontan V. Xayphouthong District Savannakhet | | Irrigation and Farm School | Secondary School | Extension worker | IRAP project JICA project |
| Mr. Sengsavanh | Crop production Xaiphouthong **DAFSO** | 22/02/1967 | Naphan V. Xayphouthong District Savannakhet | Russian English | IRAP | Senior High | City development project | Rural development IRAP project |
| Mr. Kham Soak Northilath | Credit staff Xaiphouthong **APB** | 15/03/1972 | Nalao V. Khantabouli D. Savannakhet | | Bank accounting | Senior High | Police office | Army School Bank accounting |
| Mr. Phoukhong Thonnarad | Staff of **Commerce** Office, | 02/06/1954 | Heuaychanong Xayphouthong District Savannakhet | English | Padagogy | Pedagogy School | Commerce office | Aids organization |
| Mr. Bounkeud Keomanivong | **Village** Committee Zone Chief, Nakham Neua | 06/06/1958 | Nakham Neua Xayphouthong District Savannakhet | | | Secondary School | Army village committee | Army School Village Committee |

The team was constituted prior to the implementation of PCM workshop in the village. The team members participated in this PCM workshop and learned the practical participatory approach for the formulation of the development plan based on the needs of the community. Furthermore, the team members prepared the PDM for the model area development based on the result of PCM workshop, in cooperation with farmers. The involvement of the virtual-TFT into the current feasibility study process is shown below.




In this development study, the meeting to feed back the results of PCM workshop to the villagers and the extension activities through the mobile theater has been carried out and the efficiency of such activities was confirmed. Questionnaire survey was administered to each TFT member regarding their opinion and impression of the TFT activity, the role of each member in various supporting activities and other information such as necessary assistance required by TFT and so on. Based on the results of this questionnaire survey, the roles of TFT and necessary assistance required can be summarized as follows;

Roles of TFT;

- Formulation of the proposed development plan using the participatory approach,
- Promotion of community development through the revitalization of farmers' activity,
- Promotion of the establishment of farmers' organization,
- Promotion of farmers' group activity,
- Technical and financial advice to farmers through the farmers group,
- Training arrangement for themselves and for farmers,
- Inputs supply arrangement especially the coordination between APB and FSC,
- Marketing arrangement especially in the establishment of sales group, and
- Information services in general.

Necessary assistance for TFT;

- Training arrangement to TFT members,
- Technical support by SMS,

- Institutional support by provincial committee,
- Provision of facilities necessary for field activities, and
- Financial support for TFT activities, in general.

The following figure shows the participatory planning approach for model areas in this development study. TFT activities will be executed in a sustainable and replicable manner by repeating the cycle from step 1 to step 3 (See Figure 1-1). This kind of approach can be expected to develop as village revitalization methods within and around model areas.

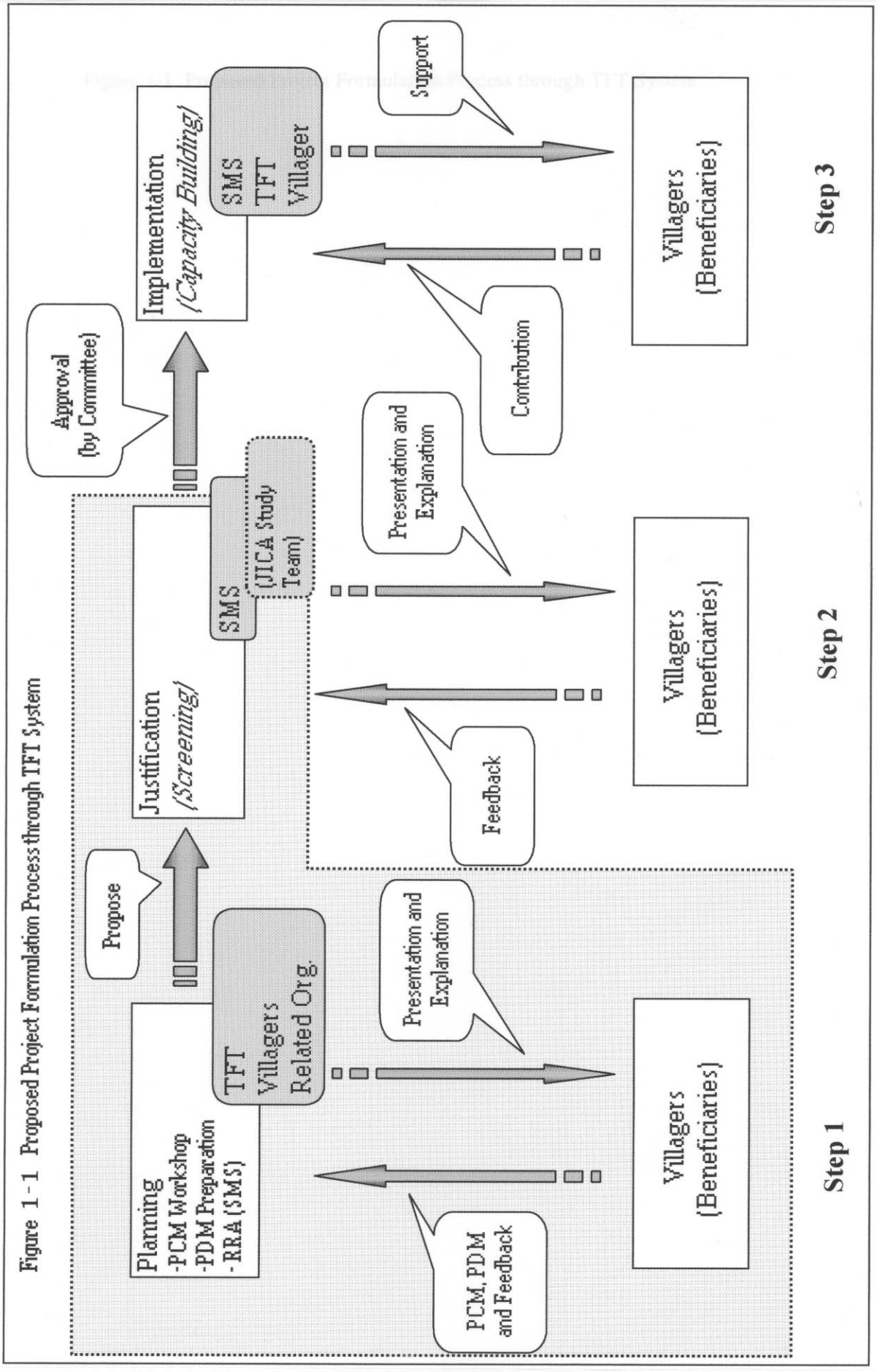



Figure 1 - 1 Proposed Project Formulation Process through TFT System

# Part 2: Model Area Development

# CHAPTER 2 GENERAL CONDITION

# CHAPTER 2 GENERAL CONDITION OF MODEL AREAS

## 2.1 Physical Conditions

### 2.1.1 Location

(1) Thongharb-Nakhua Area

In Bolikhamsai province, the model area selected for the study is Thongharb-Nakhua (104° 08'E,18° 08'N), located in Pakkading district. The model area consists of five target villages (See Figure 2-1): Nahin on the left bank of Houay Makson, Nakhua Nai on the left bank of Nam Dua, Nakhua Nok on the left and Nam Dua on the right bank of Nam Dua, and Thongharb on the right bank of Nam Dua before its confluence with Nam Khou.

All of the villages are located close to the National road No.13. Except for Thongharb, all other villages are linked to the Road No.13 by laterite road, though traffic during the wet season can be difficult but not completely impossible. Thongharb is accessible only by foot during the wet season, though vehicle transport from No.13 up to Nam Dua is possible in dry season. At present, most of the farm produce are yoked by farmers to the Road No.13 on foot before they are loaded to vehicle and transported to market. Traffic on oxcart roads can be a problem in wet season.

(2) Vangkhong Area

Vangkhong (104° 39'E,17° 41'N), located in Hinboun district is the model area selected in Khammouane province. There is only one target village in this model area (See Figure 2-2): Vangkhong, on the left bank of Nam Hinboun. Except for Phonthan in Savanakhet province but like Thongharb-Nakhua, Vangkhong is also located in the narrow strip of terrace land between national road No. 13 and the Mekong.

The laterite road (7km) leading from B Choutxong at national road No.13 is the only land access to the village. Like most major laterite roads, traffic can be difficult but not impassable during wet season. Pak Nam Hinboun, the district's trade port between Laos and Thailand, is only 1.5km away and is a promising alternative outlet for farm produce.

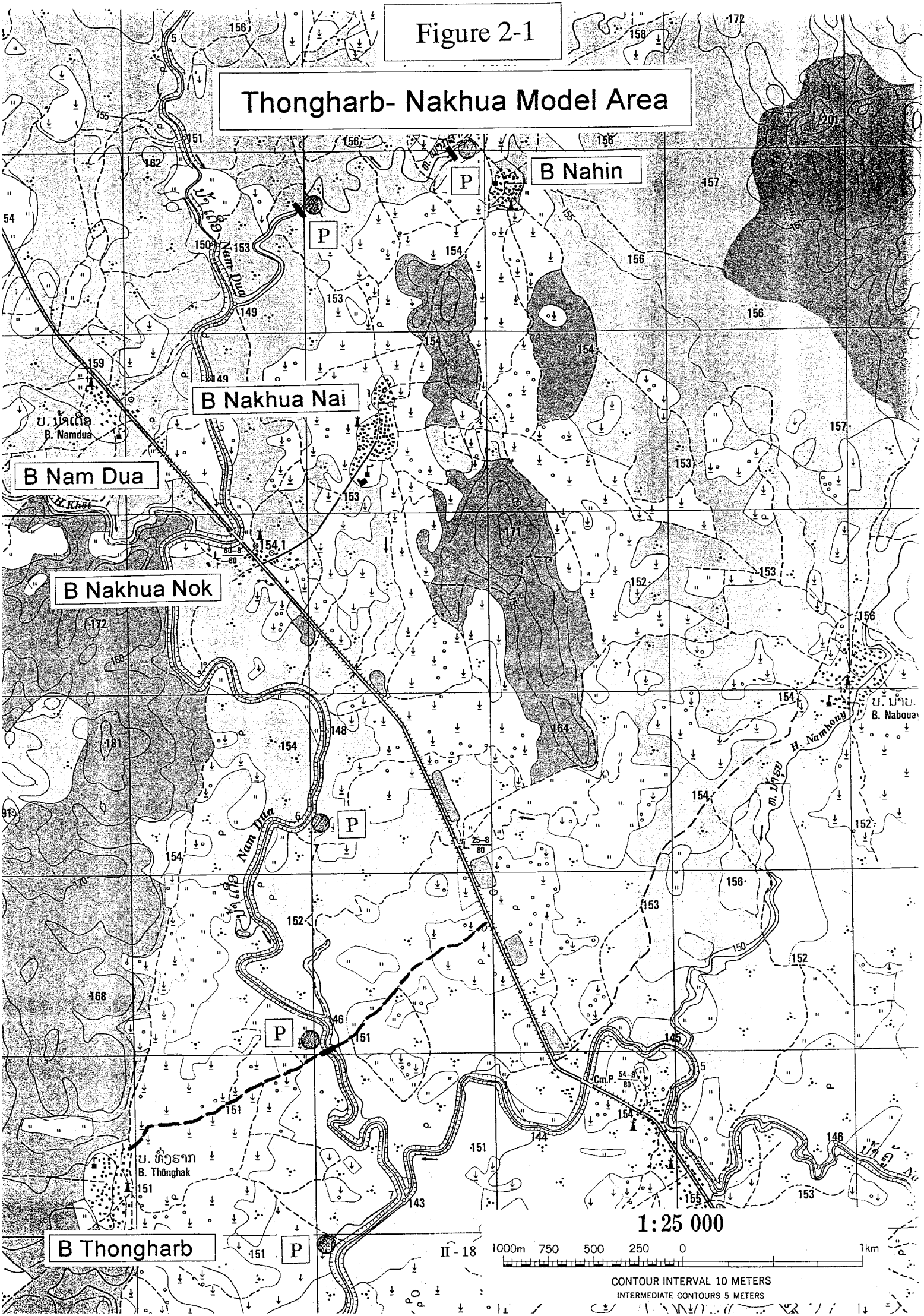
The ongoing project (1999-2000) to relocate the district offices and appurtenant institutional functions to high terraces in the vicinity of Vangkhong and B Pak Hinboun Nua is conducive to the development the model area and to opportunities in many ways. It all depends on how fast the villagers will be able to tap these opportunities.

(3) Phonthan Area

The model area in selected for the study is Phonthan (104° 59'E, 16° 22'N) in Xayphouthong district, Savanakhet province. There are three target villages in this model area (See Figure 2-3): Nakham Tai, Nakham Nua and Phonthan, all located about 55km south of the provincial capital.

Figure 2-1

# Thongharb- Nakhua Model Area



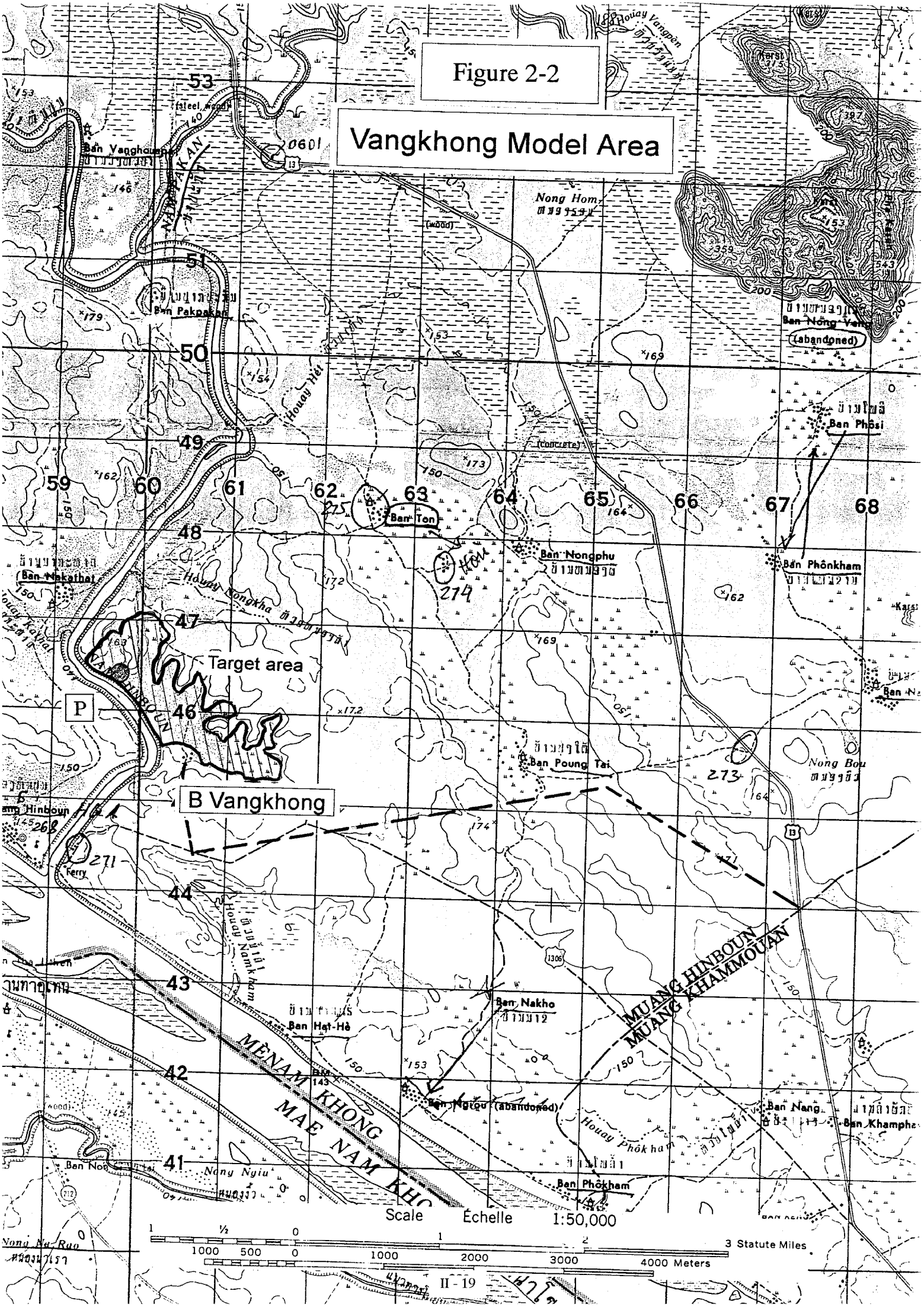


Figure 2-2
Vangkhong Model Area
Target area
B Vangkhong
P
MUANG HINBOUN
MUANG KHAMMOUAN
MÉNAM KHONG
MAE NAM KHO
Ban Vanghaupen
Ban Pakpakan
Ban Nong Veng
(abandoned)
Ban Phôsi
Ban Ton
Ban Nongphu
Ban Phônkham
Ban Hakathat
Houay Kongkha
Ban Poung Tai
Nong Bou
Ban Nakho
Ban Hat-Hè
Ban Ngiou (abandoned)
Ban Nang
Ban Khampha
Houay Phôk ha
Ban Phôkham
Ferry
Nong Nu Ruo
Scale Echelle 1:50,000
3 Statute Miles
4000 Meters
II - 19

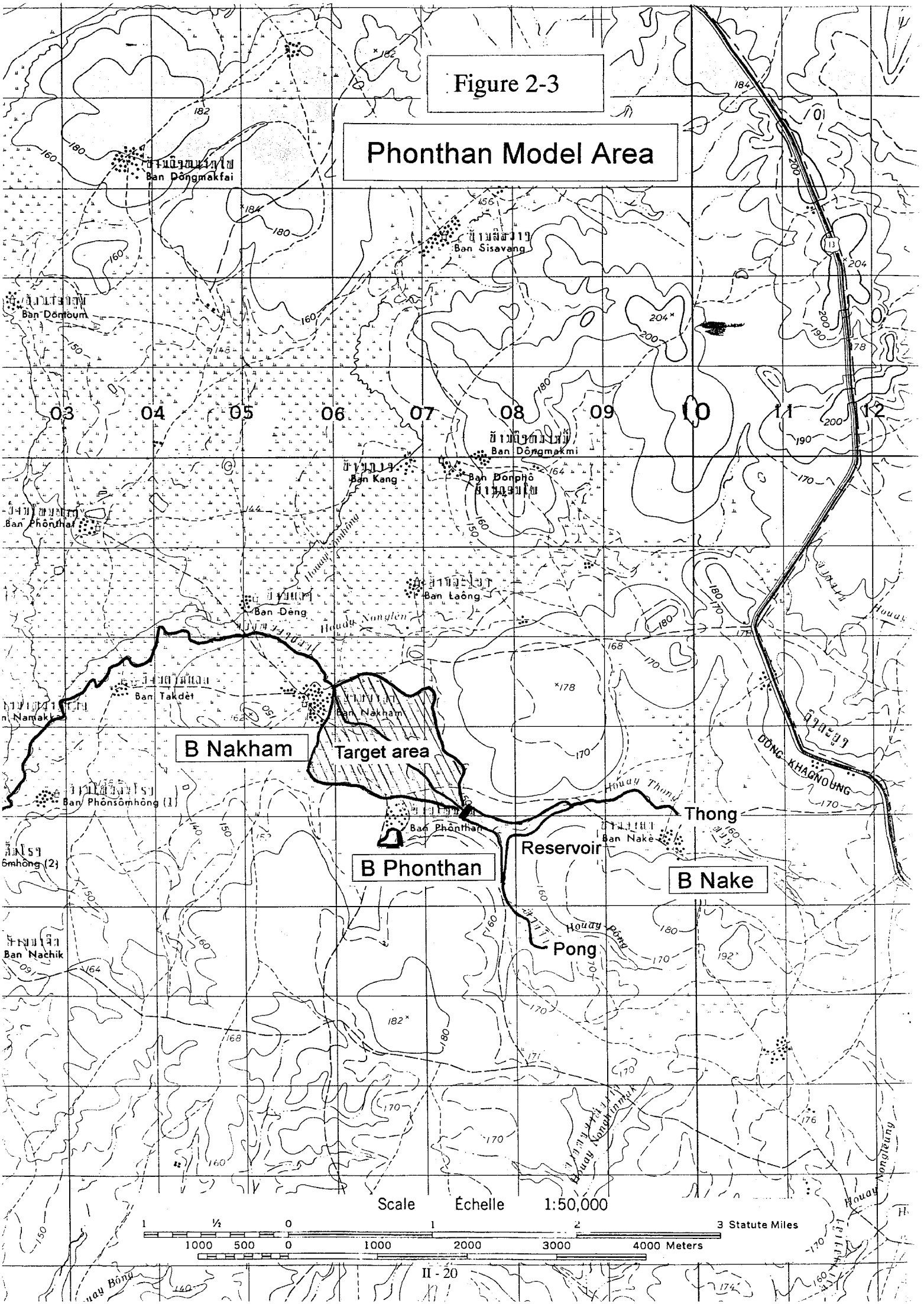


Figure 2-3
Phonthan Model Area
Ban Dôngmakfai
Ban Sisavang
Ban Dômtoum
Ban Kang
Ban Donphô
Ban Dôngmakmi
Ban Phônthan
Ban Laông
Ban Dèng
Ban Takdèt
Ban Nakham
Ban Phônsômhông (1)
Ban Phônsômhông (2)
Ban Nachik
Ban Phônthan
Ban Nake
B Nakham
Target area
B Phonthan
Reservoir
B Nake
Thong
Pong
Houay Thong
Houay Pong
Houay Nonglen
Houay Nongleung
DONG KHAGNOUNG
03
04
05
06
07
08
09
10
11
12
Scale Échelle 1:50,000
1 ½ 0 1 2 3 Statute Miles
1000 500 0 1000 2000 3000 4000 Meters

The laterite road (14km) leading from the national road No.13, passing through Nakham, is the only land access to the village. Again, traffic can be difficult but not impassable during the wet season. During the dry season however, the trip on bumpy roads can be eyeball rattling.

### 2.1.2 Topography

(1) Thongharb-Nakhua Area

The riverheads/source catchment (Sayphou Phapet) of Nam Dua/Houay Makson, to the north of Thongharb-Nakhua model area, is of very steep and precipitous terrain. The riverheads plunge from an elevation of over 1,000m to about 200m over a distance of 4,000－6,000m, forming a gradient of 1/5 – 1/8.

The model area is located in the flood plain of Nam Dua/Houay Makson. Most of the cultivated lands are below an elevation of 160m in the downstream of the confluence of the two rivers. The stretch of Nam Dua riverbed between its confluence with Houay Makson in the upstream and Nam Khou in the downstream has an average invert gradient of about 1/1,500, indicating that the topography of the model area is relatively gentle and low-lying.

(2) Vangkhong Area

The model area is located in the flood plain close to the mouth of Nam Hinboun, or only about 2km from the Mekong. As such inundation in the model area is a continuation of the 'back-swamp' of the Mekong. Due to its relatively flat and low-lying topography and chronic flooding cycle every year, only a very small patch of land on higher ground above 148m, about 1km from Nam Hinboun, is cropped to paddy (June – November) during the wet season. The central 'depression' of the model area, at present a thicket drained by two small rivers discharging into Nam Hinboun, can be charted, cleared and used for dry season paddy cultivation if underpinned with water resource development. Collaboration has been made so far by farmers and DAFSO in trying to utilize part of this flood-prone central piece for dry season crop.

(3) Phonthan Area

The model area is located in the basin of Houay Thong and Houay Pong, two relatively small streams/tributaries of Houay Phou which empties into the Mekong. The two streams converge at Kuotapo in the upstream of Phonthan. The village itself is located above 150m MSL elevation while most of the paddy fields are above 140m contour. Due to its relatively high elevation Phonthan is not affected by annual rise and ebb of water in the Mekong and flood hazard in the paddy fields is less severe.

### 2.1.3 Meteorology

Except for rainfall, spatial variation of most meteorological elements is small among the three model areas. The climate of the model areas is basically tropical monsoon, with distinct wet season from May

– October, a cool and dry season from November – February and a hot dry season in March and April.

In Paksan, about 85-97% of the annual rainfall (3,196mm, mean value for 1987-1997) occurs in the wet season and the peak happens in June-August, indicating that there is very little rain for irrigation in the remaining half of the year. The riverheads of Thongharb-Nakhua model area may receive similar amount of rainfall but rainfall in the paddy fields of the model area is probably lesser. In Thakhek, about 87-95% of the annual rainfall (2,317mm, mean value for 1988-1997) occurs in the wet season and the peak happens in July-August. In Savanakhet, about 79-97% of the annual rainfall (1,454mm, mean value for 1978-1997) occurs in the wet season and the peak happens in June-August.

### 2.1.4 Hydrology

The table below shows the annual range (max-min) of water level in the Mekong. The difference between measurements in the four gauging stations, in the sequence of river flow, along the Mekong is small. For the purpose of this study, it is therefore assumed that the fluctuation range of water level in the Mekong is about 10m, and is the same throughout its course surrounding the study area.

Mean Annual Range of Water Level - the Mekong

| Station | Vientiane | Paksan | Thakhek | Savanakhet |
|---|---|---|---|---|
| Range (m) | 9.9 | 11.0 | 10.9 | 10.7 |

(1) Thongharb-Nakhua Area

Due to the precipitous terrain in the riverheads, runoff of large rainfall occurs as spate/flash floods, reaching the villages in about six – eight hours after heavy rains. The gated weir constructed in 1997 to facilitate water pumping in Thongharb was devastated by flash flood in 1998. The 'weir-like' structure striding the Houay Makson near Nakhua Nai was also destroyed by flood. Both of them were constructed without any proper study to estimate and contain the magnitude of flash flood. Since data on river regime is not available for Nam Dua, random estimation of flood in this area could be very deceptive and misleading, as have been proven by the two broken weirs in the model area.

Due to its relatively gentle and low-lying topography, except for Nahin, a large tract of the paddy fields in four other villages come under the influence of annual inundation due to rising water level in the Mekong and in-basin wet season runoff.

(2) Vangkhong Area

As mentioned earlier, the average annual range of water level in the Mekong is about 11m at Thakhek, about 30km downstream. It is inferred that a similar range can be expected at the mouth of Nam Hinboun. Since it is not advocated to keep out completely the annual flooding cycle, the relatively flat and low-lying paddy fields found below the 150m contour are inundated to a considerable depth of 1-3m for an extended period of 1-2 months in the wet season.

Since intrusion of flood limits the land available for agriculture when water is in abundant supply, the next best option is to grow dry season rice. It is very fortunate for Vangkhong that despite its extremely uneven rainfall distribution, the run-of-the-river in Nam Hinboun in the dry season is relatively large and can be drafted for irrigation due to its relatively large catchment.

(3) Phonthan Area

Two streams empty into Kuotapo river; H Thong is considered the major tributary which contributes greatly to the water stored in the reservoir. However, no hydrological data is available for these two streams and the reservoir.

In the past 10 years or so, the dikes on both sides of the operation spillway (intake tower) were overtopped only once in September 1997. The progressive farmers have repaired the overtopped portions, as evidenced by the difference in the color of the soil/earth used in the repair work. The inside slope of the dike is not protected from erosion either by rip-rap and/or gabion. But the outside slope is protected by natural growth of turf/shrubs.

The idea to increase the dike height by 1m will submerge two 'islands' in the existing reservoir. As such water level is expected to rise to up to the same level as the existing rural road leading to B Nake, thereby submerging all structures and bushes below. In adopting this approach, sufficient provisions must be made to allow floodwater to flow smoothly. This approach should also given top priority in the perspective of mitigating the single most over-riding problem in the model area - water shortage during the dry season.

## 2.2 Socio-Economic Conditions

### 2.2.1 General Situation

The Thongharb-Nakhua model area represents a community of five villages (Ban Thongharb, Ban Nakhua Nok, Ban Nakhua Nai, Ban Nam Dua, and Ban Nahin). Thongharb and Nahin were established around 1700s. By considering the ethnic provenance, Thongharb is considered as the origin of the communities living in Nakhua Nai and Nakhua Nok. At Nahin, the ethnic group is Phouthai and is distinct from the other villages. Nam Dua village is new and the ethnic composition is more diversified.

The village was established around 1944 and has actually 47 households and a total population of 246 inhabitants[1]. The main ethnic group is Lao Kaleung, a branch of the Lao Phouthai ethnic.

Phonthan village, which was settled in 1673, is considered as the origin of the community. The population of the three villages is from the same ethnic minority group.

[1] From December 1998 socio-economic survey

### 2.2.2 Population

The population and household structures in the three model areas are summarized in the following table.

Household Structure

| Households | Thongharb-Nakhua | Vangkhong | Phonthan |
|---|---|---|---|
| Number of Household | 453 | 47 | 412 |
| Average HH size | 5.6 | 5.2 | 5.9 |
| HH sufficient with rice | 250 | 2 | 226 |
| HH insufficient with rice | 162 | 45 | 46 |
| HH with rice surplus | 41 | 0 | 145 |

Rice production is the main source of income in the three model areas, but there are also other important incomes from exploitation of minor forest products (non-timber products) and animal raising in Thongharb-Nakhua area, animal husbandry and fish catching in Hinboun river in Vangkhong and animal husbandry and cash crops (watermelon, banana and maize) in Phonthan.

The income of the villagers is generally low and about 162 households (35.7%) in Thongharb-Nakhua, 45 households (96%) in Vangkhong and 46 households (11%) in Phonthan, do not have enough food supply to last the whole year. By age group the young people (under 14 years) occupy a high percentage (30 to 48%) of the total population of the areas.

Population Structure by Age

| Age group | Thongharb-Nakhua | | | Vangkhong | | | Phonthan | | |
|---|---|---|---|---|---|---|---|---|---|
| | M | F | T | M | F | T | M | F | T |
| 0-14 years old | 431 | 461 | 892 | 59 | 60 | 119 | 368 | 365 | 733 |
| 15-45 years old | 286 | 371 | 657 | 73 | 27 | 100 | 333 | 358 | 691 |
| 45-60 years old | 434 | 465 | 899 | 8 | 10 | 18 | 361 | 475 | 836 |
| 61-up | 51 | 53 | 104 | 5 | 4 | 9 | 95 | 98 | 193 |
| Total | 1202 | 1350 | 2552 | 145 | 101 | 246 | 1157 | 1296 | 2453 |

Population Structure by Occupation

| Occupation | Thongharb-Nakhua | | | Vangkhong | | | Phonthan | | |
|---|---|---|---|---|---|---|---|---|---|
| | M | F | T | M | F | T | M | F | T |
| Farmer | 605 | 815 | 1420 | 109 | 59 | 168 | 610 | 700 | 1310 |
| Civil servant | 17 | 2 | 19 | 0 | 1 | 1 | 23 | 15 | 38 |
| Laborer | 35 | 0 | 35 | 5 | 0 | 5 | 0 | 0 | 0 |
| Student/pupil | 360 | 306 | 666 | 19 | 18 | 37 | 503 | 536 | 1039 |
| Child | 184 | 128 | 402 | 12 | 23 | 35 | 21 | 45 | 66 |
| Others | 1 | 9 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| No occupation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1202 | 1350 | 2552 | 145 | 101 | 246 | 1157 | 1296 | 2453 |

### 2.2.3 Public and Communal Organizations

(1) Thongharb-Nakhua Area

The communities in the area is administrated by the Village Public Administrative Committee headed by the Chief of Village (Nai Ban) who is assisted by one or two deputy chief(s). Political direction and coordination between villages is provided by the zone[2] chief located at Ban Nam Dua. Ban Thongharb is located in the Nam Khou zone but will be transferred to the Nam Dua zone for the implementation of future development project in the area.

Formal public mass organizations exist under the guidance and direction of the village authorities. In the area, the most advanced mass organizations are the Lao Revolutionary Youth Organization with 50 permanent members, the Lao Women's Union with 100 permanent members, and the Lao Union for Reconstruction with 10 members. However, in Ban Nakhua Nai and Ban Nahin the LWU organization is not represented.

There is only one Water User Group in Ban Thongharb. However, the organization structure of the WUO is mostly directed to receive credit support from the APB in terms of input supplies and fuel for the diesel pumps. Seven credit groups were formed under the WUO committee. These credit groups, also called the production groups, do not have water management function because the groups are not organized according to canal intake. The water management concept of Thongharb scheme consists of water delivery by continuous flow from the two diesel pumps. The farmers rotate water use but no organization has been set up under the existing WUO.

In 1997 another WUO was established at Ban Nakhua Nai, based on the model in Ban Thongharb. Because of insufficient water for irrigation and inappropriate water management, the farmers experienced heavy loss and incurred debt to the APB bank. During the dry season of 1998-99 the farmers did not cultivate their lands because they were still indebted with APB and also because only a few farmers became interested.

Because of its small size the irrigation scheme of Ban Nahin is run by one credit group. There is limited credit provision in the area during the wet season because of the high risk in production due to flood. Aside from the above-specified WUO and credit groups there is one finance sharing group in Ban Nahin and one rice bank group in Ban Nam Dua.

(2) Vangkhong Area

The communities in the area are administrated by the Village Public Administrative Committee headed by the chief of village (Nai Ban) who is assisted by two deputy chiefs.

Formal public mass organizations exist under the guidance and direction of the village authorities. In the

[2] Former Sub-district Organization.

area, the most advanced mass organizations are the Lao Women's Union with 15 permanent members and the Lao Union for Reconstruction with 11 members. The Lao Revolutionary Youth Union has only one permanent member and is perhaps not so active.

At present, there is no WUO and no credit group because the irrigation scheme is just to be established by the government and because the area is considered by APB as a high-risk area during the wet season due to floods.

(3) Phonthan Area

The communities in the area is administered by the Village Public Administrative Committee headed by the chief of village (Nai Ban) who is assisted by two deputy chiefs and three assistants. Political direction and coordination between villages are provided by the chief of zone[3] located at Ban Nakham Tai.

Formal public mass organizations exist under the guidance and direction of the village authorities. In the area, the most advanced mass organizations are the Lao Revolutionary Youth Organization with 14 permanent members, the Lao Women's Union with 40 permanent members, and the Lao Union for Reconstruction with 10 members.

There is one water user group established by DAFSO for the water management in the reservoir and irrigation canals. The WUO is divided into four production groups which also function as credit groups.

### 2.2.4 Water Supply and Sanitation

The main source of domestic water for the communities in the area is basically from natural rivers. Drinking water also come from the rivers and from public and private wells. The level of sanitation is low. Most of households in the area have no latrine and the people are still doing their needs in the open spaces and surrounding brush land.

Water Supply and Sanitation Situation

| | Thongharb-Nakhua | Vangkhong | Phonthan |
|---|---|---|---|
| Public well | 73 | 3 | 17 |
| Private well | 50 | 0 | 15 |
| HH w bathroom | 0 | 0 | 27 |
| HH w/o bathroom | 453 | 47 | 385 |
| HH w latrine | 39 | 0 | 43 |
| HH w/o latrine | 414 | 47 | 359 |

[3] Former Sub-district Organization.

### 2.2.5 Education and Condition of School Facilities

The proportion of illiterates compared with total population excluding newborn and children is the lowest at 17% in Thongharb-Nakhua area, followed by 44% in Phonthan and 54% in Vangkhong.

Population structure by education level

| Education level | Thongharb-Nakhua | | | Vangkhong | | | Phonthan | | |
|---|---|---|---|---|---|---|---|---|---|
| | M | F | T | M | F | T | M | F | T |
| New born/ child | 31 | 32 | 63 | 0 | 0 | 0 | 25 | 25 | 50 |
| Primary | 684 | 945 | 1629 | 42 | 30 | 72 | 553 | 566 | 1119 |
| Secondary | 260 | 155 | 415 | 27 | 10 | 37 | 70 | 76 | 146 |
| Upper 2ndary | 18 | 13 | 31 | 3 | 0 | 3 | 41 | 37 | 78 |
| University | 2 | 0 | 2 | 0 | 1 | 1 | 4 | 2 | 6 |
| Vocational | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Illiterate | 207 | 205 | 412 | 73 | 60 | 133 | 464 | 590 | 1054 |
| Total | 1202 | 1350 | 2552 | 145 | 101 | 246 | 1157 | 1296 | 2453 |

All the villages, except for Ban Nahin, have a primary school that offers education up to grade 3. The primary school at Ban Nakhua Nai is providing education up to grade 5 for its surrounding villages. There is also a lower secondary school in Ban Nakhua Nai. It was noted that pupils (mostly girls) drop out of school after grade 3 because of the lack of school and education facilities and the inconvenient location of the upper primary school and lower secondary school located in Ban Nakhua Nai. Particularly in Ban Thongharb almost all of the girls could not continue their education due to poor accessibility conditions especially during the wet season.

There is no primary school in Vangkhong and the pupils have to attend classes in Ban Pung, about two kilometers from the village. The secondary school is also located in Ban Pung.

All of the villages in Phonthan area, except for Nakham Nua, have a primary school that is giving education up to grade 5. There is a lower secondary school in Ban Nakham Tai that is providing education to the three villages and the surrounding areas.

### 2.2.6 Healthcare

In Thongharb-Nakhua area, there is a health post located in Nakhua Nai that is supposed to provide health care service to the community of Nam Dua zone. There is one drug store at Ban Nakhua Nok and another one in Ban Nakhua Nai. Village nurses are also stationed at Ban Nakhua Nok and Ban Nakhua Nai to serve the five villages. The nearest hospital is located in Pakkading about 32 kilometers from the area. Ban Thongharb, being which is less accessible, receives very limited health care and medication.

In Vangkhong area, there is a health post located in Ban Pung that is supposed to provide service to the surrounding communities. There is one drug store in Ban Vangkhong, staffed with only one village nurse. The dispensary is located in Ban Pung and the nearest hospital is in Songhong about 26 kilometers from the area.

There is electricity supply in the three villages. The community enterprise consists of 13 rice mills, two repair shops, seven village shops, 104 hand tractors and three pick-up trucks. The community does not have a fresh market. The nearest market is in Ban Lak Samsiha (KM 35) about 55 km away from the area.

### 2.2.7 Community Enterprises

Thongharb-Nakhua area has not been electrified. Ban Nakhua Nai has a communal power generator that is used only on important occasions/events. The community enterprise consists of ten rice mills, one repair shop, five village shops, 82 hand driven tractors, two rice threshers and two pick up trucks. The community has no fresh market and the people have to sell their produce or buy their commodities at Vienkham (junction between road No.8 and road No.13), in Nam Thone, in Pakkading or in Paksan.

In Vangkhong area, the village has just been electrified. The village enterprise is comprised of three small rice mills, one village shop and three hand tractors. The village has no fresh market. The villagers go to Songhong, the district town, to sell their commodities and buy their production supplies.

The most important agricultural enterprise is the Koutapo irrigation scheme, which can irrigate about 32 ha during the dry season. The majority of beneficiaries are from Phonthan and Nakham Tai.

### 2.2.8 Household income and expenditure

In Thongharb-Nakhua area, the average annual income per household is 9,155,757 Kip. The highest income is as high as 39,194,80 Kip and the lowest is 436,000 Kip. It is difficult to evaluate the actual household income because the figures given by the interviewees were based on what they feel are comfortable to disclose. It is anticipated that households with the lowest income did not declare all of their revenues, e.g. from collection of forest products and subsistence hunting. It is noted that the major portion of the income of wealthier families comes from livestock raising rather that crop production. According to tradition cattle raising is a capital-intensive investment and the selling of these assets is mainly for paying debt, to fund cultural events (wedding, holy ritual/ceremony etc.), and buying farm equipment. The income and expenditure is generally balanced with some surplus. However, the net profit after deduction of household labor cost is negative for 18 families and is meaningless (less than 1 million Kip) for 10 families.

In Vangkhong, the average yearly income per household is 6,245,170 Kip. The lowest household income is 2,214,800 Kip and the highest 22,556,000 Kip. It is noted that the highest income was generated from the sale of cattle, which is considered as a transfer of home capital into cash. The per capita income of the area is about 993,317 Kip per person.

In Phontahn area, the average annual household income is 9,282,616 Kip. The lowest household income is 1,310,000 Kip and the highest is 26,505,000 Kip. In general, the revenue of the high- income families is generated from livestock selling which is considered as a cash procurement.

## 2.3 Agronomy and Farm Management System

### 2.3.1 Agriculture

The present land use pattern in the three model areas is summarized below:

| Category | Thongharb-Nakhua | Vangkhong | Phonthan |
|---|---|---|---|
| Living quarter land | 93.3 | | |
| Road and other infrastructure | 9.0 | | |
| Rainfed paddy | 467.3 | | |
| (irrigated paddy field in the rainfed paddy) | (73.0) | | |
| Riverbank agriculture land | 110.5 | | |
| Upland slash and burn land | 38.2 | | |
| Barren land | 1,205.0 | | |
| Forestland | 10,148.0 | | |
| Holly land | 10.6 | | |
| Total | 12,004.9 | | |

(1) Thongharb-Nakhua Area

The total land area occupied by the five (5) villages is estimated at about 12,000 ha. The area devoted to agriculture is 727.8 ha, with 467.32 ha of rainfed paddy land, 110.5 ha of agriculture riverbank land and 38.2 ha of upland agriculture land. In Thongharb, the irrigated land in the dry season 1998/99 was only 73 ha. and 37 households who are settlers from Samnuwa area in the Nam Dua village rely on non-sustainable slash-and-burn cultivation.

The main economic activity in the area is agriculture. Paddy is the only major crop, but is not the main source of income. Paddy is consumed by the farmers themselves. Thongharb is self-sufficient in rice even during the years of severe flood, and rice surplus in the years without severe floods are even realized because irrigated rice cultivation can be practiced even in the dry season. Rice production during the wet season is very risky in the area. In case of severe floods, a complete loss of yields can be experienced. This year farmers enjoyed good wet paddy yields due to a minor influence of floods. In this year, most farmers could obtain sufficient rice for the whole year, therefore irrigated paddy production is intended for sales in order to add to family incomes. However, the existing irrigation systems are not stable. At the moment farmers cannot commence paddy production under irrigated condition due to the fact that the weir has been damaged and no fund to fix it is available.

The other 4 villages are not self-sufficient in rice, especially from July to September each year. Except for Nahin, the area is subjected to severe flood during the wet season due to the flow of water from the Nam Dua watershed and the intrusion of the Mekong from the Nam Thone. The farmers of Nakhua nai and Nahin cultivated only 35 ha irrigated land but the crop yield was still below acceptable levels due to water shortage. Two (2) years ago, a farmers group composed of 17 farm families in Nahin tried pump irrigation paddy cultivation using APB loan, but they failed in the trial because of water shortage. Upon the recommendation by PAFSO and DAPSO, six (6) farm families in Nam tried a 3 ha of irrigated paddy cultivation but failed due to water shortage in the irrigation ponds.

The general farming practices for paddy in the area is summarized as follows:

| | |
|---|---|
| Cultivation period: | Wet season paddy - from June to November Dry season (irrigated) paddy - from January to June Upland paddy – from May to October |
| Land preparation: | By hand tractor, in both wet and dry season |
| Major variety: | Local varieties: Manyom, Kao Teiya, Tyao Mari, Noi Mari, Poneo<br>HYV varieties: TDK-1, TDK-2, RD-6, RD-8, RD-21 |
| Seeding: | Wet season: mostly traditional dry bed nursery: seeding rate is 60-72 kg for 1ha<br>Dry season: only wet bed nursery: seeding rate is 36-48 kg for 1 ha<br><br>Use of certified seeds from seed multiplication centre is not common. |
| Fertilizer Application: | None in Nahin, Nam, Tonghab<br>Only basal fertilizer is applied but limited amount in Nakhua Nai and Nakhua Nor.<br>Dry season (Tonghab), 200kg/ha (compound) as Basal and 100kg/ha (Urea) at 25DAT as Top dressing |
| Weed control: | Manual weeding done several times when needed |
| Insect/pest control: | Generally farmers do not apply chemicals. |
| Harvesting: | Harvesting done by hand, residue is left in the paddy field or straw after threshing is generally used as feed to large animals |

Estimates of paddy production in the model area was based on DAFSO reports, field investigation and production records of the village. The unit yield of paddy is estimated below.

| | | |
|---|---|---|
| Rainfed paddy | : | 1.5 ~ 2.5 ton/ha |
| Irrigated paddy | : | 2.5 ~ 3.0 ton/ha |

The production of other crops such as maize, watermelons, melons, cucumbers and beans, is limited due to poor access to market and a lack of finance sector involvement in promoting the production and marketing of such crops. Group selling of any product is not yet practiced.

Forest product gathering has formed part of the lifestyle of most villagers. Seasonal collection of forest

products such as resins, wild cardamom, rattan shoots and bamboo shoots add to the income of the villagers.

(2) Vangkhong Area

The total land area is about 4,550 ha but only 52 ha are being utilized as rainfed paddy land. There is no irrigation system in the village. There exist 55 ha of bush land to be reclaimed as paddy land. The river levee where upland crops are cultivated during dry season is about 2 ha. The main agricultural activities in this area are based on cultivation of paddy. Sixteen (16) families in the village do not own paddy land, and they make a living as farm labor. The area is subject to severe flood during the wet season. Whenever the flood strikes there will be no yield, thus the villagers remain in poverty. Achieving self-sufficiency in rice is the primary goal of the people in the village.

The wet season paddy cultivation under rainfed condition starts with nursery preparation at onset of the wet season and seeding time is around early June to middle of July using both the local varieties and HYV of around 4 to 5 month of growing period. The most popular varieties in the area are Manyom, Poneo, TDK-1, RD-6 and RD-21. Most of the paddy varieties are glutinous varieties and farmers grow about four different varieties on average. Ordinary 25 – 28 days old seedlings are transplanted from early July to middle of August. Harvesting is done in November. Farmers apply about 12kg of chemical fertilizer as top dressing only for seedlings. Paddy cultivation is done with little management and weeding. Neither chemical fertilizers nor pesticides are applied for rice cultivation. After manual harvesting with sickle, manual threshing is usually done in the paddy field and the grains are transported by hand cart to the granary in the village. Some damage to rice is caused by pests and diseases according to information gathered from the farmers, but they do not know the exact names and feature of these pests and diseases.

Estimates of paddy production in the study area was based on DAFSO reports, field investigation, and production records of the village. The unit yield of paddy is estimated below.

Rainfed paddy : 1.0 ~ 2.4 ton/ha

The rice insufficiency is due to subsistence production practice that relies entirely on rainfall without the use of irrigation, fertilizers, proper HYV seeds and other improved agricultural practices. They have no experience in using fertilizers for improving paddy yield but are eager to employ the practice even without any technical assistance from DAFSO staff.

The villagers have been able to grow various upland crops, e.g. maize, vegetables, sweet potato but mainly for home consumption.

(3) Phonthan Area

The total land area of Phonthan is about 2,100 ha, having 600 ha of farm land of which 520 ha is rainfed paddy land. During the dry season, farmers use the water from the reservoir to irrigate about 32-55 ha. The paddy field is not affected by flood. Therefore, the wet season paddy production is considered not

risky.

The general farming practice for paddy in the area is summarized as follows:

| | |
|---|---|
| Cultivation period: | Wet season paddy - from June to November<br>Dry season (irrigated) paddy - from December to April |
| Land preparation: | Wet season paddy done by hand tractor and water buffalo<br>Dry season paddy done by hand tractor |
| Major variety: | Short varieties: Inoy, Hanhi, TDK-1, TDK-2<br>Medium varieties: Idam, Ganray, Kao Pon, Kohkan<br>Long varieties: RD-6, RD-8 |
| Seeding Preparation / Seedling Rate | Wet bed nursery is dominant, seeding rate is 40 kg for 1 ha,,<br>Use of certified seed from seeds multiplication center is not common. |
| Fertilizer Application: | Applied by almost all farmers<br>Basal: 100kg/ha (compound) before harrowing<br>Top dressing: 100kg/ha (compound) at 30DAT |
| Weed control: | Manual weeding done several times when needed |
| Insect/pest control: | Generally, farmers do not apply chemicals. |
| Harvesting: | Harvesting done by hand: Residue is left in the paddy field or straw after threshing is generally used as feed for large animals |

Estimates of paddy production in the study area was based on DAFSO reports, field investigation, and production records of the village. The unit yield of paddy is estimated below.

| | | |
|---|---|---|
| Rainfed paddy | : | 2.8 ~ 3.0 ton/ha |
| Irrigated paddy | : | 3.0 ~ 4.1 ton/ha |

No certified seeds has been provided to farmers. Such that farmers have to select seeds from their own field to be utilized as seeds for the next season.

The other crops produced in this area are mainly dry season crops such as sweet corn, watermelon, chili, and beans, but some crops are also produced during the wet season. Generally, farmers experience difficulties in marketing these cash crops. For example, in the previous year, it was profitable for farmers to market their watermelon in Vientiane and other major towns, but now prices of watermelon in these towns are lower than what farmers from this district can afford to sell. At present only two farm families grow watermelon in less than 1ha.

### 2.3.2 Livestock and Fisheries

Livestock raising is only for home consumption. It is done using traditional techniques. Raising of large animals is also subject to the traditional methods. Natural grazing is being adopted but sometime feed shortage problem occurs during late dry season from March to May because a limited grazing area. Farmers do not give commercial feed ration to animals. An inventory of animals in the areas is summarized below.

| Type of animal | Thongharb-Nakhua | Vangkhong | Phonthan |
|---|---|---|---|
| Buffalo | 150 | 66 | 447 |
| Cattle | 200 | 62 | 480 |
| Pig | 100 | 4 | 417 |
| Poultry | 800 | 518 | 4,549 |

Based on field investigation and interview survey in Thongharb-Nakhua area, plowing and harrowing are done in almost of the land by two-wheel tractor. Now, buffaloes are kept as savings. Fish culture does not exist in the area. Only fish catching is observed in the areas. The fish catch is mainly for home-consumption, but it was also found that some villagers also sell fish in the village or to middlemen.

In Vangkhong area, water buffaloes are traditionally used as draft animal for paddy cultivation, specifically in plowing and harrowing. Recently two-wheel hand tractors are widely used for land preparation. Based on field investigation and interview survey, about 40% of plowing and harrowing is done by power tiller, while 60 % of leveling work is still dependent on water buffaloes. Water buffalo and cattle are raised by 40 % of the farmers. The feed is grass and rice straw after harvesting of paddy field. The average number of water buffalo and cattle raised per farmer is 4.5 heads. Several years ago, farmers formed a group to obtain credit for cattle raising from APB. The group has been successful due to the fact that cattle raising is a relatively simple task and the village is still surrounded by large grazing land. Poultry is a popular livestock in the areas and almost all of the farmers raise chicken. One fishpond exists in the village which was constructed by the villagers under the "Food for Work" scheme supported by the national project of CARE. However, the pond has not been utilized for fish culture. Only fish catching in Hinboun river is observed and is the main source of cash income in the village.

In Phonthan area, the grasses in bush land are used for feeding the animals during the wet season unlike the rice straw after harvesting of paddy field is given during the dry season. Water buffalo is traditionally used as draft power, transport and savings. Recently, two-wheel tractors have become widely used for land preparation. Based on field investigation and interview survey, about 55 % of the land in wet season and 100 % in dry season is plowed and harrowed by two-wheel tractors. Poultry is the popular livestock in the area and important protein source. A number of families have fishponds but raise fish in the traditional way. Traditional fish raising practice is simple; farmers purchase fingerlings, release them in the ponds but do not look after them. Feeding is done ocassionally. Fish culture is not practiced in the existing reservoir, but people rely on natural population from the reservoir. The number of fishponds is about 74, occupying a water (surface) area of 1.48 ha in total

## 2.4 Agricultural Support System and Marketing

### 2.4.1 Extension System

The extension service provided by PAFSO/DAFSO is very limited and the main activity in each village is primarily data collection. However, various activities such as technical guidance, promotion of dry season paddy and consultation on loan application are being carried out according to the requirement of farmers. In Savanakhet, DAFSO staff is deployed to each zone to take care of all the villages within the zone. Since the staff is expected to reside in one of the villages within the zone, villagers can receive rather frequent service compared with the other provinces. On the other hand, Department of Livestock is mobilizing a VVW (village veterinary worker) in each village in order to make vaccination to large animals. This activity is well functioning under guidance of DAFSO.

In Thongharb-Nakhua area, inappropriate extension service has been regarded as the main reason after the failure of some completed irrigation projects. In Nahin, for example, the province supplied the pumps, PAFSO/DAFSO endorsed the villager's loan application to APB and technical service was extended to ACG. Irrigated paddy cultivation was a failure due to water shortage through excessive water seepage/loss in the canals and field. The consequence was that the farmers become more in debt. In Nam Dua, two pumps were supplied by PAFSO for irrigation and this trial has also failed due to water shortage in spite of PIS warranty. Farmers are pressured to make repayment for the loan by selling their livestock and other properties. Because of these experiences, the farmers in this model area are rather reluctant to heed to agricultural extension service and also to apply for APB loan. Although four households in Nam Dua are willing to carry out irrigated paddy production during the current dry season, they have to utilize the village fund instead of APB loan. As a unique trial in Nam Dua village where a rice bank group is functioning considering that all villagers are the members. District office provided 5.9 tons of polished rice in the storehouse of the village in 1995. The farmer who takes 100kg of the rice should return 170kg of paddy or equivalent to 110kg of rice. This system has functioned properly and the size of ordinary stock inventory is 10 - 15 ton. The extension staff in this area should seriously consider the replication of this system to other villages.

In Vangkhong area, the size of the village is very small with paddy production sufficient only for 6 months of the year. Farmers, therefore, have strong intention to improve their production in order to improve their living standard. Two ACGs were established in the past, one for purchasing calf and the other for fertilizers for wet season cultivation. This fertilizer trial has not been successful due to absence of supervision neither by PAFSO nor by DAFSO. A new ACG consisting of six households was established this year to obtain credit for APB fertilizer, because those who applied fertilizer had better yield than the others during the last cropping season. Farmers carried out this activity without any supervision from PAFSO/DAFSO. DAFSO staff seldom visits this village and the main activity of DAFSO staff is data collection and promotion of irrigated paddy. Since achieving self-sufficiency in rice is the primary hope of the villagers, farmers have dug the irrigation canal while waiting for the pump to be installed and other assistance in both monetary and technical form in order to embark on irrigated paddy cultivation. Furthermore, farmers have constructed one fishpond under the support of

CARE. There is, however, no proper assistance in the design of irrigation system and for the operation of fish culture by PAFSO and DAFSO.

In the village of Phonthan, there are 20 contact farmers for wet season paddy and three contact farmers for dry season paddy. They represent the progressive farmers in the village and as contact farmers for wet season paddy, they are attaining surplus paddy production. However, the role of the contact farmer is not clearly defined.

### 2.4.2 Input Supply System

Fertilizer is supplied mainly through APB and FSC. However, an efficient supply system has not been achieved. DAFSO and retailers also handle fertilizer distribution, but their capacity is also very limited. As the supply system of certified paddy seed is not matured, farmers are forced to use a part of their previous harvest for the seed without any renewal for long time.

In Thongharb-Nakhua , there are seven ACGs are organized in order to get loans for fertilizer, fuel for pump and cash for land preparation (tractor hiring). One group consists of 10-12 members all belonging to the same village and members of the ACG's. In comparison, villagers outside the model area are rather reluctant to apply for APB loan due to past experience as mentioned above. Furthermore, there are other limitations for the fertilizer supplied by APB such as shortage in amount and delay in delivery. Although the repayment should be made only in cash in the case of APB loan, FSC accepted repayment in kind - paddy. That was the reason why some farmers preferred to obtain fertilizer from FSC during the past cropping seasons. FSC has, however, changed the policy from the current dry season to sell fertilizer only in cash. These farmers, therefore, have to obtain cash loan from APB to purchase fertilizer from FSC.

Although irrigated paddy has yet to be introduced to the villages in Vangkhong area, farmers utilize HYV of paddy and fertilizer for wet paddy production. As in the other areas, seed supply is not carried out properly and farmers are utilizing seeds from their previous crop without any renewal. APB supplies fertilizer to ACGs without any technical confirmation by DAFSO. Each member receives one bag of urea and two bags of compound fertilizer per ha of paddy field. Farmers have to pay for the transportation of fertilizer and make repayment only in cash. Ordinary farmers (non-members) purchase fertilizer in cash from the market and apply only for seedbed.

In Phonthan area, there are eight ACGs in the three villages covered with each group consisting of seven to twelve households. The main purpose is to get loans for fertilizer, tractor and water buffalo. As for tractor, APB delivers the tractor to the farmer and the farmer pay in cash according to a repayment plan. Whereas, in case of water buffalo, APB deliver the necessary cash to the farmer for purchasing. As for fertilizer, APB calculates the necessary amount of fertilizer based on the area list submitted by the group. The APB provides four bags of fertilizer for 1 ha of paddy area, as recommended by DAFSO, and farmers can select the kind of fertilizer they use. Farmers are responsible for loading, unloading and transportation of fertilizer. The biggest problem of fertilizer supply by APB is the delay in supply. The number and the members of ACG are, however, increasing gradually. FSC also supply fertilizer

through the network of middlemen but the supply procedure is not systematic and this causes confusion among the farmers. For example, in Phonthan, 300 bags of fertilizer were delivered without any assessment of requirement and two villagers were asked by FSC for the distribution of fertilizer and the recovery collection of paddy upon harvest. This distribution and recovery process is not properly carried out without any assistance from FSC and/or DAFSO.

Several years ago, farmers received certified seeds from PAFSO and since then, farmers reserve seeds from their previous cropping without renewal. Even if the certified seeds are available in Tasano Seed Center, the villagers in this model area cannot approach the center due to limited means of transportation. DAFSO once tried to produce seeds and it was successful but it was terminated due to shortage of budget.

### 2.4.3 Marketing System

Thongharb-Nakhua Area

There are several rice mills in each village in this model area with capacity ranging from 0.3 - 2.5 ton/day. All these rice mills are operated only to polish paddy for consumption. The surplus paddy is sold mainly to FSC. FSC is requiring farmers to organize themselves into 'buying and selling' group for paddy wherein they are going to buy paddy from the farmers and they resell to FSC. So far, no such group has been organized and FSC is still directly purchasing paddy from the individual farmers. Thongharb is in a disadvantaged situation for the marketing of paddy due to absence of good access road.

The main cash crops in this area are perennial crops such as banana, papaya and sugar cane which farmers cultivate on the river terrace. The main market outlet for these crops is Thongnami, a small market open only for passers-by located about 7 km to the southeast along route-13. Quite a considerable part of the farmers' produce is wasted, especially in village such as Nahin because middleman cannot reach them. Sweet corn, sweet potato and other vegetables are also produced on the river levee or in paddy field (Thongharb) but are mainly consumed locally. As a trial-run in Nam Dua, a promotion program has been introduced to produce feed corn on contract farming basis by State Rural Development Enterprise. The company will provide seeds and technical service, and will buy all the produce. But so far, the farmers are reluctant to be involved in this activity because other inputs such as fertilizer and chemicals remain as liability of the farmers.

There is one village middleman in Thongharb and five village middlemen in Nakhua Nok, but most of them deal only with fresh fish. These middlemen collect fish from villagers and transport them to Thang Baeng market which is located at the junction point to Lak Xao. Since the middleman from Lak Xao is interested in fish, there is always a demand for fresh fish.

Various forest products such as cardamom, resin, rattan and honey are also collected by villagers and sold to the middleman from outside. These forest products are important sources of cash incomes for villagers, while the commission collected from villagers for harvesting these forest products is the main

source of village fund in Nam Dua.

Vangkhong Area

There are two (2) rice mills in the village, one having a capacity of about 100kg/hr and the other is still under installation. This rice mill is operated only to serve the villagers and milling cost is as high as 50 Kip/kg of paddy. Ten out of 46 households do not avail of milling service and polish their paddy manually. Since self-sufficiency in rice has not been attained in this village, villagers are purchasing rice individually from Nongbok area through middleman.

Vegetables such as onion, garlic, coriander, lettuce and cabbage are cultivated on river levees mainly for home consumption. Sweet corn and sweet potato are also cultivated during dry season as cash crops but the marketability is very low.

There are three (3) village-based middlemen and they purchase fish, frog, mushroom, bamboo shoot, cricket and forest vegetables from the villagers. Among these commodities, fish, frog, mushroom, bamboo shoot and cricket are marketed to Thailand or Thakhek while forest vegetables are marketed to Hinboun or Thakhek. Since the main cash income for ordinary villagers comes from fish and frog catch and other forest products, the role of village middleman is highly appreciated in term converting natural resources into cash. Cash income is important for ordinary villagers to purchase rice.

Phonthan Area

There are six (6) rice mills in Phonthan and Nakham Tai and three (3) rice mills in Nakham Nua and the capacities varies from 0.3 to 3.5 ton/day. In terms of milling recovery, 24kg of paddy can produce 14kg of polished rice and 3 to 6kg of rice bran. The lesser the capacity of the mill, the higher yield of rice bran. The milling cost is 1,000 Kip for 24kg of paddy for farmer who wishes to take the rice bran. If farmer leaves the rice bran to the mill, the milling cost is 500 Kip or even free. Most farmers pay the 1,000 Kip and take the rice bran. Most of these rice mills are operated to serve the farmers except for one large mill in Nakham Nua that is owned by one of the member middlemen appointed by FSC. This middleman purchase about 1,000 tons of paddy from 18 surrounding villages for milling and about 1,500 tons of polished rice from 100 surrounding rice mills. In total about 2,000 tons of rice is being sold to FSC through this middleman. Furthermore, this middleman is also responsible to deal with 200 ton of fertilizer including distribution of fertilizer to farmers and collection of paddy from farmers. In this model area, therefore, the surplus paddy is mainly sold to the rice mill, which belongs to the network under FSC.

Farmers also produce vegetables such as chili and lettuce but only for home consumption. Although watermelon is the main cash crop in this area for a long time, farmers no longer continue the cultivation because chemical application becomes indispensable and also the market has become very limited. Sweet corn and long beans are now grown in the uplands during wet season and in paddy field during dry season but these are consumed locally. There is a high potential for producing groundnut and soybean if improved variety will be provided. However, farmers are rather reluctant to grow these crops

primarily due to unstable market condition.

In Nakham Tai, a few farmers have been successful in operating fish culture activities in improved natural ponds in a rather holistic manner including fruit production and duck raising around the fishpond. Market demand of fish is very high and the expansion of fish culture activity should seriously be considered in this area. Similarly, high market demands are observed for small animals such as chicken, duck and pig. Middlemen from outside visit the villages frequently seeking for such kinds of small animals.

Collection of forest products by the villagers is not very common in this area, but sometimes middlemen come to this area to buy frog specifically during the rainy season. Farmers collect bamboo shoots only for home consumption.

## 2.5 Agricultural Finance

In connection with the agricultural finance operated by APB in the three provinces of Bolikhamsai, Khammouane and Savanakhet where the model areas are located, Table 2-1 and Figure 2-4 show the APB's lending situation including (a) loan amount by type, (b) share of concessional loans, (c) deposit business, (d) average loan amount per account, (e) concessional loan by interest rate, (f) increase of concessional loans, (g) increase of deposit business and (h) average deposit amount per account.

(1) Thongharb-Nakhua Area

There is no APB field office at Pakkading. APB used to send out its officers for the purpose of rendering financial services from its office at Paksan which is the provincial capital located 70 kilometers on the Highway No.13 from Thongharb-Nakhua area. The APB office in Paksan City is one of the Service Units of APB. Among the service units of APB, its status is high even if its facilities and equipment are as poor as the other SUs. The Paksan office is responsible for financial services in all 6 Districts which involves a population of 164 thousand in 409 villages. There are only two (2) field offices of APB. The amount of loans and deposits are shown in the Tables below. The share of the concessional loans in the total loan amount of the Paksan office is 77.3%, which is higher than the